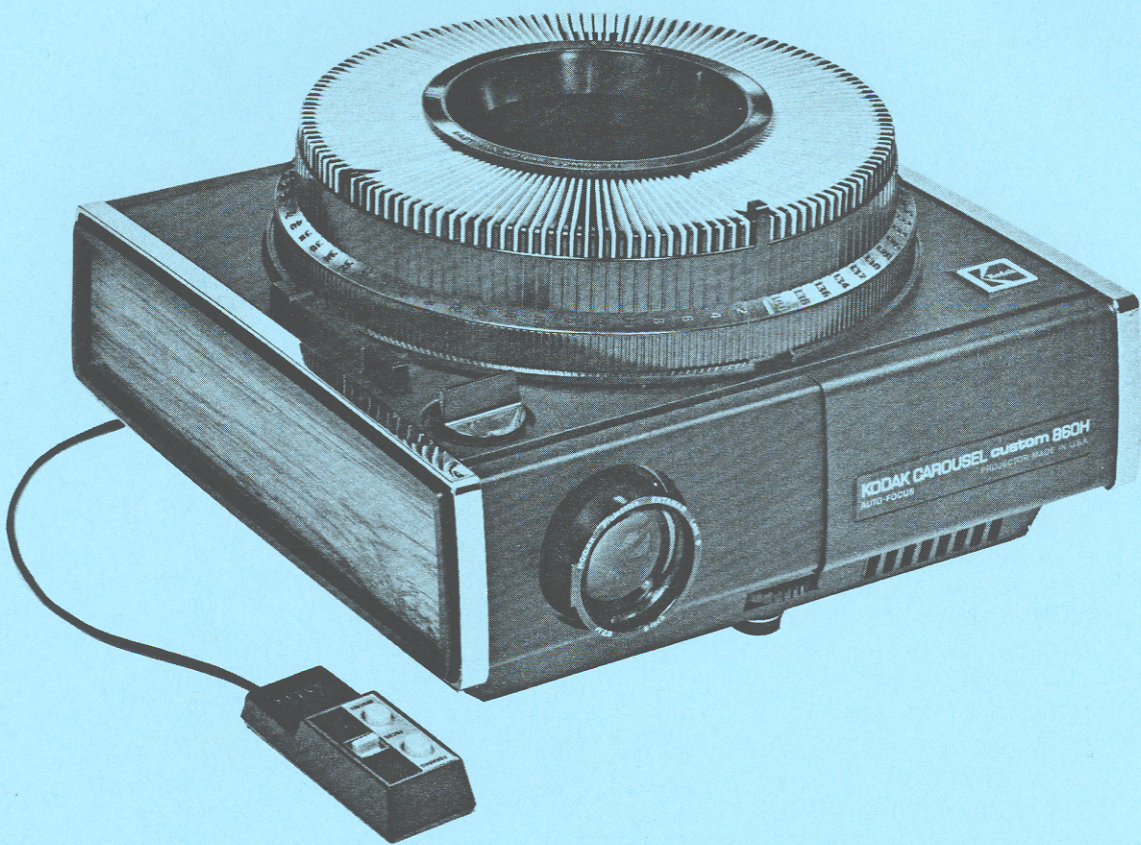


Servicing the

# KODAK CAROUSEL CUSTOM 850H & 860H PROJECTORS



EASTMAN KODAK COMPANY • CUSTOMER EQUIPMENT SERVICES DIVISION  
SERVICE ENGINEERING DEPARTMENT  
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# 1. GENERAL INFORMATION

## 1.1 ELECTRICAL SPECIFICATIONS

- 1.1.1 OPERATING VOLTAGE  
105-125 volts, 60 Hz
- 1.1.2 PROJECTION LAMP  
300-watt horizontal burning, ANSI Code ELH lamp, 115-120 volts
- 1.1.3 DROPPING RESISTOR  
Extends lamp life when power switch is in "Low" position.  
Resistance -- 5 ohms
- 1.1.4 DIELECTRIC STRENGTH TEST:

A dielectric strength test should be performed on the projector and meet the following requirements:

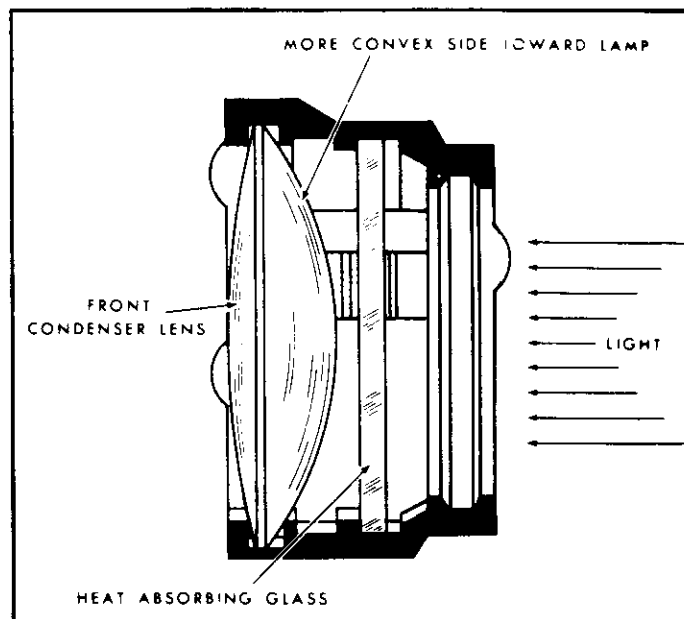
Leakage current must not exceed 2.5 milliamperes with 900 volts, 60 Hz, applied for one minute between the shorted prongs of the power plug and the frame with the power switch in the lamp or high position.

## 1.2 OPTICAL SYSTEM

- 1.2.1 The current line of *KODAK* Projection *EKTANAR* and *EKTANON* Lenses may be used with both models.
- 1.2.2 The condenser system contains the front condenser lens and the heat-absorbing glass. Install as indicated in sketch.

## 1.3 SLIDE TRAY

- 1.3.1 The slide tray is high-quality molding with one index position and either eighty or one hundred and forty slide positions (depending on the tray).
- 1.3.2 There are four models of the tray that may be used: the *KODAK CAROUSEL* Slide Tray (black), *KODAK CAROUSEL* Universal Slide Tray (gray), the *KODAK CAROUSEL* 140 Slide Tray, and *KODAK CAROUSEL* Slide Tray for the *KODAK CAROUSEL* S Slide Projector.
- 1.3.3 Emergency release of the slide tray: Insert a coin in wide slot in center spindle. Turn coin left or right and lift tray from projector.





#### 1.4 SELECT BUTTON

The select button is not designed to advance the tray, but when DEPRESSED ALL THE WAY AND HELD will advance the mechanism to HALF-CYCLE or SELECT position (see 2.2). When the select button is depressed, the tray is free to rotate to any position or to move to the indexed area for tray removal.

#### 1.5 AUTOMATIC TIMER

Automatic slide change is accomplished by setting the timer knob to 5, 8, or 15 seconds. The remote cord is not required for automatic operation, but may be used for either forward or reverse actuation to override the automatic operation. The built-in forward and reverse switch will also override the automatic operation.

#### 1.6 REMOTE CONTROL CORD

- 1.6.1 The Custom 850H model includes "FOR." button for forward operation and "REV." button for reverse operation.

Forward operation is controlled by momentary pressure all the way down on the "FOR." button, followed by immediate release.

Reverse operation requires a slightly longer hold all the way down on the "REV." button, followed by immediate release.

If pressure and release on the reverse button is quick, or if it is not pushed all the way down, the slide tray may be "tricked" into advancing instead of reversing.

- 1.6.2 In addition to the forward and reverse buttons described in 1.6.1 above, the remote control cord used on the Custom 860H model has a focus button for remotely adjusting focus in addition to the automatic focus feature of the projectors (2.5).

#### 1.7 THERMAL FUSE

The thermal fuse is a safety device which protects the projector from overheating and possible damage caused by overheating within the projector housing.

There is no visible change in the appearance of the fuse when it burns out. The most obvious symptoms are: projector will stop running or cannot be turned on.

#### 1.8 CAPACITOR

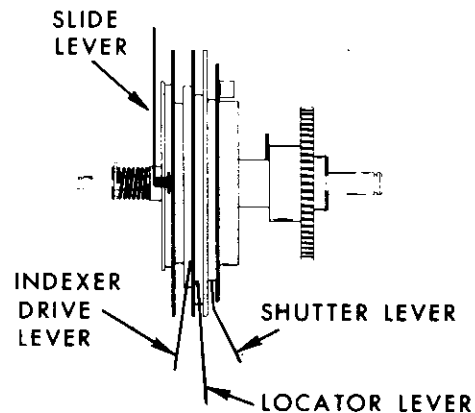
The capacitor suppresses electrical noise which otherwise might be picked up by either an associated tape recorder or a public address system.



## 2. SEQUENCE OF OPERATION

### 2.1 FULL CYCLE, FORWARD (See foldout from page 7.)

- 2.1.1 When projector is turned on, main drive motor runs continuously. Power is transferred to the fan by a belt and to the worm pulley by a second belt.
- 2.1.2 The worm pulley (10) rotates worm gear and clutch sleeve driver (11) continuously. The clutch spring (9) is held in relaxed position by clutch contact lever (4) which allows cam stack and shaft (8) to remain stationary.
- 2.1.3 A forward cycle is started when solenoid (5) momentarily pulls cycle lever (17) away from clutch spring (9). This action simultaneously breaks electrical contact to solenoid and allows clutch spring (9) to tighten on revolving clutch sleeve, starting cam shaft rotation. The cams move mechanism levers, and one revolution accomplishes one cycle.
- 2.1.4 As shutter (13) closes, drive lever (6) and indexer (1) begin to move and slide lever (7) begins to eject slide from gate (16).
- 2.1.5 As slide lever ejects slide from gate, shutter lever (12) continues moving and, in turn, opens pressure pads (15).
- 2.1.6 When slide lever lifts slide completely into tray, locator (14) disengages tray lugs and indexer (1) continues its movement to rotate slide tray forward.
- 2.1.7 Indexer completes moving tray forward, then withdraws, and locator moves to engage tray lugs, which accurately aligns tray over gate.
- 2.1.8 As slide lever descends, slide drops by gravity into open gate. When slide lever hits bottom, pressure pads close, indexer returns to starting position, and shutter (13) opens.
- 2.1.9 The clutch spring (9) contacts clutch contact lever (4), clutch begins to slip, and cam shaft (8) ceases to rotate.



### 2.2 HALF-CYCLE

- 2.2.1 The purposes of half-cycle or use of SELECT button are to:
  - a. Return slide from gate to tray for editing.
  - b. Allow tray to be rotated manually to any numbered slide position, or to "0" position for removal of tray from projector.
  - c. Allow slide opposite gate index to drop and be shown when button is released.



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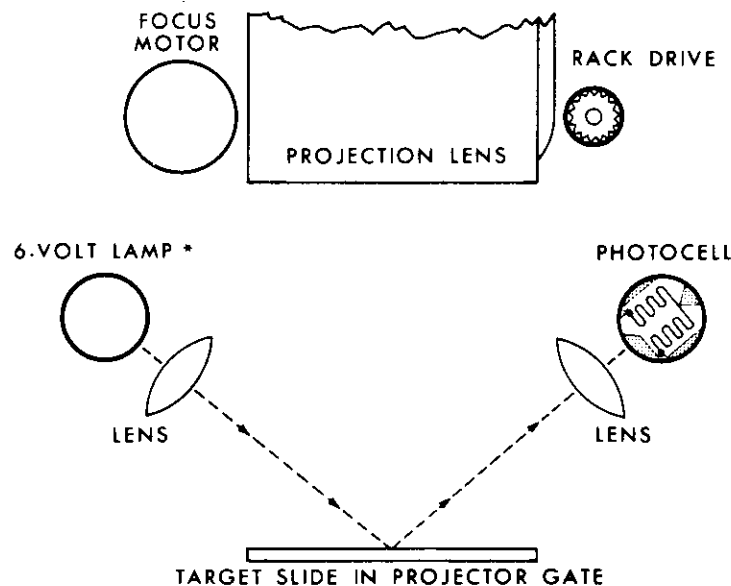


## 2.4 AUTO-FOCUS

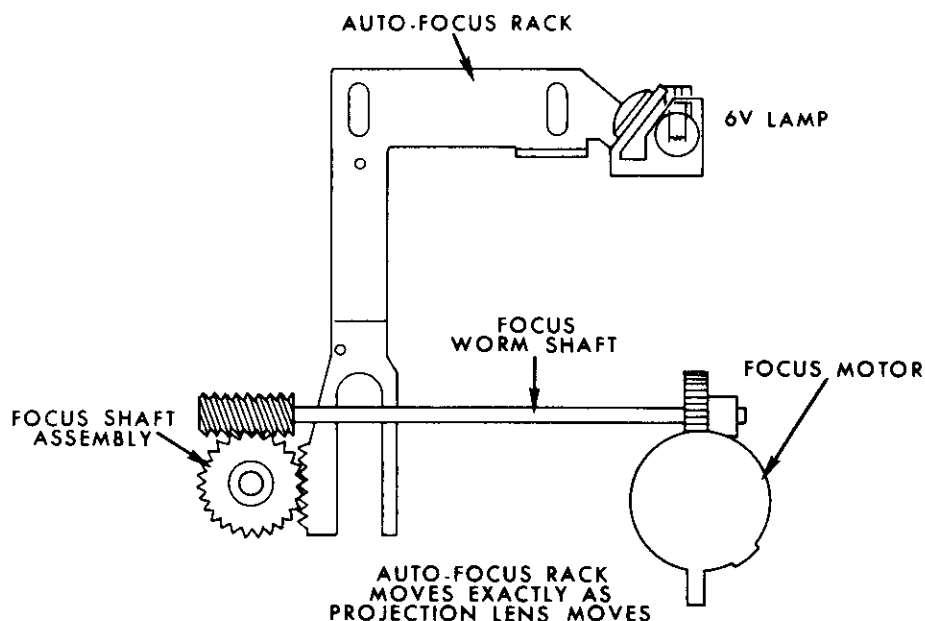
The purpose of the auto-focus feature is to make sure that the front surface of each slide will be the same distance from mounting rack of projection lens and, therefore, from lens itself. It will accomplish this whether or not image on screen is in focus, or even when there is no projection lens in projector.

For normal operation, first slide is placed in gate and auto-focus mechanism allowed to position rack relative to the front surface of that slide. The operator then focuses image on screen by moving projection lens with the focus knob on projector, or on Custom 860H model, with focus knob on projector or button on remote control. Thereafter, each succeeding slide's front surface will be at the same distance from rear of lens. If slides are similar (all glass- or all cardboard-mounted, etc), each screen image will be brought into focus, automatically adjusted for reasonable warpage.

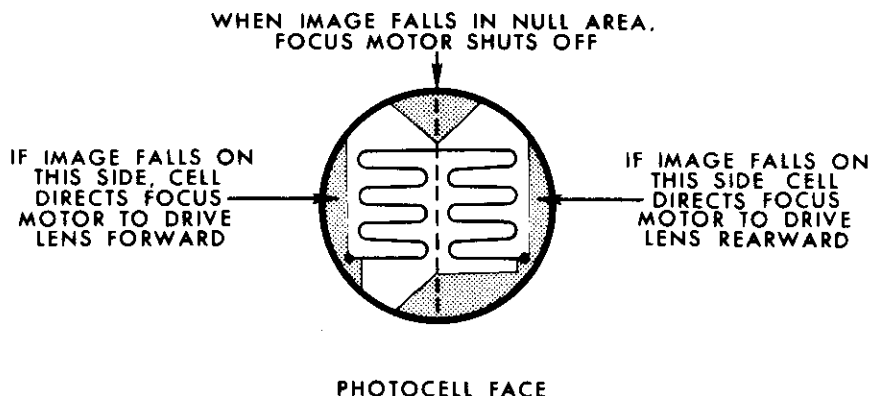
- 2.4.1 Auto-focusing is accomplished by directing the filament image of a 6V lamp through a lens and onto the center of a slide in the gate. This image is reflected from the slide through a collecting lens and onto the photocell. The projection lens does not need to be turned on for the auto-focus to function.
- 2.4.2 The auto-focus rack, with 6V lamp, will be driven forward or backward, depending on where light (filament image) strikes the photocell. As rack moves, the image will move toward center of cell. Movement of the auto-focus rack also moves the projection lens through the focus shaft assembly.



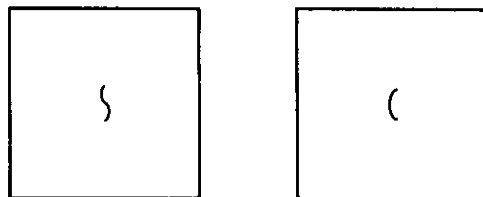
\*Lamp is actually lower; a mirror brings it to position shown in sketch.



- 2.4.3 Auto-focus rack movement continues until the filament image falls within the center or null area of the photocell.

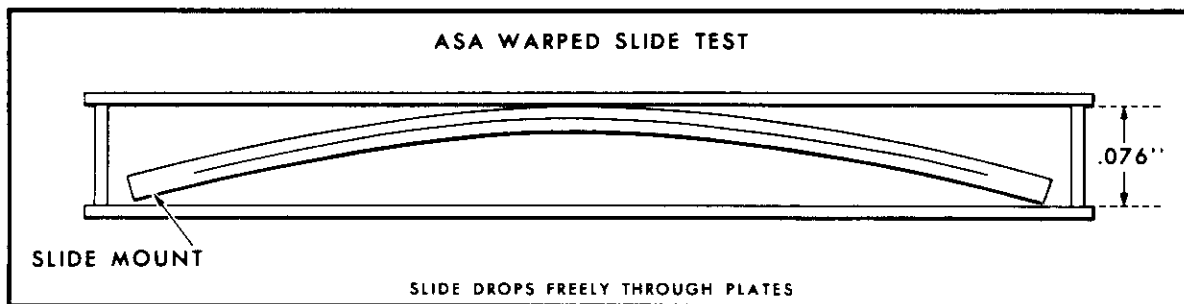


- 2.4.4 As image moves across cell, it also moves on surface of slide. For proper auto-focus operation, null position must occur when image on slide is within a rather limited area at center of slide. Adjustment, therefore, consists of positioning the 6V lamp and/or cell so as to bring the image within tolerance on slide.
- 2.4.5 The filament image will appear as a flat "S" or a flat "C" on surface of slide when viewed from front with projection lens removed.





- 2.4.6 In a properly adjusted projector, and after first slide has been focused on the screen, succeeding slides will be brought into focus provided they are not warped more than .076-inch. Slides warped more than .076-inch will cause the reflected filament's image to be beyond the face of the photocell.

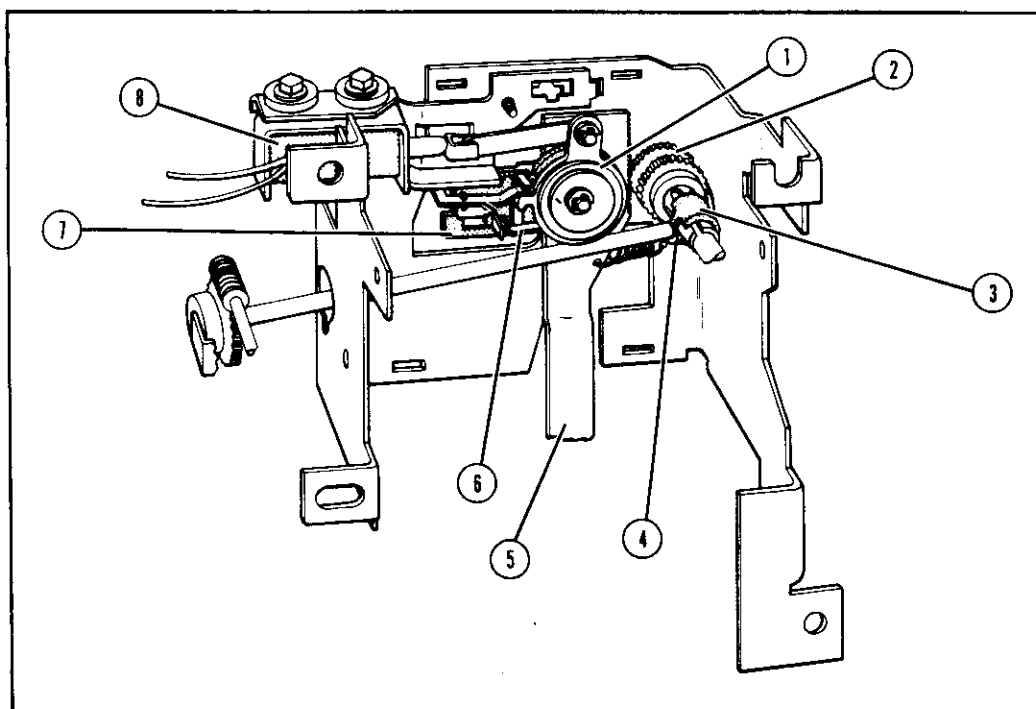


- 2.4.7 Do not mix glass-mounted and cardboard-mounted slides. Reflection is off first surface light source strikes. Glass-mounted slides put reflection surface .030-inch ahead (thickness of one glass panel) of transparency surface of a cardboard-mounted slide.

If first slide is glass-mounted, only glass-mounted slides will be in focus in a mixed tray. If first slide is cardboard-mounted, only cardboard-mounted slides will be in focus in a mixed tray.

## 2.5 REMOTE FOCUS (CUSTOM 860H MODEL)

- 2.5.1 Remote focusing on the Custom 860H model is accomplished by the following sequence:
- Actuating remote focusing button backward or forward causes locking solenoid (8) to pull rack stop arm assembly (1) which clamps focus rack (5) between rack stop arm assembly and rack lock cam assembly (7).
  - Further travel of rack stop arm assembly actuates switch (6) which disconnects auto-focus control circuit and connects focus motor to remote switch circuit.
  - A light slip clutch (not shown) between two lower gears (2) permits focus motor to drive projection lens to any position for best focus on screen.
  - Releasing remote focus button restores automatic focus system. For manual focus, a firm clutch (3) slips when focus knob on projector is turned. The worm gear (4) on cross shaft prevents lower gears from turning.





### 3. DISASSEMBLY

#### 3.1 REMOVAL OF BASE COVER

3.1.1 Turn projector upside down; loosen the coin-slotted screw. Hinged cover can now be opened.

3.1.2 Grasp cover and pull to release from two spring-held hinge pivot posts.

NOTE: When reassembling the base cover, make sure all electrical wires are dressed and in their proper positions. This will avoid their being pinched by the cover.

#### 3.2 REMOVAL OF THERMAL FUSE ASSEMBLY

3.2.1 Remove base cover (3.1).

3.2.2 Remove dropping resistor baffle cover held by three 1/4-inch hex head screws.

3.2.3 Remove Phillips head screw holding thermal fuse assembly to lamp bracket.

3.2.4 Disconnect thermal fuse leads by removing two Wire-Nuts and remove thermal fuse assembly.

#### 3.3 REMOVAL OF GRILLE ASSEMBLY

3.3.1 Remove base cover (3.1).

3.3.2 Remove dropping resistor baffle cover held by three 1/4-inch hex head screws.

3.3.3 Disconnect timer lever link from the actuating lever by removing one 1/4-inch hex head screw.

3.3.4 Expose back of power switch by lifting up paper insulator. Remove electrical leads to power switch and forward-reverse switch by pulling them off terminals.

3.3.5 Remove pin holding lamp door to lamp and mirror bracket assembly.

3.3.6 Remove side panel adjacent to the carrying handle by removing three 1/4-inch screws.

3.3.7 Remove louvered heat baffle (under lamp); one 1/4-inch hex head screw.

3.3.8 Remove the four remaining 1/4-inch hex head screws holding the grille in place. One is located next to the power control switch; one adjacent to the lamphouse door opening and two hold the base cover hinge post bracket to the housing. Pull grille straight out and guide lamp door through opening in grille.

3.3.9 Remove remote control receptacle and hinge post bracket by removing two Phillips head screws.

### 3.4 REMOVAL OF THE LAMP AND MIRROR MOUNT BRACKET

- 3.4.1 Remove base cover (3.1).
- 3.4.2 Remove condenser lens and heat-absorbing glass by disengaging the wire clamp assembly from under the hook and swinging it out of the way. Lift the two pieces of glass out of the projector.
- 3.4.3 Remove paper insulator over the power switch area. Remove electrical leads to the power switch by pulling them off terminals.
- 3.4.4 Remove side panel adjacent to projection lens, three 1/4-inch hex head screws.
- 3.4.5 Remove lamphouse door assembly by removing pin from hinge.
- 3.4.6 Remove thermal fuse bracket assembly from the lamp mirror bracket assembly by removing one Phillips head screw.
- 3.4.7 Remove 1/4-inch hex head screw from wire clamp holding lamp leads to blower housing cover to allow slack. Guide door through the grille.
- 3.4.8 Remove five 1/4-inch hex head screws. One is in front of the lamp opening; the second is behind the mirror; the third is toward the outer edge of the projector under the hinge point for the lens clamp assembly. The fourth screw is toward the front of the projector and fastens the base locking bracket, mechanism, and lamp and mirror bracket assembly to the housing. The fifth screw is behind the lamp and adjacent to the blower housing.

NOTE: The two 1/4-inch hex head screws closest to the lamp opening are nickel-plated.

- 3.4.9 Form mechanism tab slowly to allow clearance for removal of lamp and mirror bracket assembly, or spring the lamp and mirror bracket out from under the mechanism tab by pushing it inward.
- 3.4.10 Guide the lamp and mirror mount assembly out of the projector over the two locating lugs in the housing.

NOTE: When reassembling, be sure that the forward-reverse switch ground tab is on the top side of the lamp and mirror bracket, not below it.

### 3.5 REMOVAL OF MAIN DRIVE MOTOR

- 3.5.1 Remove base cover (3.1).
- 3.5.2. Remove storage wall assembly; three 1/4-inch hex head screws.
- 3.5.3 Remove three 1/4-inch hex head motor-mounting screws.
- 3.5.4 Disengage fan belt and worm pulley belt as motor is lifted out of projector housing.
- 3.5.5 Electrically disconnect motor by removing all Wire-Nuts securing motor wires.



3.5.6 To reassemble, the worm pulley belt should be positioned first, then fan belt.

CAUTION: Take care not to nick or cut belts as this will cause belts to tear.

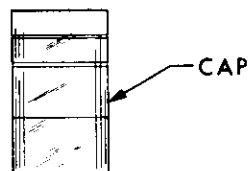
### 3.6 FAN REPLACEMENT AND/OR FAN BELT REPLACEMENT

3.6.1 In order to remove the fan, the grille must be moved back to provide clearance for removal of the blower housing cover. Follow procedure for removal of grille assembly (3.3) but do not disconnect any of the electrical leads.

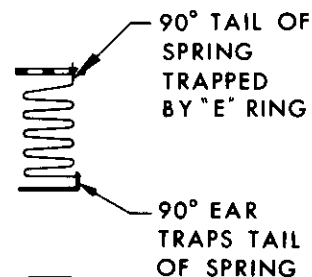
3.6.2 Removal of timer lever link is accomplished by removing "E" ring from brass pivot and lifting timer off pivot. Then, disengage from lug end on contact arm and timer link.

3.6.3 Remove four 1/4-inch hex head screws from the blower housing cover. Remove the paper baffle and cover.

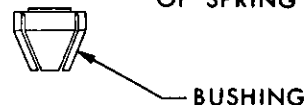
3.6.4 Remove plastic fan cap, "E" ring, spring, washer, fan bushing; next disengage fan belt and remove fan. This leaves a plain washer and a cork washer on fan shaft.



3.6.5 Loosen three hex head mounting screws holding main drive motor, lift motor, and remove belt.



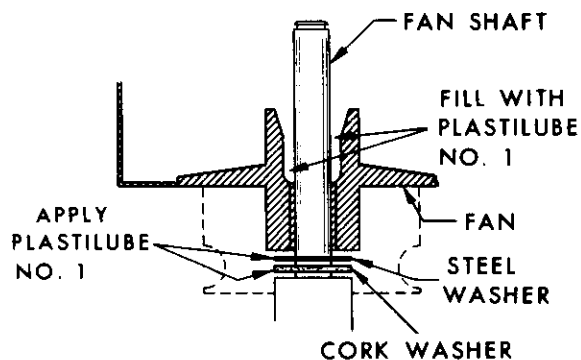
3.6.6 To reassemble, place belt over fan shaft; then lubricate shaft with Plastilube #1.



3.6.7 Place fan over shaft; then fill its cavity with Plastilube #1.

3.6.8 Reassemble remaining fan mounting parts.

3.6.9 Position belt on fan pulley, lift motor, stretch belt and position around motor pulley, reposition motor, and tighten motor mounting screws.



NOTE: Fan belt must be placed on fan pulley first, then motor pulley. Otherwise, belt may be nicked or cut when stretched past upper blower baffle cover.

### 3.7 REMOVAL OF MECHANISM ASSEMBLY AND LENS MOUNT ASSEMBLY

3.7.1 Remove focus knob by pulling straight off.

- 3.7.2 Remove the following: base cover (3.1), dropping resistor cover (three 1/4-inch hex head screws), and main drive motor without disconnecting the 120V leads (3.5).

NOTE: When replacing motor, belt from mechanism is driven by pulley closer to motor, and belt from fan is driven by other pulley.

- 3.7.3 Disconnect low-voltage system leading to mechanism assembly, focus motor, component board, and the remote focus switch in the Custom 860H model.
- 3.7.4 Remove cord compartment wall with component board bracket; three 1/4-inch hex head screws. On Custom 860H model, remove remote focus solenoid (two 1/4-inch hex head screws).
- 3.7.5 Remove spring hooked between auto-focus rack and lens mount.
- 3.7.6 Remove side panel adjacent to the projection lens (three 1/4-inch hex head screws).
- 3.7.7 Remove the front panel (three 1/4-inch hex head screws).
- 3.7.8 Remove six 1/4-inch hex head screws holding lens mount and mechanism assemblies.
- 3.7.9 Grasp lens mount and mechanism assemblies with both hands and carefully lift out of housing. After removal from housing, very carefully separate assemblies.
- NOTE: It is possible to operate mechanism assembly by hand, duplicating all the functions of the projector related to cycling.
- 3.7.10 In reassembling, nest lens mount and mechanism assemblies together; then locate both in housing. Make sure that the auto-focus rack properly engages the lower focus shaft gear.
- 3.7.11 Reassemble the balance of components in the reverse order of disassembly.

### 3.8 DISASSEMBLY OF LENS MOUNT ASSEMBLY

- 3.8.1 Remove lens mount assembly (3.7).
- 3.8.2 Remove focus motor.
- a. Remove two Phillips head screws which secure motor to motor bracket.
  - b. When reassembling motor, position ear on end bell in recess in bracket and replace screws.
- 3.8.3 Remove lower lens barrel rails by grasping tines of rail with thumb and forefinger; squeeze together and push out.
- 3.8.4 Remove upper lens barrel rails by first removing two lens rail springs; then remove rails as in 3.8.3.
- 3.8.5 Remove focus shaft by disengaging focus shaft spring and then tip and pull from square bearing hole.



- 3.8.6 Remove focus motor bracket (three 1/4-inch hex head screws through rubber grommets) and then the focus worm shaft assembly.

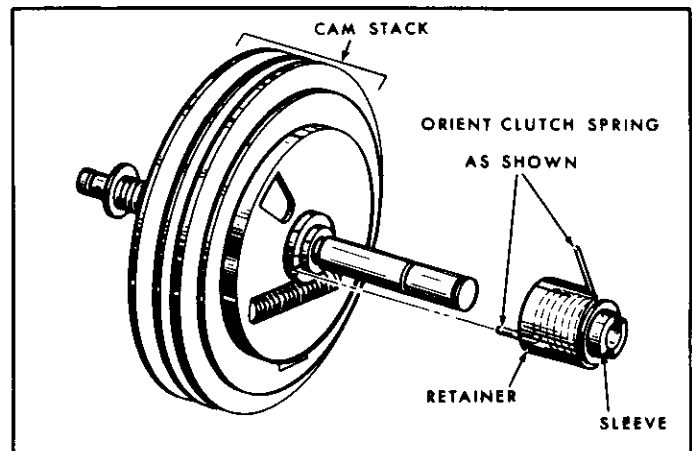
### 3.9 DISASSEMBLY OF MECHANISM ASSEMBLY

- 3.9.1 Remove mechanism assembly (3.7).
- 3.9.2 Remove six 1/4-inch hex head screws and disconnect direction lever spring; then carefully lift off top plate assembly.
- 3.9.3 Remove one 1/4-inch hex head screw and slide solenoid mount assembly out of mechanism assembly.
- 3.9.4 Cam shaft assembly: remove two bronze bearings from ends of cam shaft (one "E" ring and one "C" ring). Remove spring between index lever and mechanism frame; disconnect spring between slide lever and mechanism frame, then remove timer contact spacer.
- 3.9.5 Remove slide lever bracket (two 1/4-inch hex head screws) and slide lever with its spring; then spread sides of mechanism assembly frame and lift out cam shaft.

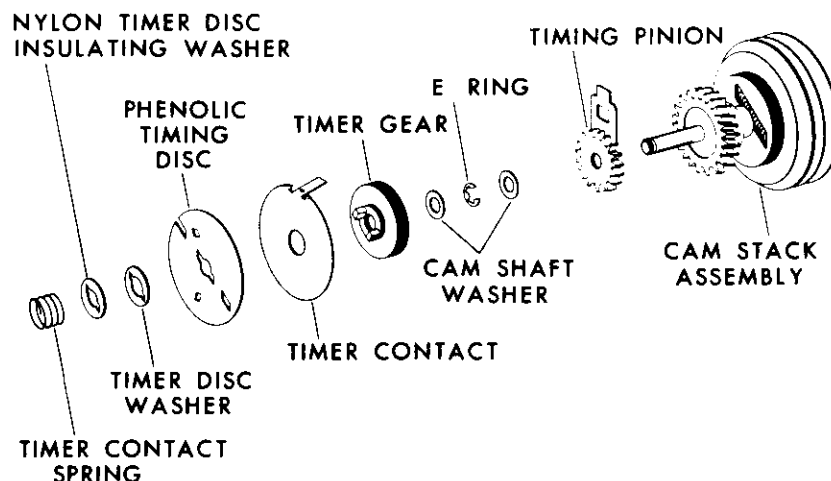
### 3.10 DISASSEMBLY OF CAM SHAFT

- 3.10.1 Remove cam shaft (3.9).
- 3.10.2 Remove components: "E" ring, washer, worm gear, clutch spring, and sleeve.
- Replace any defective parts and lubricate clutch spring shaft and sleeve.
  - Reassemble in reverse order.

NOTE: Clutch spring must be assembled as shown for correct timing.



### 3.11 AUTOMATIC TIMER



The parts comprising the timer are mounted on the cam shaft as shown, but are not part of the cam shaft assembly. The phenolic timer disc may become torn or the timer contact disc tab broken; otherwise, no replacements are likely.

### 3.12 WORM PULLEY REPLACEMENT AND/OR MECHANISM BELT REPLACEMENT

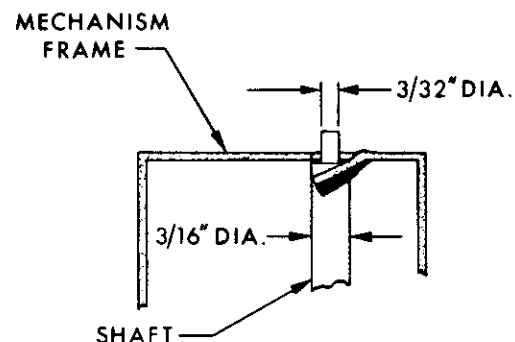
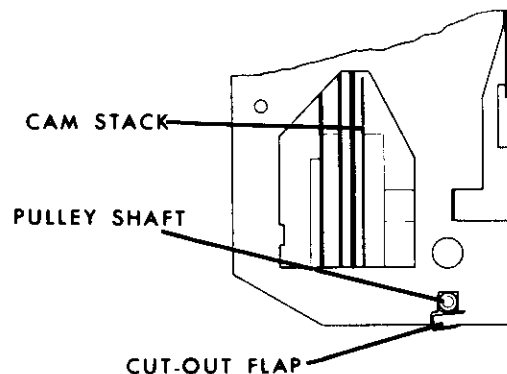
3.12.1 Remove base cover (3.1) and main drive motor (3.5). Lift motor out and set aside without disconnecting wires.

3.12.2 Bend flap of mechanism frame down to release shaft.

3.12.3 Lift out entire shaft and worm pulley. Replace worm pulley; lubricate shaft with light coat of Plastilube #1; replace mechanism belt and reassemble.

NOTE: Bend flap in mechanism frame slowly and easily so it will not break off.

3.12.4 When repositioning shaft, make sure that flap presses against 3/16-inch diameter with enough force to keep shaft from rotating. Worm pulley rotates on shaft.



### 3.13 REMOVAL OF SLIDE LEVER RAMP

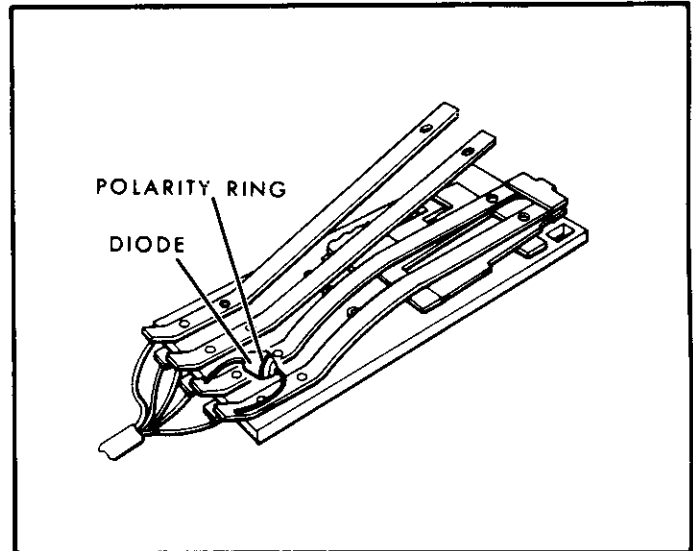
- 3.13.1 Remove the retaining rivet by any suitable means (hand file, punch, or small electric grinder).

NOTE: In all instances, be sure not to bend the slide lever and keep the filings out of the mechanism.

- 3.13.2 When replacing the new ramp, insert the screw (part No. 171244) through the ramp and drive the screw into the metal. Be sure the screw is fully seated.

### 3.14 DISASSEMBLY OF REMOTE CONTROL

- 3.14.1 Remove three Phillips head screws and lift half of switch housing.
- 3.14.2 Remove cycle button and focus lever (focus lever on Custom 860H model only).
- 3.14.3 Disengage remote cord from switch housing and lift out cord with contact assembly attached.
- 3.14.4 Diode may be removed in Custom 860H model by unsoldering leads.



NOTE: Observe polarity of diode when removing (indicated by ring), and replace new diode in same direction.

### 3.15 REMOVAL OF CARRYING HANDLE

- 3.15.1 Remove base cover (3.1).
- 3.15.2 Remove handle by removing two 1/4-inch hex head screws at pivot point.

### 3.16 REMOVAL OF COMPONENT BOARD ASSEMBLY

- 3.16.1 Remove base cover (3.1).
- 3.16.2 Remove component board by removing bracket assembly which supports the storage wall compartment (two 1/4-inch hex head screws).
- 3.16.3 Component board may now be removed by disconnecting electrical leads and removing cell (3.19).

### 3.17 REMOVAL OF REMOTE FOCUSING SOLENOID IN CUSTOM 860H MODEL

- 3.17.1 Remove base cover (3.1).
- 3.17.2 Disconnect the two leads from component board to solenoid.

3.17.3 Remove solenoid by removing two screws.

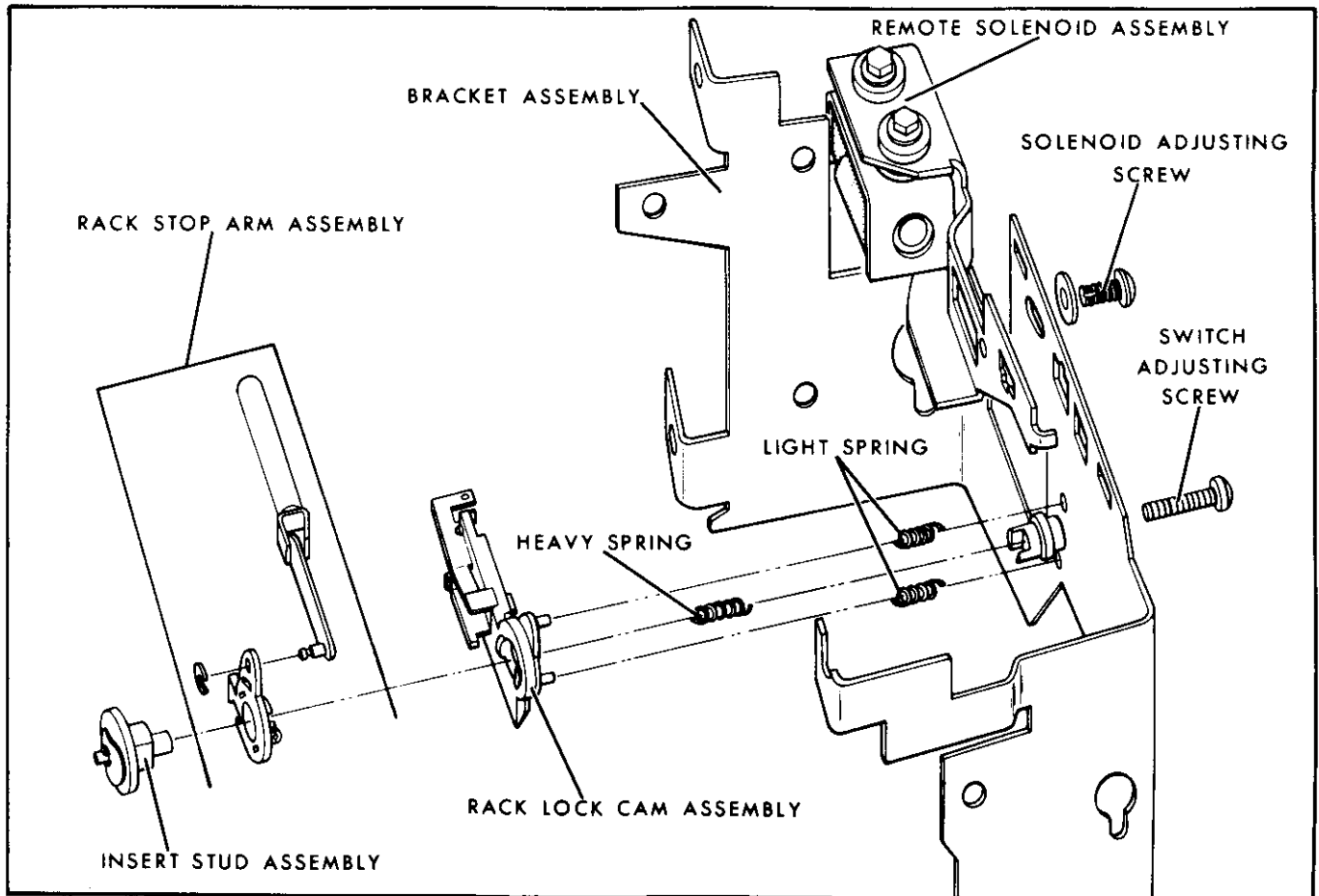
3.18 REMOVAL OF REMOTE FOCUSING SWITCH IN CUSTOM 860H MODEL

3.18.1 Remove base cover assembly (3.1).

3.18.2 Remove main projection lens.

3.18.3 Unsolder three leads to switch.

3.18.4 Break cement seal and remove adjusting screw holding switch to lens mount housing.

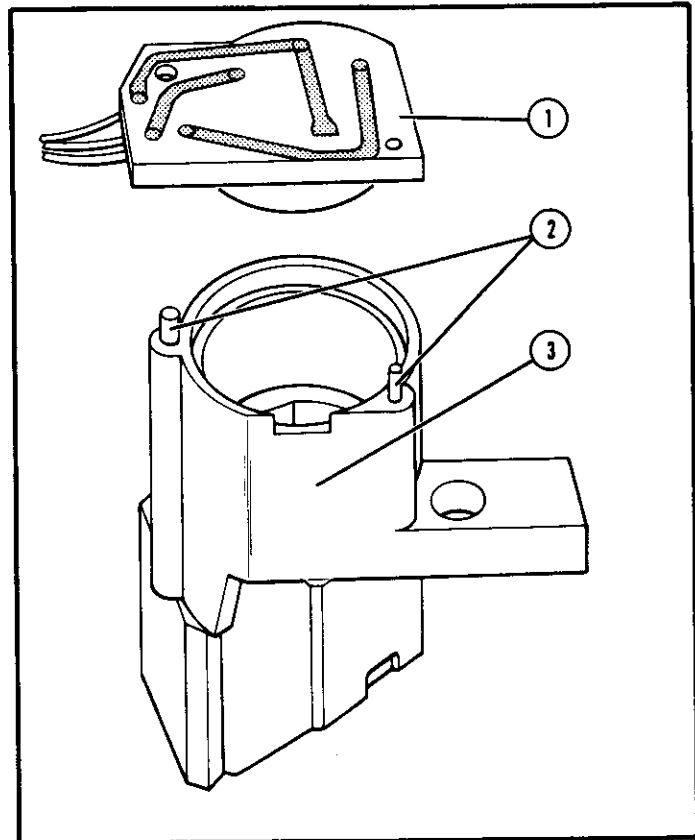




### 3.19 REMOVAL AND INSTALLATION OF PHOTOCELL ASSEMBLY

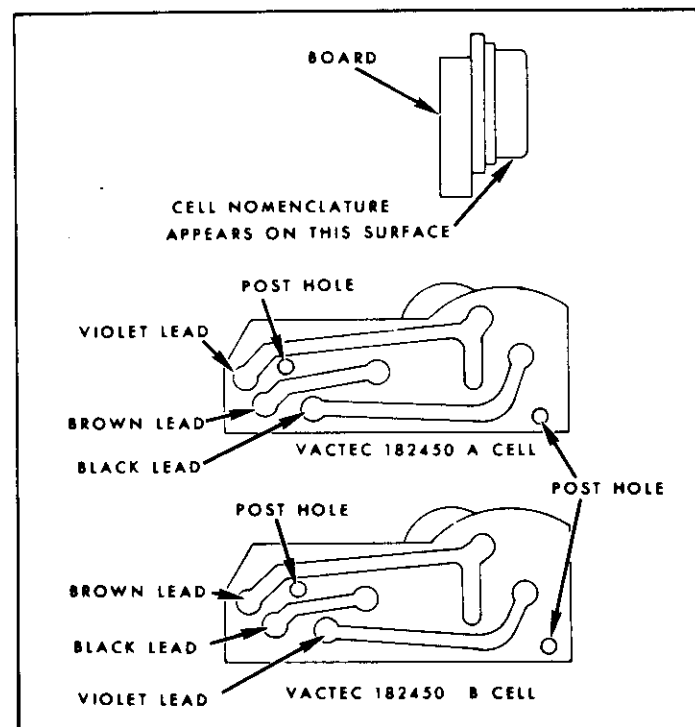
- 3.19.1 Remove base cover (3.1).
- 3.19.2 Remove cell circuit board and cell (1) by applying a fine-tipped soldering iron to the two polystyrene posts (2) which fasten the circuit board to the black plastic cell housing. When the plastic flows, lift the cell from its housing (3).
- 3.19.3 Unsolder the three wires which are attached to the circuit board.
- 3.19.4 Reassemble in the reverse order.

NOTE: If there is not sufficient post (2) material to heat-seal the circuit board, replace the cell housing (remove one Phillips head screw).



- 3.19.5 When replacing the cell circuit board (part No. 182450), check the cell number and letter, which appear on the outside diameter of the cell housing (see illustration). There are two cell board assemblies, "A" and "B", which look alike but must be wired differently. Failure to wire as illustrated (i.e., "A" cell wired like "B" cell or vice versa) will cause the focus motor to drive continuously.

NOTE: When installing a new photocell or cell housing, align the cell following the procedure in 4.5.



### 3.20 REMOVAL OF LEVELING FOOT ASSEMBLY

- 3.20.1 Remove base cover (3.1).
- 3.20.2 Grasp leveling foot and unscrew past the bind until removed. If the plastic knob is broken, use pliers to grasp leveling foot.
- 3.20.3 Install new leveling foot.
- 3.20.4 Crimp the top three or four threads perpendicular to the thread using a pair of diagonal cutters.
- 3.20.5 Replace base cover.

### 3.21 REMOVAL OF FRONT NAMEPLATE

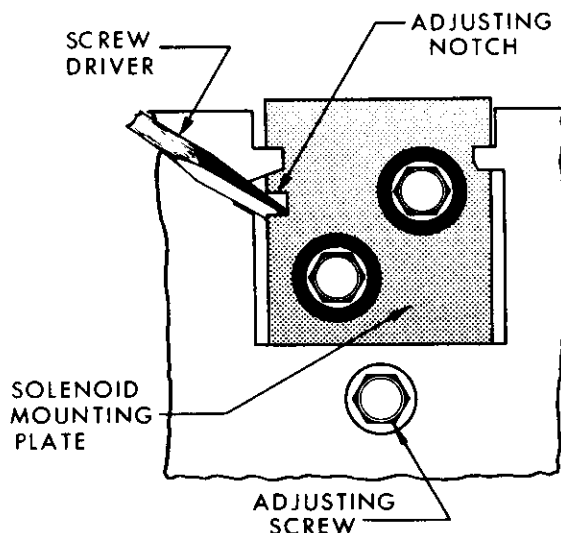
- 3.21.1 Remove base cover (3.1).
- 3.21.2 Remove side panel adjacent to projection lens (three 1/4-inch hex head screws, one of which is hidden under the power switch paper insulator).
- 3.21.3 Slide combination projection lens cover and nameplate off of the front panel guides.

## 4. ADJUSTMENTS

### 4.1 CYCLE SOLENOID

- 4.1.1 Solenoid should operate without chattering.
- 4.1.2 To adjust for minimum noise, loosen adjusting screw slightly, insert screwdriver into notch, and raise or lower solenoid mount as necessary. Tighten screw. If solenoid stroke is too short, reverse cycle will not work.

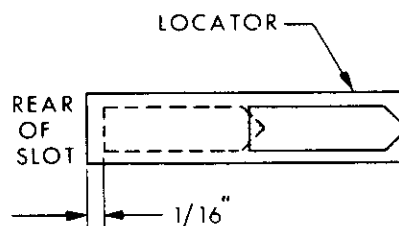
NOTE: This adjustment may be done with only the base cover removed.



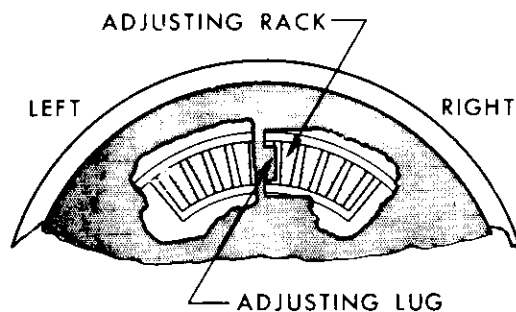
### 4.2 LOCATOR LEVER

- 4.2.1 Locator should withdraw from lugs of slide tray and stop within 1/16-inch of, but not touching, rear of slot in the mechanism frame.

When locator moves again, any movement to rear indicates that the cam is "out of time".



- 4.2.2 Erratic or jerky movement of the slide tray is an indication that the cam shaft is "out of time".
- 4.2.3 Disengage clutch spring from contact. Rotate cam shaft with thumb, so top moves toward main motor until the cam has rotated approximately 180 degrees.
- 4.2.4 Insert screwdriver in cam shaft and spread spacer and cam as indicated in Mechanism Assembly drawing.

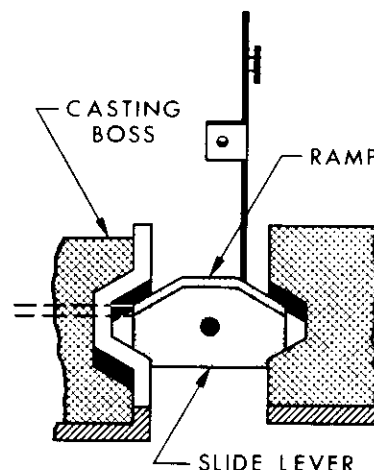


- 4.2.5 Adjusting lug will probably be found in or near center of adjusting rack.
- 4.2.6 Moving lug to the left (toward motor) will cause locator to move closer to rear of slot.

NOTE: This adjustment may be done with base cover removed.

#### 4.3 SLIDE LEVER

- 4.3.1 Slide lever must raise slides fully into tray so tray may rotate to the next slide. It must not raise slide so high that tray is raised by slide going into its compartment.
- 4.3.2 Loosen the inner screw on slide lever bracket, and with a small adjustable wrench, grasp bracket and move it to change pivot location of slide lever. Tighten screw.



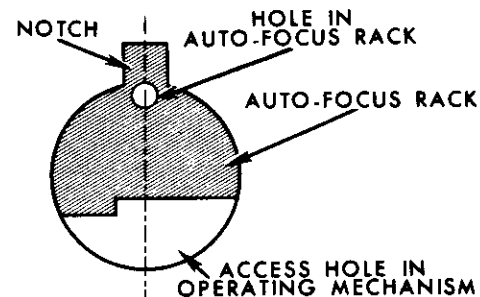
- 4.3.3 This adjustment may be made with mechanism in projector housing and only base cover removed. Turn projector over and observe ramp of slide lever; at half-cycle position, its lower shoulder should be roughly level with surrounding casting boss of projector.

#### 4.4 NULL ADJUSTMENT

- 4.4.1 Remove base cover (3.1) and projection lens.
- 4.4.2 Plug projector into a normal 110-120-voltage supply; turn projector upside down.

**WARNING:** DANGEROUS VOLTAGE

- 4.4.3 With projector switch on "Fan" and a glass slide in projector gate, observe action of auto-focus rack as you move the slide forward and backward in gate. Each time slide is "At Rest" or in a projection position, small hole in auto-focus rack should line up in center of access hole and notch in mechanism frame. This is the "Null Alignment".



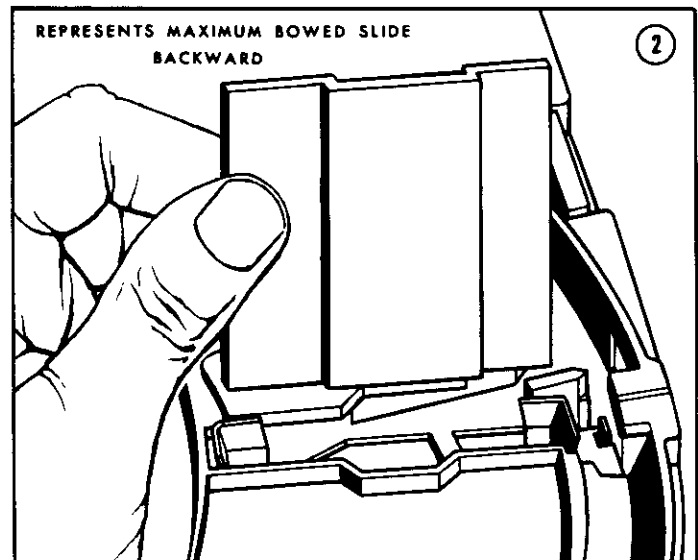
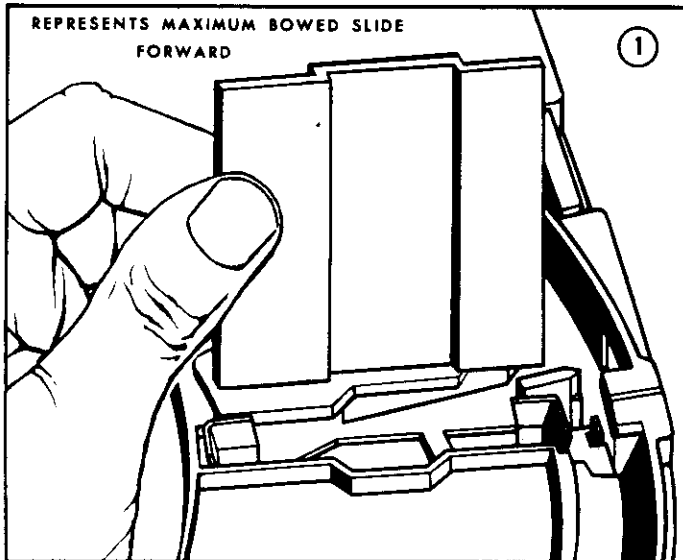
**NULL ADJUSTMENT**

- 4.4.4 If it does not line up, proceed with null adjustment; loosen cell housing screw and move cell housing in or out for correct null. Tighten screw and cement screw head to cell housing.

**NOTE:** Correct null adjustment will fix most projectors wherein lens drives in or out continuously with a slide in the gate.



- 4.4.5 Check accuracy of the null position by inserting Tool #TL1744 in the gate as shown in illustration No. 1 below, and allow the focus motor time to drive the lens forward. Reverse the tool as shown in illustration No. 2, and allow the focus motor to drive the lens backward.

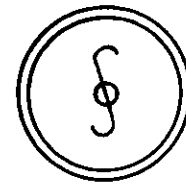
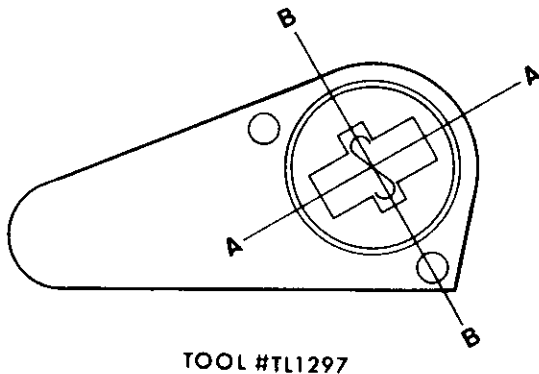


- 4.4.6 If the focus motor does not come to a stop with the tool in the gate in either of the directions, the null position requires further adjustment. If the focus motor fails to stop in the forward direction, be sure the rack is not being stopped by the shutter pin.

#### 4.5 CELL ALIGNMENT

- 4.5.1 Place a glass-mounted slide in gate. (It may be Tool #TL1298 mounted as currently supplied.)
- 4.5.2 Check to see that null position of the auto-focus rack is as pictured in null adjustment section (4.4).
- 4.5.3 Disconnect focus motor.
- 4.5.4 Remove filter and mask.
- 4.5.5 Position cell adjusting Tool #TL1297 over posts of cell housing or use fan cap (part No. 172115) placed in cell housing (closed end in).

- 4.5.6 After making sure auto-focus is in proper null position, "S" or "C" image should fall as pictured when using Tool #TL1297, or centered on center dot when using fan cap.



- 4.5.7 If image is not centered, loosen cell housing mounting screw and bring image in along B-B axis by moving cell housing back and forth. Snug down screw.
- 4.5.8 With two screwdrivers, one in back of cell housing for support, form ear on which housing is mounted, up or down, until image is centered in the A-A axis.
- 4.5.9 Reassemble mask, filter, and photocell assembly; heat-seal two posts and reconnect focus motor.
- 4.5.10 Make fine readjustment for correct null positioning, if necessary. Tighten and cement screw.

NOTE: This adjustment (4.5) is necessary if new cell or cell housing is installed. This may also be necessary if cell housing tab has been deformed.

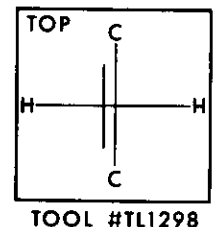
#### 4.6 TARGET SLIDE ADJUSTMENT

NOTE: This entire adjustment (4.6) should not be performed unless a new rack assembly is installed in an old mechanism. This is a factory adjustment and should not be disturbed.

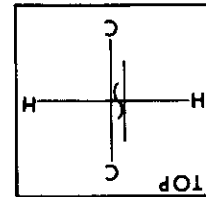
- 4.6.1 Place projector on bench upside down; remove base cover, place switch in "Fan" position, disconnect focus motor, and plug projector in normal 110-120-volt supply.

**WARNING:** DANGEROUS VOLTAGE

- 4.6.2 Insert glass-mounted target slide, Tool #TL1298, into gate. "Top" indicates top of projector when projector is right side up. Lock rack in null position.



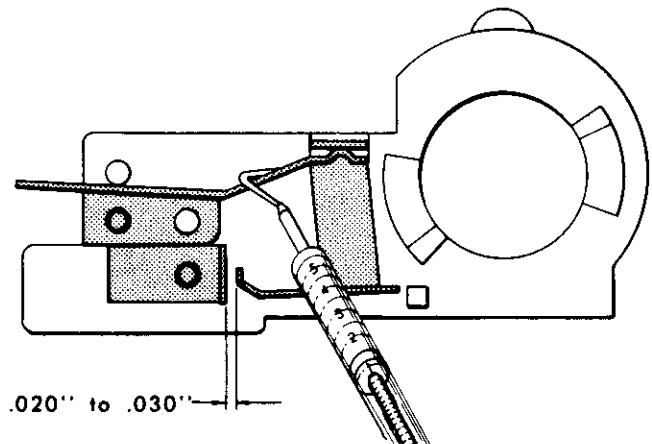
- 4.6.3 Look through the empty projection lens opening in the projector; the 6V lamp filament image should fall on the target slide as pictured.



- 4.6.4 The short line denotes a tolerance of .050-inch. Images should fall within this tolerance, or an additional .050-inch, and be equally spaced above and below horizontal line H-H, as illustrated.
- 4.6.5 If it does not appear as illustrated, it can be brought into alignment by forming the lamp mounting end of the auto-focus rack.
- 4.6.6 Focus rack may be adjusted with Tool #TL1299 (revised) by reaching through opening in mechanism base plate near 6V lamp.
- 4.6.7 The null adjustment may be relaxed to aid in engaging tool to auto-focus rack. Once engaged, and while re-forming, null adjustment must be mechanically maintained by inserting a pointed tool into hole in rack and locked into notch in plate. Form (bend) rack as necessary to obtain correct alignment. To disengage tool, relax null adjustment again. Remember to check null position after performing this procedure.

#### 4.7 SWITCH ADJUSTMENT FOR AUTO-FOCUS MODE OF CUSTOM 860H MODEL

- 4.7.1 Remove switch (3.18), if normally closed contact is not providing a reliable circuit for auto-focus.
- 4.7.2 Check switch for proper contact settings.
- Normally closed contacts should break between 1 1/2 ounces to 4 ounces.
  - Normally open gap between contacts should be between .020-inch and .030-inch.
- 4.7.3 Reassemble adjusted switch.



#### 4.8 SWITCH AND SOLENOID ADJUSTMENTS FOR REMOTE FOCUS MODE OF CUSTOM 860H MODEL

- 4.8.1 Projector should be plugged into normal 110-120-volt line, and remote control cord plugged into projector.
- 4.8.2 Loosen solenoid adjusting screw. Place flat-blade screwdriver into slot, and move solenoid bracket back and forth until it just operates switch in both directions while actuating remote switch back and forth (focus motor operates). Now move bracket toward solenoid the thickness of the tab that protrudes through the lens mount plate.
- 4.8.3 Tighten solenoid adjusting screw to lock solenoid bracket in position.

#### 4.9 MIRROR ALIGNMENT

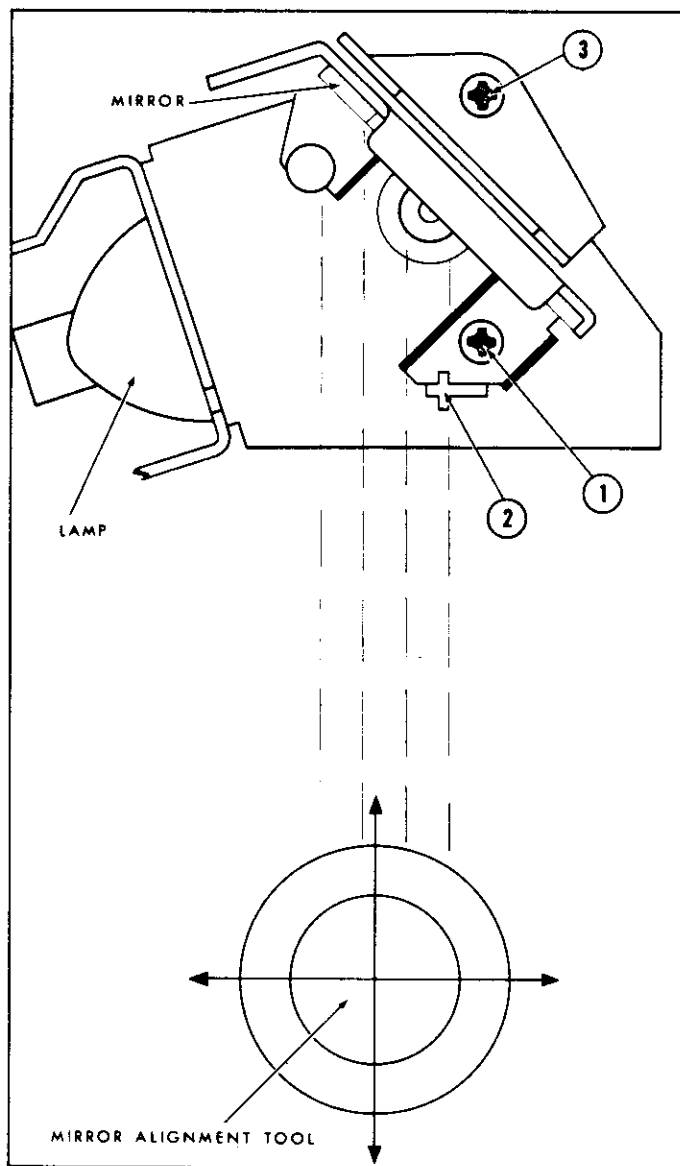
- 4.9.1 Remove projection lens and replace with mirror alignment lens (Tool #TL1759).
- 4.9.2 Insert tool into the rear end of a 5-inch,  $f/2.7$  KODAK Projection EKTANAR Lens similar to the one shown in the illustration. Position the lens into projector as follows:
  - a. Invert lens with alignment tool facing out and insert into projector.
  - b. Rack the lens all the way into the projector.

NOTE: Mirror alignment tool should be almost flush with the front of the projector.

- 4.9.3 Plug the projector into a variable voltage source (Variac) set at 40V ac. If you do not have a variable voltage supply, you may use either a neutral density slide to reduce light intensity or a cardboard slide with a 1/4-inch hole at center.

**WARNING:** 40V ac or a special slide is used so that the lamp filament image on the mirror alignment tool can be looked at without doing harm to your eyes.

- 4.9.4 Place the power switch in the "Low" position. Alignment is proper when the circle of light is centered on the alignment tool. [If the circle is left or right of center, loosen screw (1), place a flat-blade screwdriver in the adjustment slot (2) and twist to align.] Tighten screw.
- 4.9.5 If the circle is up or down from center, adjust by turning screw (3) clockwise to move up and counterclockwise to move down.
- 4.9.6 After adjustment is complete, cement screw heads.





## 5. TROUBLESHOOTING

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
5.1 Projector will not cycle (forward).	<ol style="list-style-type: none"> <li>1. Cycle solenoid failure.</li> <li>2. Clutch spring may be bent.</li> <li>3. Check for bind in cycle lever.</li> <li>4. Check for clearance between clutch contact arm of cycle lever and TIP of clutch spring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check 24V supply. If 24V ac <math>\pm</math> 4V ac is not present, replace main motor. If present, replace solenoid.</li> <li>2. Replace spring (3.10) or replace cam shaft assembly (3.9).</li> <li>3. Remove bind.</li> <li>4. Form cycle lever.</li> </ol>
5.2 Continuous cycling.	<ol style="list-style-type: none"> <li>1. Clutch spring bent or broken.</li> <li>2. Short in remote cord.</li> <li>3. Bind in select, cycle, or direction lever.</li> <li>4. Clutch spring not being stopped by contact arm of cycle lever.</li> <li>5. 6V lamp terminal contacting mechanism frame.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace spring (3.10) or replace cam shaft (3.9).</li> <li>2. Check cord (3.14); replace if necessary.</li> <li>3. Re-form levers for bind and lubricate.</li> <li>4. Replace spring (3.10), replace cam shaft (3.9) or re-form contact arm of cycle lever.</li> <li>5. Add glass or electrical tape to mechanism frame at contact point.</li> </ol>
5.3 Projector will not index (forward or reverse).	<ol style="list-style-type: none"> <li>1. Select lever interfering with movement of index lever, as in half-cycle operation.</li> <li>2. Index lever not shifting to low side of cam.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for binds in select lever.</li> <li>2. Check for burr on index lever.</li> </ol>
5.4 Projector will not reverse.	<ol style="list-style-type: none"> <li>1. Cycle solenoid out of adjustment.</li> <li>2. Bind in cycle lever and/or direction lever.</li> <li>3. Direction lever hair-spring missing or bent.</li> </ol>	<ol style="list-style-type: none"> <li>1. Readjust (4.1).</li> <li>2. Check and remove bind; lubricate if necessary.</li> <li>3. Remove mechanism (3.7) and replace spring.</li> </ol>

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
	4. Clutch spring bent. 5. Reverse button of remote control cord not held long enough. 6. Cycle solenoid does not operate.	4. Replace spring (3.10) or replace cam shaft assembly (3.9). 5. Customer error. 6. Check 24V supply. If 24V ac + 4V ac is not present, replace main motor. If present, replace solenoid.
5.5 Projector always reverses.	1. Bind between direction lever and mechanism frame. 2. Defective remote cord.	1. Remove bind and lubricate if necessary. 2. Check for bind between reverse and forward contacts (3.14).
5.6 Noisy operation.	1. Broken or malformed ribs on fan causing "fluttering" noise. 2. Lack of lubrication on fan shaft. 3. Fan cap not fully seated. 4. Worm pulley with a high spot will cause a "fluttering" noise. 5. Gear noise from focus motor.	1. Replace fan (3.6). 2. Lubricate shaft (3.6). 3. Seat with thumb. 4. Replace worm pulley (3.12). 5. Increase backlash between gears or install new motor (3.8.2).
5.7 Tray cannot be rotated when "Select" button is held down.	1. Projector not on. 2. Locator does not withdraw from tray lugs. 3. Slide lever not raising slide fully into tray.	1. Projector must be turned on. 2. Check locator adjustment (4.2). 3. Check slide lever adjustment (4.3).
5.8 Shutter "hang-up"	1. Shutter spring unhooked or missing.	1. Remove mechanism (3.7) and replace spring.

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
	2. Shutter may be striking cycle lever.	2. Remove mechanism (3.7); file cycle lever at point of contact with shutter. Do not file shutter or light leak on projection screen may result.
5.9 Projection lens drifts on "High". No slide in gate.	1. Stray light.  2. Null position incorrect.  3. Cell housing filter(s): steel mask missing or defective, or mirror missing or defective.  4. If drift continues after steps 1-3 at 130V.	1. Check front condenser lens for proper orientation (flatter side of lens toward gate). See illustration in 1.4.3.  2. Adjust null-cell alignment (4.4 and 4.5).  3. Add or replace items which are missing or defective. If mirror in cell housing is at all questionable, replace cell housing.  4. Replace cell and component board (3.16).
5.10 Projection lens drifts on "Fan". Slide in gate.	1. Focus rack off or under drive gear.  2. Rack binding.  3. Main drive motor.	1. Reposition focus rack. Replace rack spring if off or missing.  2. Remove bind.  <u>NOTE:</u> Check for slack in 6V lamp leads.  3. Disconnect orange and red wires from secondary of main drive motor. If focus motor stops, check secondary for short with continuity checker. If there is no continuity between orange and red leads, install new main drive motor (3.5).  <u>NOTE:</u> Orange and red are <u>isolated</u> secondaries and should show no continuity to gray, yellow, green, and blue secondaries.

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
		<p>If orange and red wires show continuity to yellow, install new main drive motor (3.5).</p> <p>CAUTION: Make all continuity checks with power cord disconnected.</p> <p>If orange and red leads show continuity, replace cell and component board. If focus motor does not stop with orange and red leads disconnected, replace cell and component board.</p>
	4. If drift continues.	4. Adjust null alignment (4.4).
5.11 Focus motor drives in one direction.	<ol style="list-style-type: none"> <li>1. Null alignment.</li> <li>2. Cell filter(s).</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust null alignment. Add missing filters and mask. Replace cell housing if mirror is questionable.</li> <li>2. See section 5.9.3.</li> </ol> <p>If the above does not correct condition, replace cell and component board (3.16).</p>
5.12 Focus motor dead.	<ol style="list-style-type: none"> <li>1. Possible loose Wire-Nuts on focus motor or 6V lamp.</li> <li>2. 6V lamp burned out.</li> <li>3. Null-cell alignment.</li> <li>4. Dead spots in focus motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten Wire-Nuts.</li> <li>2. Replace rack assembly lamp.</li> <li>3. Adjust as necessary (4.4 and 4.5).</li> <li>4. Replace focus motor (3.8.2).</li> </ol>
5.13 Focus motor oscillates with slide in gate and lamp on "High".	Defective focus motor.	Replace focus motor. Be sure to dress Wire-Nuts away from worm gear (3.8.2).
5.14 Focus motor runs continuously.	<ol style="list-style-type: none"> <li>1. Transistor defective.</li> <li>2. Photocell wired incorrectly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace circuit board (3.16).</li> <li>2. Rewire correctly (3.19.5).</li> </ol>

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
	3. Rack strikes shutter pin.	<p>3. Remove base cover. Remove 6V lamp and socket from the focus rack assembly (pops out). Clean the divider wall area adjacent to the bent-over end of the shutter pin.</p> <p>Turn the end of the bent shutter pin toward the front of the projector and tape the pin to the divider wall in this position, using tape (part No. 186560), or equivalent. Replace 6V lamp assembly and base cover.</p>
5.15 Remote focus fails.	<p>1. Diode in remote control defective.</p> <p>2. Main motor 24V winding burned out.</p> <p>3. Focus motor dead.</p> <p>4. Switch and solenoid adjustments incorrect.</p>	<p>1. Replace diode (3.14).</p> <p>2. Replace motor (3.5) and circuit board (3.16).</p> <p>3. Replace focus motor (3.8.2).</p> <p>4. Adjust as necessary (4.8).</p>
5.16 Fails to focus on warped slides.	Check null and cell alignment.	Adjust null and cell alignment as necessary (4.4 and 4.5).
5.17 Slides jam.	Gate not properly aligned.	Align gate by forming plated gate assembly (right and left) to be in contact with tabs on the top plate of mechanism.
5.18 Projector stops running or will not turn on.	<p>1. No power to projector.</p> <p>2. Thermal fuse open.</p>	<p>1. Check power supply.</p> <p>2. Check fuse with continuity checker. If it shows open, replace fuse (3.2).</p>
5.19 Illumination uneven.	Mirror alignment incorrect.	Adjust mirror alignment (4.9).



## 6. TOOLS, LUBRICANTS, CEMENTS

### 6.1 SPECIAL SERVICE TOOLS

Tool #TL 862	Glass-mounted test slide
Tool #TL 972	KODAK READY-MOUNT Test Slide
Tool #TL1031	1/4-inch hex socket wrench with 6-inch shank and plastic handle
Tool #TL1115	Mechanism operating fixture (optional)
Tool #TL1297	Cell adjusting tool (no longer available) Use fan cap.
Tool #TL1298	Target slide
Tool #TL1299	Rack forming tool (revised)
Tool #TL1744	Auto-focus gauge
Tool #TL1759	Mirror alignment tool

### 6.2 CEMENT

G-135 Glyptal Cement

Adjustment screw on cell housing  
 Adjustment screw on remote solenoid  
 Adjustment screw rack lock cam assembly  
 Adjustment screws on mirror bracket

### 6.3 LUBRICANTS (Application -- See 6.4.)

763001	(A&O 61-3686)	SAE #20 Oil
763002	(A&O 61-3655)	Plastilube #1
763003	(A&O 10-592)	Plastilube #1 Grease plus 12% Moly

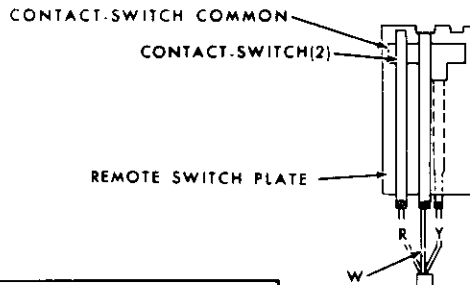
### 6.4 LUBRICATION

LUBRICATION POINTS	AMOUNT	LUBRICANT
Bearings of main drive motor when motor has been removed for other repairs	2 drops	763001
Bearing of clutch shaft	2 drops	"
All worms and gears	Light coat	763002
Nylon cam surfaces	Light coat	"
Fan and fan shaft	Light coat	"
Steel and cork fan washer	Heavy coat	"
Pivot point of levers and cam levers	Generous	763003
Nylon bushing on drive lever	Medium	"
Dimples on indexer lever (underside)	Medium	"
Slot at end of shutter lever	Medium	"
Clutch assembly	Generous	"

Lubricate all points with a light coat. A little lubrication applied frequently is better than overlubrication. The serviceman should use his judgment and lubricate points as needed.

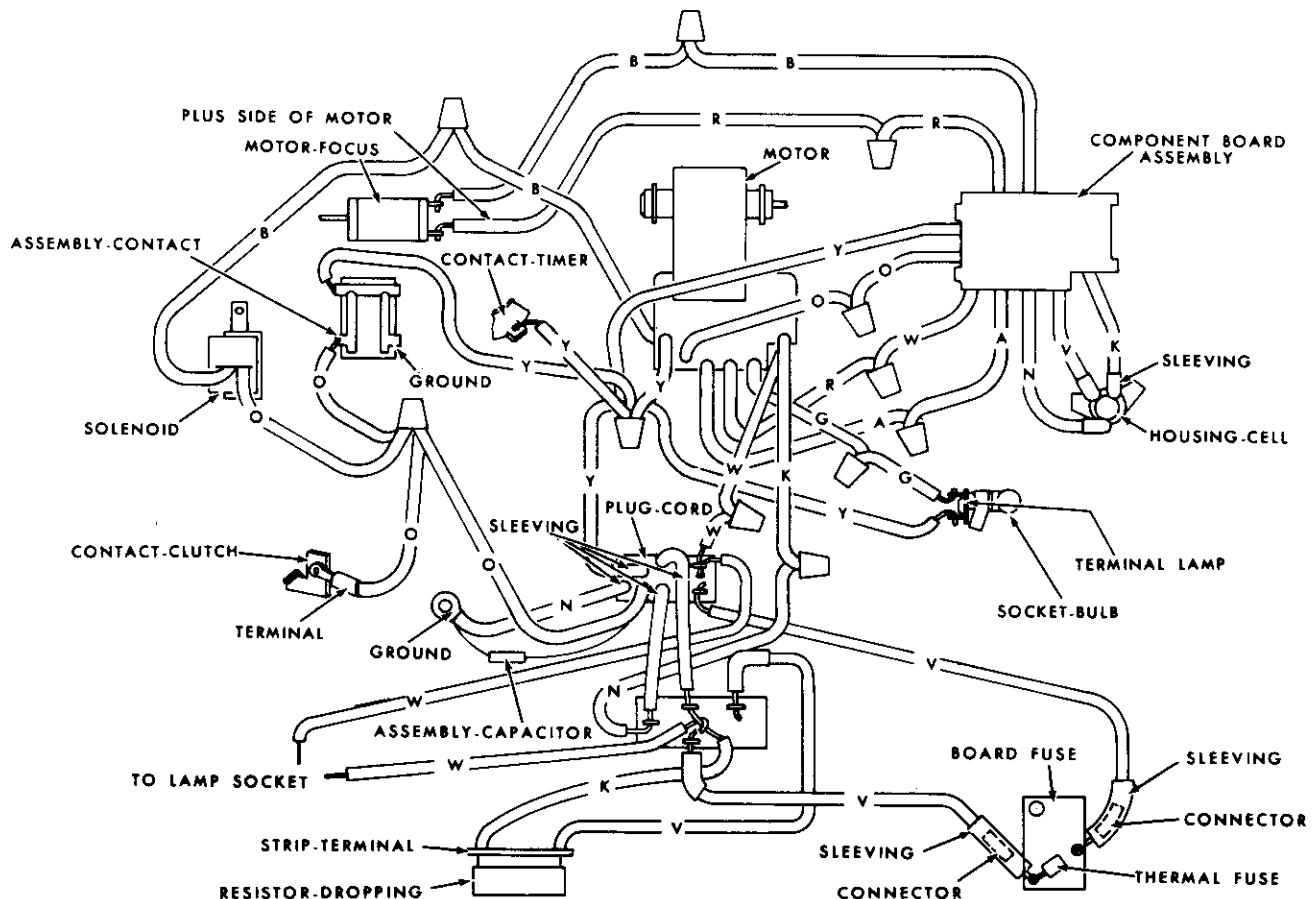
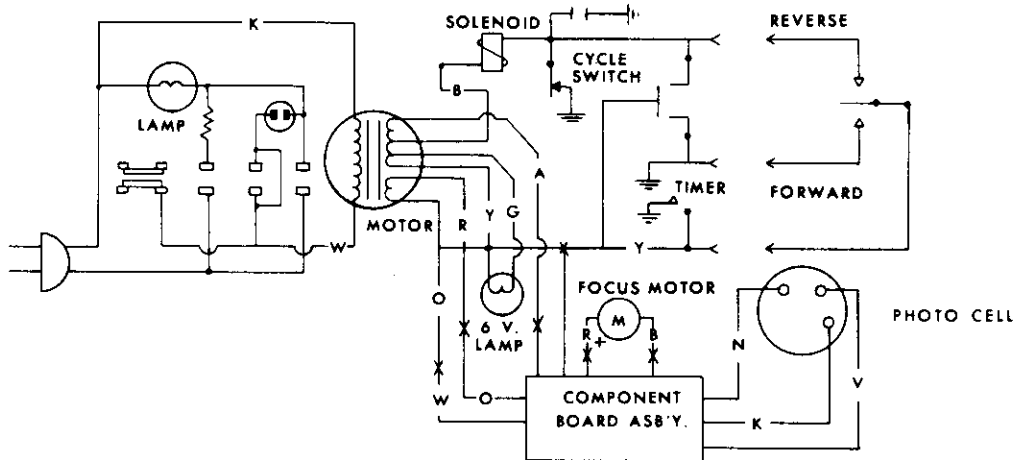
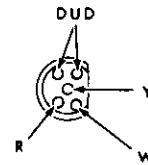
# ELECTRICAL DIAGRAMS KODAK CAROUSEL CUSTOM 850H PROJECTOR

EARLY MODEL PROJECTORS MAY  
VARY FROM DIAGRAMS SHOWN



WIRE COLOR CODE			
K - BLACK	G - GREEN		
N - BROWN	B - BLUE		
R - RED	V - VIOLET		
O - ORANGE	A - GRAY		
Y - YELLOW	W - WHITE		

REMOTE CORD



## KODAK CAROUSEL CUSTOM 860H PROJECTOR

EARLY MODEL PROJECTORS MAY  
VARY FROM DIAGRAMS SHOWN

