

# Film-Tech

The information contained in this Adobe Acrobat pdf file is provided at your own risk and good judgment.

These manuals are designed to facilitate the exchange of information related to cinema projection and film handling, with no warranties nor obligations from the authors, for qualified field service engineers.

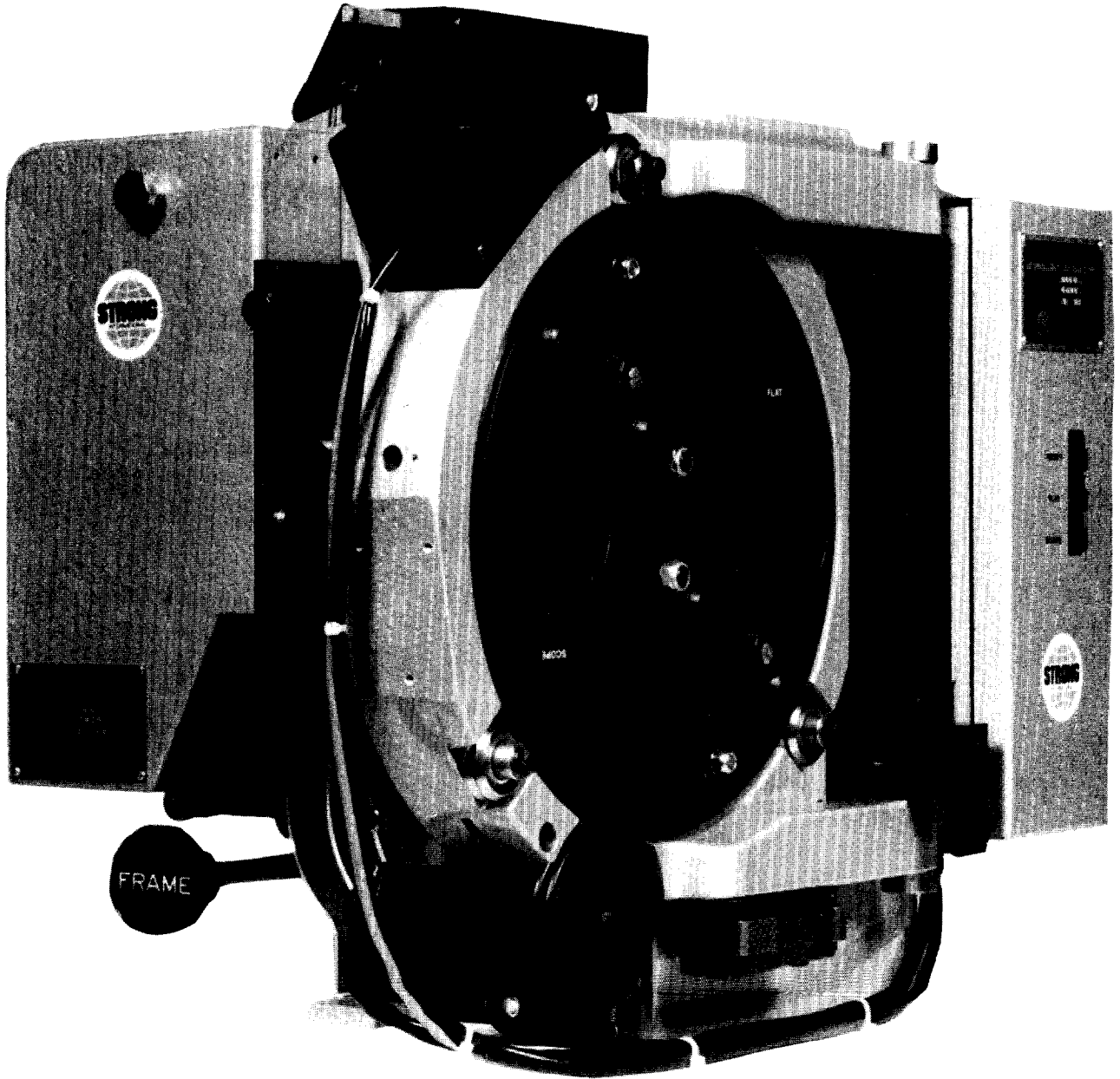
If you are not a qualified technician, please make no adjustments to anything you may read about in these Adobe manual downloads.

[www.film-tech.com](http://www.film-tech.com)

# Simplex<sup>®</sup> 35

PROJECTOR MECHANISM

## INSTRUCTION BOOK



**STRONG**  
INTERNATIONAL, INC.  
4350 McKinley St.  
Omaha, Nebraska 68112  
402/453-4444

### MODEL PR1060

with TU2020/2030 Turret

Issue 10/93

## TABLE OF CONTENTS

PREFACE	1
FIGURE 1	3
FIGURE 2	4
INSTALLATION	
Unpacking	5
Mounting	5
Lamphouse Alignment	6
Lamphouse Light Shield	6
Framing Lamp Transformer	6
Picture Changeover	6
Lens Turret	6
Projection Lenses	7
START-UP PROCEDURES	
Initial Oiling	8
Threading	9
Initial Operation	10
MAINTENANCE	
Lubrication	11
Sprockets	11
Pad Rollers	11
Fastening Hardware	11
Film Gate	11
Film Trap	11
Lens Turret	11
Overall Appearance	12
FIGURE 3	13
FIGURE 4	14
FIGURE 5	15
FIGURE 6	16

**TABLE OF CONTENTS (continued)**

**ADJUSTMENTS & REPLACEMENTS**

Intermittent Shoe Replacement	17
Intermittent Shoe Alignment	17
Film Trap & Aperture Changer	17
Film Trap Lateral Rollers	17
Pressure Strap Replacement	18
Studio Guide Replacement	18
Gear Compartment Cover	18
Intermittent Movement	18
Intermittent Sprocket	19
Oil Pump Feed Reversal	20
Framing Lamp	20
Film Sprocket Assemblies	20
Pad Roller Assemblies	21
Shutter Timing	21
Shutter Replacement	22
Automatic Lens Turret	22
<b>PAD ROLLER ASSEMBLIES (Detail)</b>	<b>23</b>
<b>SUPPLEMENTAL PARTS LIST</b>	<b>25</b>
Film Gate & Pivot	26
Film Trap & Aperture Changer	28
Lens Turret	31

**STRONG INTERNATIONAL**  
a division of Ballantyne of Omaha, Inc.  
Engineering/Sales  
October 1996

## **PREFACE**

THE SIMPLEX 35 PROJECTOR, Model 1060, combining rugged construction with ease of operation, provides theatre owners with a superior mechanism, engineered to the high standards set for all Strong International products. The following design features illustrate why the Simplex 35 Projector is able to provide continuously excellent performance throughout its long operating life:

### **UNIT DESIGN**

Unit method of design simplifies part replacement and maintenance. All units may be quickly removed and replaced. Components within a particular unit are just as easily handled.

### **SOUNDHEAD**

Although the Simplex 35 Projector was designed for use with the Simplex 5-Star Soundhead, other soundheads may be used without loss of quality.

### **MAIN DRIVE AND IDLER GEAR ASSEMBLIES**

The main drive gear and idler assemblies are easily installed, insure proper driving from the soundhead, and are adjustable.

### **OPTICS**

A conical shutter, positioned close to the picture aperture, provides very high light efficiency. Optical design is compatible to modern xenon lamphouse systems.

### **LENS TURRET**

The TU2020 Lens Turret is available in either Automatic (PR1060A) or Manual (PR1060M) configurations. The standard turret accommodates (1) each 2-25/32" Wide Screen (flat) and Anamorphic (CinemaScope) lens without use of a MagnaCom. A three-lens turret (TU2030) is available for the Model 1060. Individual focus controls permit concise focusing of each lens independently.

### **FILM COMPARTMENT**

The roomy film compartment permits ease of threading and cleaning. The lens turret is hinged and swings open for added convenience.

### **GEAR COMPARTMENT**

The gear compartment has a removable cover, rounded corners, and an enameled finish which simplifies cleaning.

## **MAIN FRAME**

The main frame forms a single unit with the base, top, and front that is noteworthy for its simplicity and strength.

## **FILM SPROCKETS**

The upper feed, and lower holdback sprockets, having twenty-four teeth each, reduce shaft speeds to prolong operating life, permit smoother wrap-around, and lessen the danger of splice breakage. Exclusive use of VKF<sup>®</sup> sprockets insures minimum film wear. The pad rollers are made of durable, lightweight nylon.

## **FILM TRAP**

The film trap conforms to the curved film gate, and accommodates the multiple-aperture plate used with the TU2020 and TU2030. Film tension can be easily adjusted while the machine is running. The trap is readily removed and replaced for routine cleaning and maintenance.

## **FILM GATE**

The curved gate, together with the film trap, controls the movement of the film past the aperture by five different tension settings. Gate curvature provides compensation for heat-induced warping of the film at the aperture, thus insuring a sharper image on the screen. The gate is easily removed, cleaned, and replaced.

## **INTERMITTENT MOVEMENT**

The intermittent movement features a webbed starwheel for high strength, long life, and positive registration. The VKF<sup>®</sup> intermittent sprocket is adjustable, making absolute alignment possible.

## **LUBRICATION**

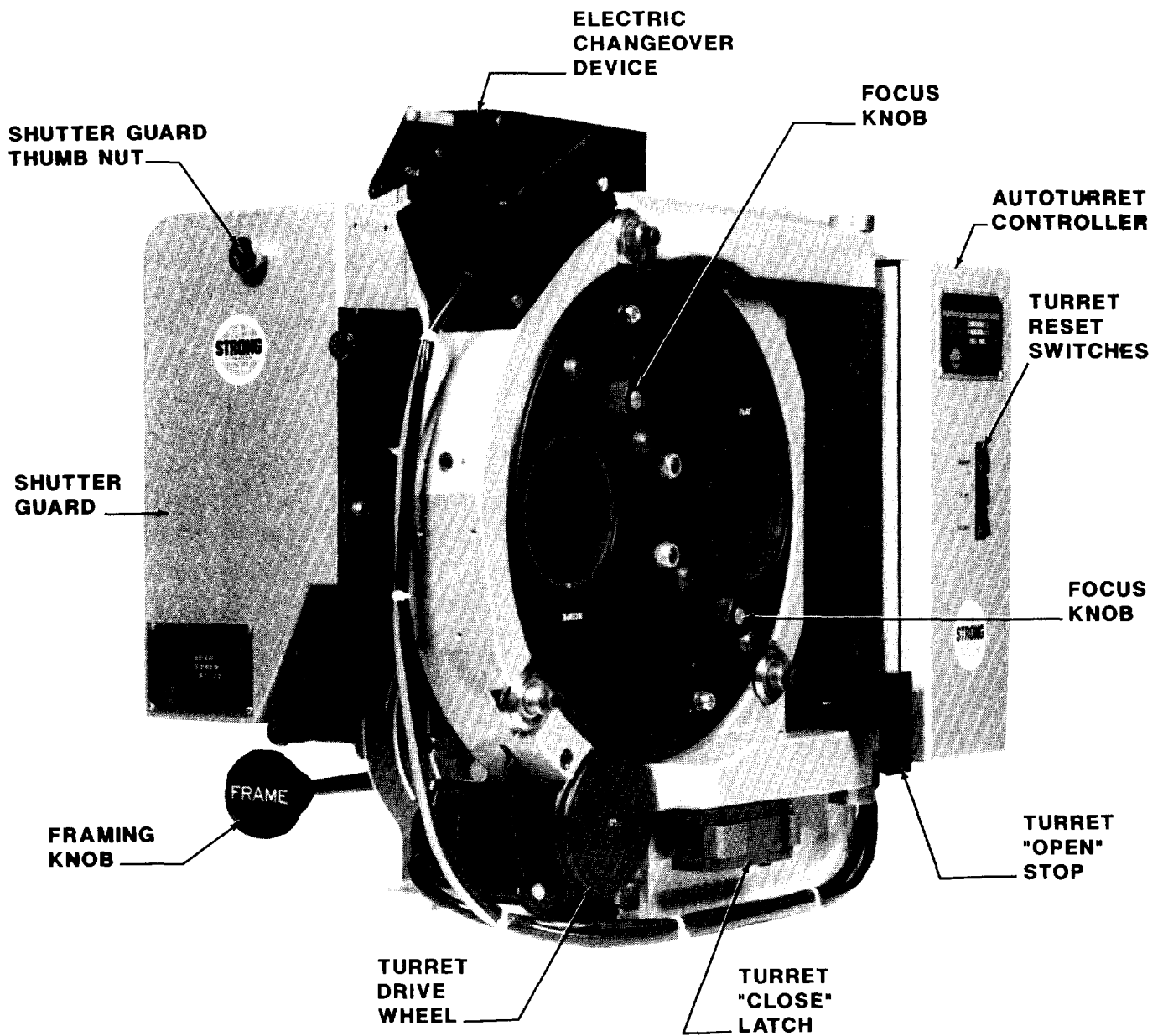
A Spray-O-Matic Lubrication System, with a gear-driven oil pump, completely lubricates all moving components. The moving parts inside the gear compartment are visible through the glass panel in the full-vision oil-sealed cover. The intermittent movement lubricates itself by pump action, and the Spray-O-Matic system. An oil level sight glass in the film compartment permits a visual check of the oil level.

## **COOLING**

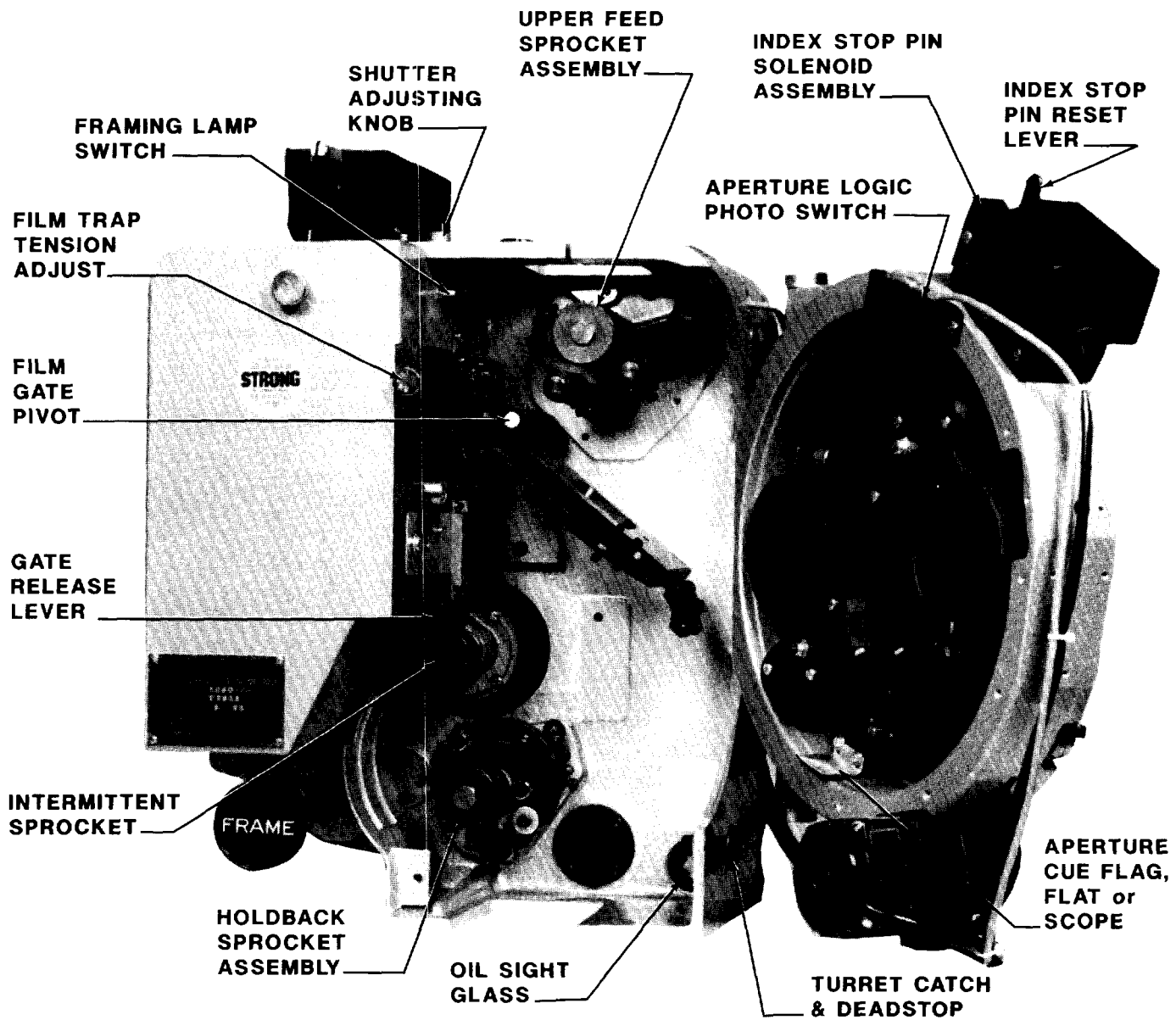
The Simplex 35 Projector includes a standard air cooled trap. Water cooled traps may be ordered as an option, factory installed or field retrofit.

VKF<sup>®</sup> is a registered trademark of LaVezzi Precision, Inc.

Elmhurst, Illinois



**FIGURE 1**



**FIGURE 2**



## INSTALLATION

EACH SIMPLEX 35 PROJECTOR is carefully inspected and film tested before leaving the factory. Carefully inspect the unit on receipt for any shipping damage, and file any damage claims with the carrier **immediately**. It is the responsibility of the consignee, not Strong International, to file such claims.

THE FOLLOWING RECOMMENDATIONS should be studied carefully prior to installation. Your Strong International Dealer may wish to assist in installing those projection booth products supplied by him.

## UNPACKING

The Simplex 35 Projector is shipped in a sturdy wooden crate. TOP and OPEN THIS SIDE are marked on the carton. The projector is mounted to the base of the crate with (2) 3/8-16 hex head screws. If shipped as an "All-In-One" system (including 5-Star soundhead), the soundhead is mounted to the base with (2) 5/16-18 hex head screws.

An accessory kit is shipped with each Simplex 35 Projector. The kit includes the following:

- (1) Can Simplex Projector Oil
- (1) Oiler
- (1) Set Allen Wrenches
- (1) Framing Lamp Transformer

The tools and accessories are required for adjustments and routine maintenance after installation. Store them in a secure location in the projection booth.

## MOUNTING

When not shipped as an "All-In-One" system, the projector must be mounted to the soundhead, after the soundhead has been installed to the projection pedestal or console. See Soundhead Manual.

The projector mounting bar (P-2396) is shipped with the 5-Star Soundhead. Mount the bar to the base of the projector using the (2) 3/8-16 socket head screws provided. Mount the projector to the top of the soundhead with the mounting bar in the channel on the top of the soundhead casting. Attach the mounting bar to the soundhead casting using the (2) 5/16-18 hex head screws and washers supplied. A slight degree of tolerance between the mounting bar and the soundhead casting permits positioning the projector for smooth film feed between the projector and soundhead. When correctly positioned, securely tighten all mounting fasteners. Run the drive belt to the projector and tension the belt with soundhead idler assembly.

## LAMPHOUSE OPTICAL ALIGNMENT

Carefully follow the lamphouse manufacturer's instructions regarding correct optical alignment between the lamphouse and projector. The lamphouse is generally aligned to the projector aperture, but some consoles require positioning the projector and soundhead to the optical center of the lamphouse. DO NOT alter the film path between the projector and soundhead in the course of these adjustments. DO NOT operate the lamphouse with the douser open unless the projector is running.

## LAMPHOUSE LIGHT SHIELD

Light shields, or nose cones, supplied by the lamphouse manufacturer, may be installed between the projector shutter guard and the lamphouse snood. Make certain that the nose cone does not obstruct the rotation of the shutter. Trim or otherwise modify the nose cone as required.

## FRAMING LAMP TRANSFORMER

Connect the (2) yellow leads of the transformer to the framing lamp leads running from the 90 degree connector at the top of the projector on the shutter housing. Shield the leads in flexible conduit as required. Supply 120 V.AC to the (2) black transformer leads. The framing light switches ON and OFF by means of the pushbutton switch above the film trap inside the film compartment.

## PICTURE CHANGEOVER

The Simplex 35 is normally supplied with either a G-2090 (Essannay) or G-2095 (Kelmar) 120 V.AC picture changeover device. Connect the changeover leads as follows:

<u>G-2090</u>	<u>G-2095</u>
Blk - OPEN	Blk - OPEN
Brn - CLOSE	Red - CLOSE
Wht - COMMON	Wht - COMMON
	Grn - GROUND

NOTE: These changeover devices require a 120 V.AC **pulse** to operate. Connecting the changeover to a **sustained** 120 V.AC supply will destroy the electrical coil. Check carefully the instructions supplied with the automation controller or the (installer-supplied) switching circuit.

## LENS TURRET

The MANUAL turret requires no electrical connections. Installer connections to the AUTOMATIC turret are made to terminals located in the control box adjacent to the turret on the front of the projector. The FLAT, SCOPE, and SPECIAL inputs are derived from an automation controller and/or other installer-supplied circuitry.

NOTE: "SPECIAL" input applies **only** to a third lens in a three-lens turret.

## LENS TURRET (con't.)

Connect the control leads as follows. OBSERVE CORRECT AC PHASING.

<u>Terminal No.</u>	<u>Function</u>
J5-1	AC Phase (Blk)
J5-2	AC Neutral (Wht)
J5-3	Ground (Grn)
J6-1	SCOPE Format
J6-2	FLAT Format
J6-3	"SPECIAL" Format (TU2030)
J6-4	Lens Format COMMON

## LENS INSTALLATION

The lens barrels are individually marked to designate their screen format. The barrels of the standard two-lens turret are marked SCOPE (CinemaScope®, or anamorphic) and FLAT (wide screen, non-anamorphic). The additional barrel in the three-lens turret is marked SPECIAL. The lenses must be installed in the correct barrels, for both correct lens counterbalancing and aperture logic. Magnacom lenses are not required in any configuration.

Rotate the turret to the SCOPE position. The automatic turret will index to this position after the SCOPE switch is pressed; the manual turret must be indexed by hand. Make certain the SCOPE aperture plate is in position. Center the focus adjustment screw, allowing equal travel forward and back. Insert the CinemaScope lens and anamorphic adapter into the SCOPE barrel. Start the projector, ignite the lamphouse, and project a picture to the screen. Move the lens inside the barrel until a sharply focused picture is projected, and the anamorphic correction is on the correct horizontal plane. Securely tighten the lens locking knob on the top of the SCOPE barrel. Close the lamphouse douser.

Reset the turret to FLAT format, and make certain the FLAT aperture is in position. Center the focus adjustment screw, and insert the FLAT lens. Open the lamphouse douser and move the lens inside the barrel until a sharply focused picture is projected. Tighten the lens locking knob above the FLAT barrel.

Repeat the above procedures as required for the "special" lens used in a three-lens turret. Once installed, DO NOT remove the lenses for cleaning. The turret is hinged, and opens to permit cleaning the rear surfaces of the lenses.

File the aperture plates to size the picture to the screen and/or masking.  
**NOTE:** When projecting a white light while filing apertures, close the lamphouse douser **frequently** to allow the lens to cool.

DO NOT attempt to correct "keystoning" by shimming the turret or offsetting the position of the lenses. The lenses **must** be positioned on optical center to project a satisfactory image.

## START-UP PROCEDURES

ALL SIMPLEX PROJECTORS are carefully "run-in" at the factory before shipping. No "run-in" period at the installation site is required. Some gear whine may be noticed initially, but should disappear after a few hours of operation.

### INITIAL OILING

One quart of Simplex Projector Oil is included in the accessory kit supplied with new equipment. **USE ONLY GENUINE SIMPLEX PROJECTOR OIL IN THE MECHANISM.** Use of other lubricants may inhibit pump operation and damage moving parts. Additional oil is available through authorized Strong International Dealers; order Part No. R-0059 for (1) quart quantities.

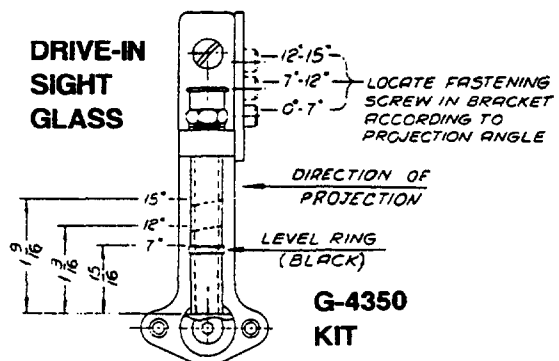
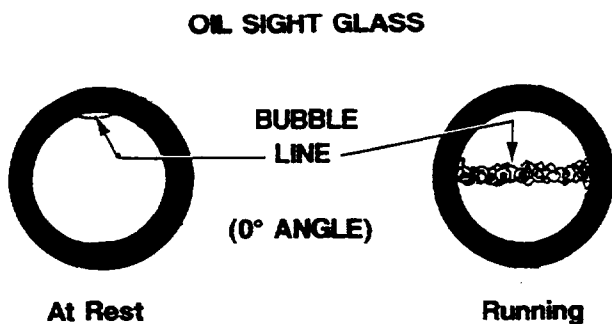
**DO NOT, at any time, operate the projector without oil.**

Add oil through the filler located at the top of the gear compartment cover. The oil level is visible through the sight glass inside the film compartment at the base of the main frame. When the projector is level (0 degree projection angle), the correct oil level should be nearly to the top of the sight glass, with a small air bubble visible at the top.

As the machine is tilted to a downward projection angle, the air bubble will disappear. When the machine is started, the visible oil level will drop, indicating that the pump is drawing the oil from the reservoir and circulating it throughout the gear compartment.

If the machine is to be used in an extreme upward projection angle, the oil level will drop, and may disappear when the machine is running. In this event, it is recommended to install a G-4350 Drive-In Oil Gauge Mounting Kit (see Parts Catalogue, Page 1-18). The main frame is drilled to accept use of this kit.

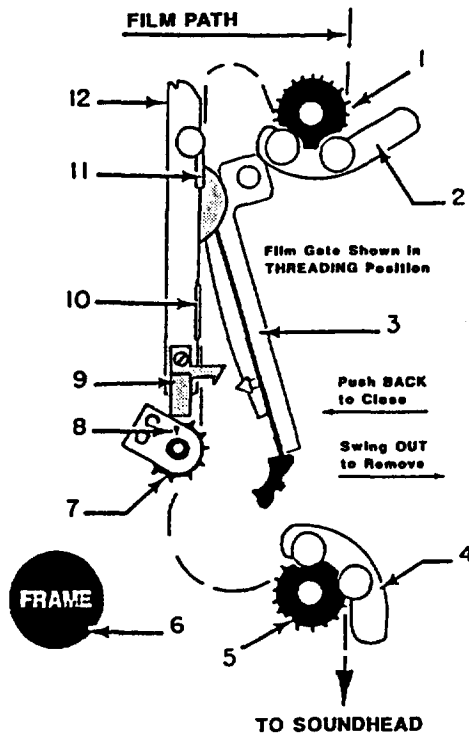
Rotate the soundhead flywheel by hand to turn the projector mechanism. It should turn freely and smoothly. Start the projector motor and run for at least one minute. Check for an oil splash against the gear compartment cover glass.



## THREADING

Threading the projector correctly is one of the operator's most important duties. Careful attention during this operation pays off in improved performances and long print life.

Unlatch and open the turret. Rotate the framing knob (Item 6) to its center position (FRAME reading level, as shown). Using the soundhead flywheel, turn the mechanism by hand to place the intermittent sprocket (Item 7) in its "rest" position. In the "rest" position, the index mark (Item 8) will align with one of the painted white index lines on the intermittent shaft collar after the sprocket rotation is complete.



**THREADING DIAGRAM**

Open the pad roller assemblies (Items 2, 4). Open the film gate (Item 3) by pressing the gate opening latch (Item 9). The film gate will swing open to the threading position (as shown).

At this time, it is advisable to dismount the film gate by swinging the gate to its full forward position, and withdrawing the gate from the film compartment. Use a clean, dry cloth to wipe down all film-bearing surfaces of the gate and trap (Item 12). Replace the film gate after cleaning. This procedure should be performed at each threading operation.

Thread the film as illustrated. Engage first the intermittent sprocket (Item 8), and check for correct framing at the framing aperture (Item 11). When correct, close the gate by pushing the gate into the trap and engaging the gate latching lever (Item 9). Form loops above and below the gate as illustrated, and close the pad roller assemblies (Items 2, 4).

Turn the mechanism by hand to advance a few frames of film. Run fingers over each sprocket (Items 1, 5, 7) to insure that the sprocket teeth are centered in the film perforations, and the film is centered on the sprockets. Check again the position of the film in the framing aperture (Item 11). A correct frame image in the framing aperture insures correct frame positioning in the picture aperture (Item 10). Use the framing knob (Item 6) to correct misframes. Close the turret.

Thread the soundhead as instructed in the soundhead manual. A slight degree of film tension is required above the feed sprocket (Item 1) and below the soundhead. This prevents the film from snapping on motor start.

## INITIAL OPERATION

CLEAN ALL FILM BEARING SURFACES BEFORE EACH THREADING OPERATION. Check all sprocket teeth for hooks or burrs; replace if required. Keep all pad rollers clean and operating freely. Make certain the turret is set to the correct lens and aperture for the desired screen format. FLAT format is generally used for initial setup of the projection system.

The Film Trap Tension Knob is located at the top of the film trap, and is numbered 1 - 5. Rotate this knob counterclockwise to its stop. This setting ("1") indicates minimum trap tension. Thread film into the projector, ignite the lamp, and project a picture to the screen. Use of RP-40 test film is highly desirable for this stage of machine set-up. This test film may be purchased directly from the Society of Motion Picture and Television Engineers:

SMPTE Test Film Department  
595 West Hartsdale Avenue  
White Plains, New York 10607

Order: 35 PA-50 (50 ft.)  
or 35 PA-200 (200 ft.)

Install the lenses and set focus as detailed in the preceding INSTALLATION section. File the apertures to fit screen parameters.

If the projected picture is unsteady, rotate the film trap tension knob clockwise **one step at a time**, while the film is running. Always adjust for the **minimum** tension required to project a steady picture. Excessive tension not only increases wear on parts, but in extreme cases may cause torn perforations and film breakage.

Check the projected picture for travel ghost. "Travel Ghost" is the term commonly applied to vertical streaking of lighter areas against a darker area, and is particularly noticeable during opening or closing titles and credits. If ghosting is apparent, rotate the shutter adjustment knob on the top of the projector until the ghosting disappears. If the ghost cannot be eliminated by means of this knob, see "Shutter Timing" in the ADJUSTMENTS AND REPLACEMENTS section of this manual.

The rotation travel of the lens turret is limited by the indexing stop pin mounted to the outer ring of the turret. The automated turret on the PR1060A includes a solenoid which pulls the pin when the turret is in motion. Two coil expansion springs seat the pin when the turret is at rest. When first energized, the autoturret will automatically index to FLAT mode, if not already in FLAT. The photo switch on the turret ring will "read" the cueing flag and set the correct aperture (silver = FLAT, black = SCOPE, black outer edge = third lens on TU2030).

In the event of a turret motor failure, the automatic turret can be operated manually until a replacement motor is obtained. It is advisable to de-energize the turret control until the replacement motor is installed. The dual aperture plate can be pushed in or pulled out manually to set the correct format.

## **MAINTENANCE**

THE PROJECTOR MECHANISM should periodically undergo a careful and thorough inspection. A regular schedule of adjustments and replacement of wearing parts will insure long life and minimize downtime.

### **LUBRICATION**

Drain and discard the projector oil at least annually. Clean the intake filter and the oil reservoir. Replace with genuine Simplex Projector Oil.

### **SPROCKETS**

Examine each sprocket carefully for wear, undercutting ("hooks"), and/or looseness. Replace as required. Assuming the projector is used for forward-running only, hooked sprockets can be re-used by reversing the sprocket on its shaft. Check the alignment of the intermittent sprocket.

### **PAD ROLLERS**

Check pad rollers for grooves, flat spots, and/or looseness. Clean rollers thoroughly to relieve binding; replace as required. Check alignment of pad rollers to sprockets; centered, flanges not rubbing, (2) film thicknesses above sprocket face.

### **FASTENING HARDWARE**

Check all fasteners for tightness. Normal operating vibration may cause fasteners to loosen. Tighten as required.

### **FILM GATE**

Remove all foreign matter (dirt, wax) by cleaning thoroughly. Examine film runners and intermittent shoes for wear; replace if required. Check alignment of intermittent shoes to intermittent sprocket faces. Check gate opening and closing lever for smooth operation; clean upper pivot shaft to relieve binding.

### **FILM TRAP**

Examine lateral guide rollers for grooves and binding. Clean carefully, adjust, or replace. Remove all foreign material from tension straps. Inspect for wear; replace if required.

### **LENS TURRET**

Periodically check the condition of the O-ring drive tires on the auto turret drive wheel. Clean periodically; replace if worn or cracked. DO NOT LUBRICATE.

## LENS TURRET (continued)

The indexing plate of the lens turret rotates on (3) ball bearings mounted to the turret ring casting. The uppermost bearing is retained by means of an eccentric bushing, allowing a degree of adjustment. To adjust, loosen the socket head bearing screw, and increase or decrease bearing pressure by rotating the eccentric bushing with a 9/16 inch wrench. **Do not apply excessive pressure;** allow the index plate to rotate freely, but without "play" between the plate and ring.

On both AUTO and MANUAL turrets, the index stop is actuated by the (2) expansion springs mounted between the stop pin and the turret ring. Make certain these springs are correctly installed. Replace immediately if worn; the correct spring tension is required to seat the index stop pin. The index stops on the lens indexing plate are mounted with (3) screws each. Two of the mounting holes are slotted to provide a degree of fine adjustment of the lens position. Securely tighten all (3) screws when the lens is correctly positioned.

The index stop pin solenoid pulls when the auto turret is in motion. If the solenoid buzzes when pulled, dismount and clean the solenoid. Replace the solenoid armature in its original position.

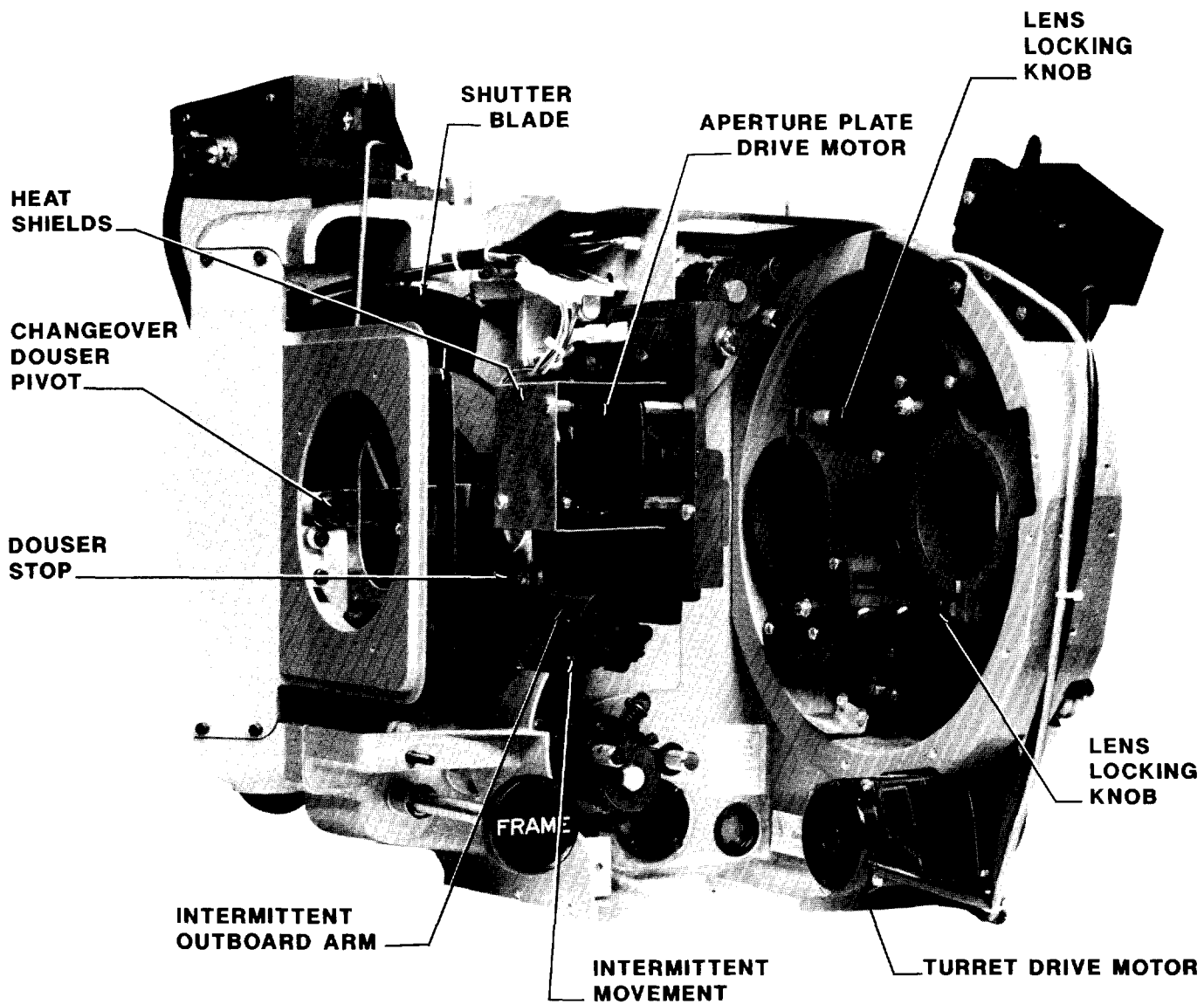
Clean the turret hinge to allow free operation. Make certain that the turret is fully closed when locked. The deadstop screw in the center of the turret catch can be adjusted to remove "play." **Do not shim the turret, or offset the index stops in an attempt to correct "keystoning."** Keep lenses on correct optical centers.

Clean the lenses as recommended by the lens manufacturer. Do not remove the lenses from the turret for cleaning; doing so would alter the preset focus of the lenses. Swing the turret open to the THREAD position for easy access to the rear surfaces of the lenses. Close and lock the turret after cleaning the lenses.

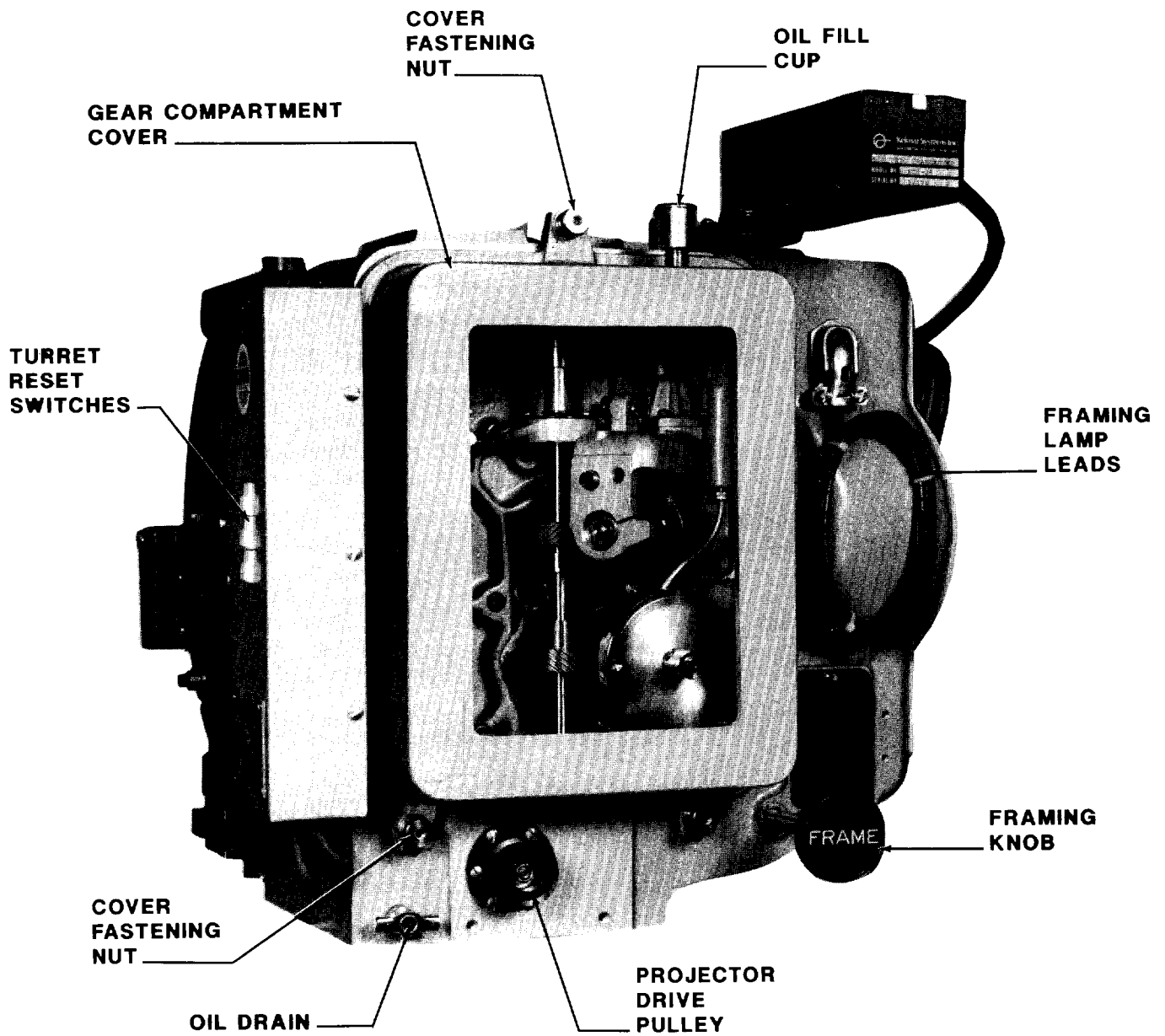
## OVERALL APPEARANCE

Clean all enameled surfaces of the projector regularly. Oily surfaces will attract and hold dust and film particles.

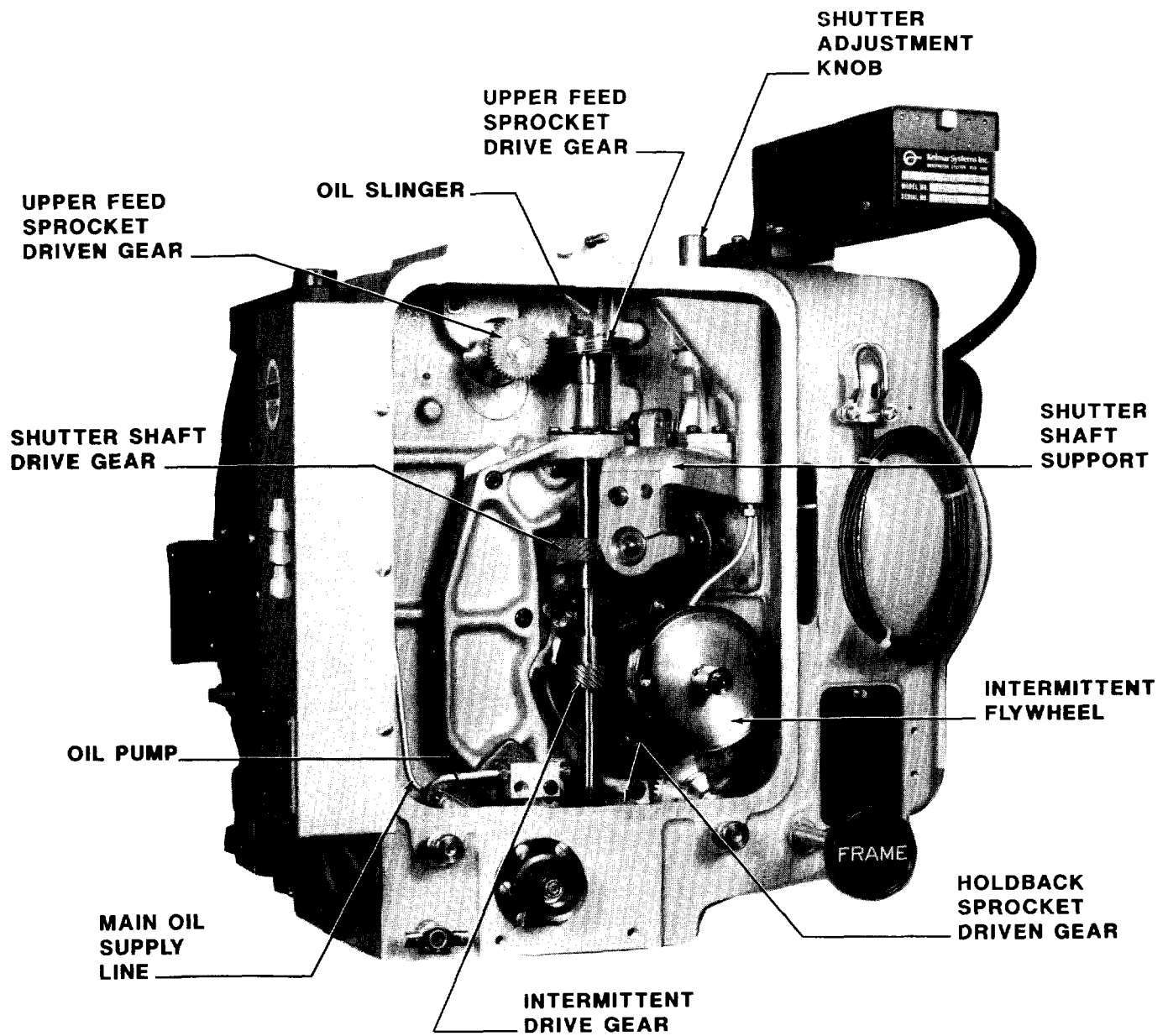




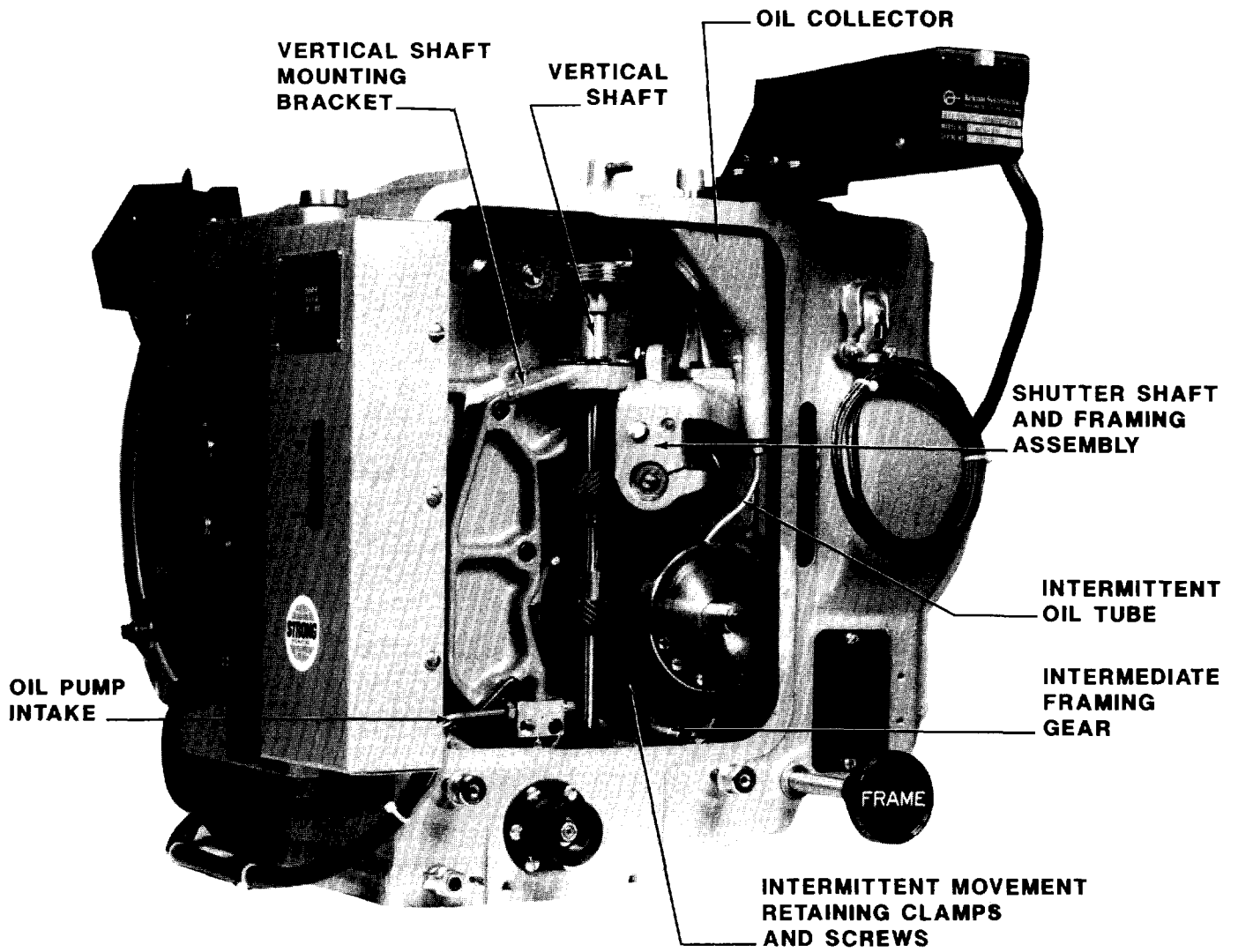
**FIGURE 3**



**FIGURE 4**



**FIGURE 5**



**FIGURE 6**

## **ADJUSTMENTS AND REPLACEMENTS**

REFER TO THIS SECTION in conjunction with following the instructions in the MAINTENANCE section. Conscientious maintenance and service of the Simplex 35 will insure many years of excellent performance.

ADJUSTMENTS are quickly accomplished, and replacements performed, as all units and components are readily removed. Adjustments and replacements described below may be performed by qualified projection booth personnel. Any elements of maintenance and service not detailed below should be referred to an authorized Strong International Dealer.

### **INTERMITTENT SHOE REPLACEMENT**

Remove film gate. Dismount the shoe assembly by removing the mounting screw and leaf spring. Replace worn components as required; check leaf spring for adequate tension. Reassemble and remount.

### **INTERMITTENT SHOE ALIGNMENT**

Place a straight edge across the outboard face of the intermittent sprocket and the outer face of the tension shoe. Loosen the intermittent shoe assembly mounting screw, and slide the shoe assembly, as required, for exact alignment. Tighten mounting screw securely.

### **FILM TRAP AND APERTURE CHANGER ASSEMBLY**

Dismount the film gate and the shutter guard. Turn off power to the turret control. Loosen the single captive film trap mounting screw located between the trap tension knob and the sliding dual aperture plate. Unplug the aperture change motor (PR1060A only). Pull the trap assembly straight out from the projector main frame. To replace, make certain that the contacting surfaces on both the main frame and the trap casting are clean. Slide the film trap in so that it registers with the (2) dowel pins on the main frame. Securely tighten the captive screw. Plug in the aperture change motor (PR1060A only). Check the alignment of the intermittent sprocket to the film trap (see INTERMITTENT MOVEMENT section following).

### **FILM TRAP LATERAL GUIDE ROLLERS**

Dismount film trap and associated components (see above). Loosen the (2) lateral roller pivot set screws. Slide the lateral roller pivots out of the casting and remove the lateral rollers and spring. Replace worn parts and reassemble. NOTE: For ease of threading, the spring-loaded lateral roller should be installed inboard. Position the fixed (outboard) lateral roller to the outboard edge of the film path. The horizontal positioning of the lateral rollers is determined by sliding the rollers and pivots in the trap casting.

## **FILM TRAP LATERAL GUIDE ROLLERS (con't.)**

Center the rollers in this manner to the film path. Leave enough end play in the pivots to permit free rotation of the lateral rollers, and tighten the (2) pivot set screws.

## **PRESSURE STRAP REPLACEMENT**

Dismount the film trap and associated components. Rotate the trap tension knob fully counterclockwise to position "1." Remove the (2) screws from each strap, and remove the straps. Replace with new straps and reassemble.

NOTE: Project film to reset gate pressure (see START-UP PROCEDURES).

## **STUDIO GUIDE REPLACEMENT**

Remove the film gate and open the turret assembly. Remove the (2) flat socket head screws and dismount the studio guide. Position and install the replacement studio guide; close the turret and replace the film gate.

## **GEAR COMPARTMENT COVER REMOVAL**

Only when absolutely necessary, remove the gear compartment cover and only after the machine has been at rest for at least (10) minutes to allow all oil to settle into the reservoir. Remove the (3) cover fastening thumb nuts. Make certain no foreign material deposits in the gear compartment while the cover is removed. Before replacing the cover, wipe all oil from the cover gasket and the mating surface on the projector main frame. Any oil remaining on these surfaces will provide an oil seepage path after the cover is replaced. Tighten all (3) thumb nuts equally and fingertight, just enough to form an oil-tight seal.

## **INTERMITTENT MOVEMENT REPLACEMENT**

1. Open the film gate. Rotate the framing knob (on the gear side) fully counterclockwise.
2. Set the shutter adjusting knob in mid-position. To locate mid-position, rotate the knob to its stop, and reverse 1-1/2 turns.
3. Remove the gear compartment cover (see above).
4. Rotate the vertical shaft until the intermittent drive gear mounting screw is visible. Remove the mounting screw and slide the gear downward.
5. Loosen the (2) intermittent retaining clamp screws on the framing cam and position the clamps to clear the intermittent case.
6. Withdraw the intermittent assembly from the gear compartment side, taking care not to strike the intermittent oil feed tube positioned above the intermittent assembly.
7. Slide the replacement intermittent movement into position. The keyway in the intermittent case is aligned with the key in the framing cam.
8. Rotate the intermittent retaining clamps to retain the intermittent assembly and tighten the fastening screws securely.

### **INTERMITTENT MOVEMENT REPLACEMENT (con't.)**

9. Rotate the shutter counterclockwise (from the rear of projector) until its leading edge is exactly in line with the upper edge of the picture aperture (aperture just completely blocked).
10. Rotate intermittent flywheel until the intermittent sprocket turns clockwise; (1) of the (4) index lines on the outboard collar will align with the index line on the outboard bearing support arm.
11. Continue to rotate the flywheel in the same direction until the intermittent sprocket just begins to move.
12. Reverse rotation of the flywheel until the sprocket stops. Then, rotate the flywheel counterclockwise until the start of sprocket rotation is felt.
13. Continue to rotate the flywheel until the precise point at which the sprocket is about to move is reached. Retain that setting.
14. Raise the intermittent drive gear and rotate it tooth by tooth until it meshes with the intermittent driven gear. At this time, the mounting hole in the drive gear should align with the hole in the vertical shaft. Do not rotate the vertical shaft or driven gear. Replace the gear mounting screw.
15. Align the intermittent sprocket with the film trap (see below).

### **INTERMITTENT SPROCKET ALIGNMENT**

Loosen the intermittent sprocket fastening screw and slide the sprocket, as required, until the outside face of the sprocket is flush with a straight edge placed on the outside face of the lower holdback sprocket. Securely tighten the intermittent sprocket fastening screw.

### **INTERMITTENT SPROCKET REPLACEMENT**

1. Remove film gate. Dismount shutter guard and film trap.
2. Rotate the framing knob to its extreme clockwise position to expose the intermittent sprocket film stripper mounting screw. Remove the screw and stripper.
3. Turn the projector mechanism by hand so that one of the collar index lines aligns with the index mark on the outboard arm, and the sprocket mounting screw is exposed.
4. Remove the intermittent sprocket mounting screw and nut.
5. Loosen the (2) intermittent outboard collar set screws and remove the collar.
6. Remove the (2) outboard arm socket head mounting screws and dismount the outboard arm.
7. Remove the intermittent sprocket. Slide replacement sprocket onto shaft.
8. Position the intermittent outboard bearing arm on intermittent sprocket and start the (2) socket head mounting screws finger tight. Adjust the bearing arm, as required, so that the bearing is precisely centered with respect to the intermittent shaft. Tighten the (2) mounting screws.
9. Fasten the replacement intermittent sprocket to the intermittent shaft using the screw and nut supplied.

## **INTERMITTENT SPROCKET REPLACEMENT (con't.)**

10. Slide the intermittent outboard collar on the intermittent shaft and align one of its index lines to the index mark on the outboard bearing arm. Pull the intermittent sprocket OUT while pressing the outboard collar IN, so that shaft end play is just perceptible.
11. Securely tighten the (2) collar set screws. Check that the shaft end play is just perceptible.
12. Replace intermittent sprocket film stripper.
13. Align the intermittent sprocket (see above).
14. Replace film trap and shutter guard. Install the film gate and align the intermittent shoe assembly as required.

## **OIL PUMP FEED REVERSAL (Drive-In Theatre Operation)**

See PARTS CATALOGUE, Page 1-20. Remove gear compartment cover. Remove compression nut, compression bushing, and oil line and filter from the left-hand side of the oil tube connector. Reconnect parts in sequence on the right-hand side, and tighten. Install the Drive-In Oil Gauge Assembly (G-4350) if desired (see PARTS CATALOGUE, Page 1-18).

## **FRAMING LAMP BULB REPLACEMENT**

Remove shutter guard. Remove framing lamp bulb. Insert replacement bulb into socket; twist to seat. Replace shutter guard.

## **FRAMING LAMP SWITCH REPLACEMENT**

Remove shutter guard. Desolder switch leads from switch terminals. Replace switch and resolder leads to replacement switch. Replace shutter guard.

## **FEED AND HOLDBACK SPROCKET ASSEMBLIES REMOVAL (See pages 23, 24)**

From the film compartment side, remove the (4) socket head mounting screws retaining the sprocket assembly to the projector main frame. Withdraw the assembly from the film compartment. Make certain that the gasket is in the groove in the sprocket assembly casting. When replacing, start the mounting screws finger tight. Position the assembly so that there is slight backlash between the meshing gears. The (4) mounting holes in the casting are sufficiently oversize to permit this adjustment. Tighten the mounting screws and check gear backlash. Adjust as required.

## **FILM SPROCKET REPLACEMENT (See pages 23, 24)**

1. Remove (1) of the (2) film stripper mounting screws. Loosen the other mounting screw and rotate the stripper to clear the sprocket.
2. Open the pad rollers.



### **FILM SPROCKET REPLACEMENT (con't.)**

3. Remove the hex head sprocket fastening screw from the outboard end of the sprocket shaft and slide the sprocket from the shaft. Leave the spring washer and flat washer on the shaft.
4. Slide the replacement sprocket (G-6611) onto the sprocket shaft, aligning the key in the sprocket with the keyway in the shaft. Secure with the sprocket fastening screw.
5. Replace the film stripper.

### **FILM SPROCKET DRIVEN GEAR REPLACEMENT (See pages 23, 24)**

1. Remove film sprocket assembly as a unit (see above).
2. Remove gear fastening screw and slide gear from shaft.
3. Slide replacement gear onto shaft. Insert the fastening screw, position the gear to allow slight end play, and securely tighten fastening screw.
4. Replace sprocket assembly and adjust for backlash (see above).

### **PAD ROLLER ASSEMBLY REPLACEMENT (See pages 23, 24)**

1. Remove film sprocket assembly as a unit (see above).
2. Open pad rollers, compress actuating spring on the sprocket assembly so that the small hole in one arm of the forked spring guide is accessible. Pass a pin or paper clip through this hole to relieve the spring tension.
3. Remove pad roller assembly mounting screw and dismount pad roller arm.
4. Replace worn components as required, reassemble, and remove the pin from the spring guide. Spacer washers, if used, are retained in their original positions. Make certain that the pad rollers are centered directly over the film sprocket.
5. Position pad roller arm adjusting screw on the sprocket assembly casting so that, with (2) thicknesses of film between the sprocket and pad rollers, both pad rollers just rotate. Ensure that the adjusting screw locknut is then securely tightened.
6. Reinstall sprocket assembly and adjust for backlash (see above).

### **SHUTTER TIMING (See Inside Back Cover)**

Place the shutter adjusting knob in its mid-position. To locate mid-position, rotate the knob to its stop, and reverse 1-1/2 turns. Remove the shutter guard. Turn the projector mechanism by hand so that the index mark on the intermittent outboard bearing arm is centered between two of the collar index lines. Loosen the (2) socket head shutter hub clamping screws. With the screws loosened, the shutter blades should turn freely. Hold the inching knob to "freeze" the mechanism, so the shutter shaft remains stationary. Rotate the shutter to the fully closed position (one blade completely covering the film aperture). Tighten the (2) hub clamping screws. Replace the shutter guard. Project a picture and check the screen; a slight adjustment of the shutter adjustment knob on the top of the head may be required to eliminate travel ghost (see START-UP PROCEDURES).

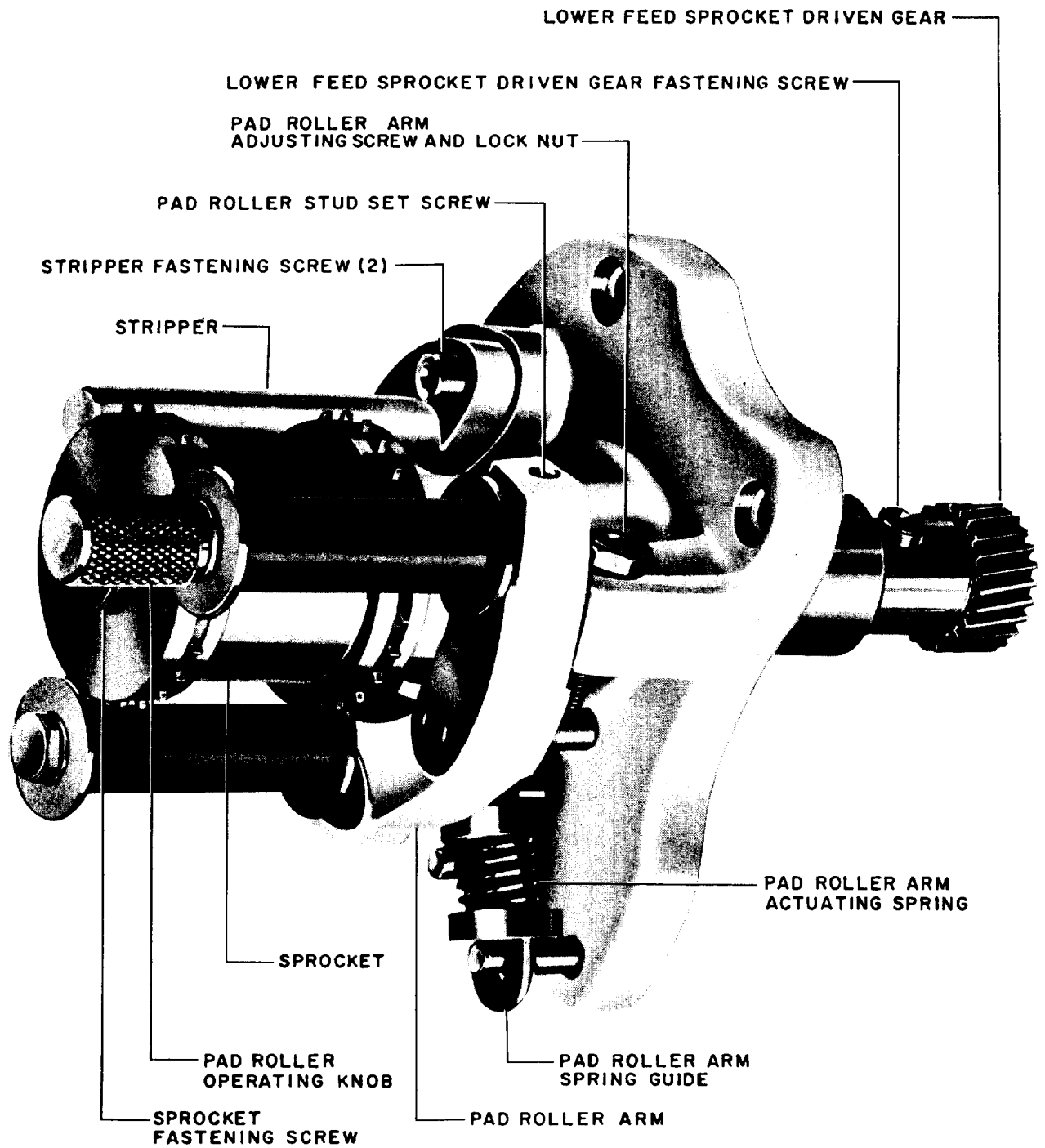
## SHUTTER REPLACEMENT

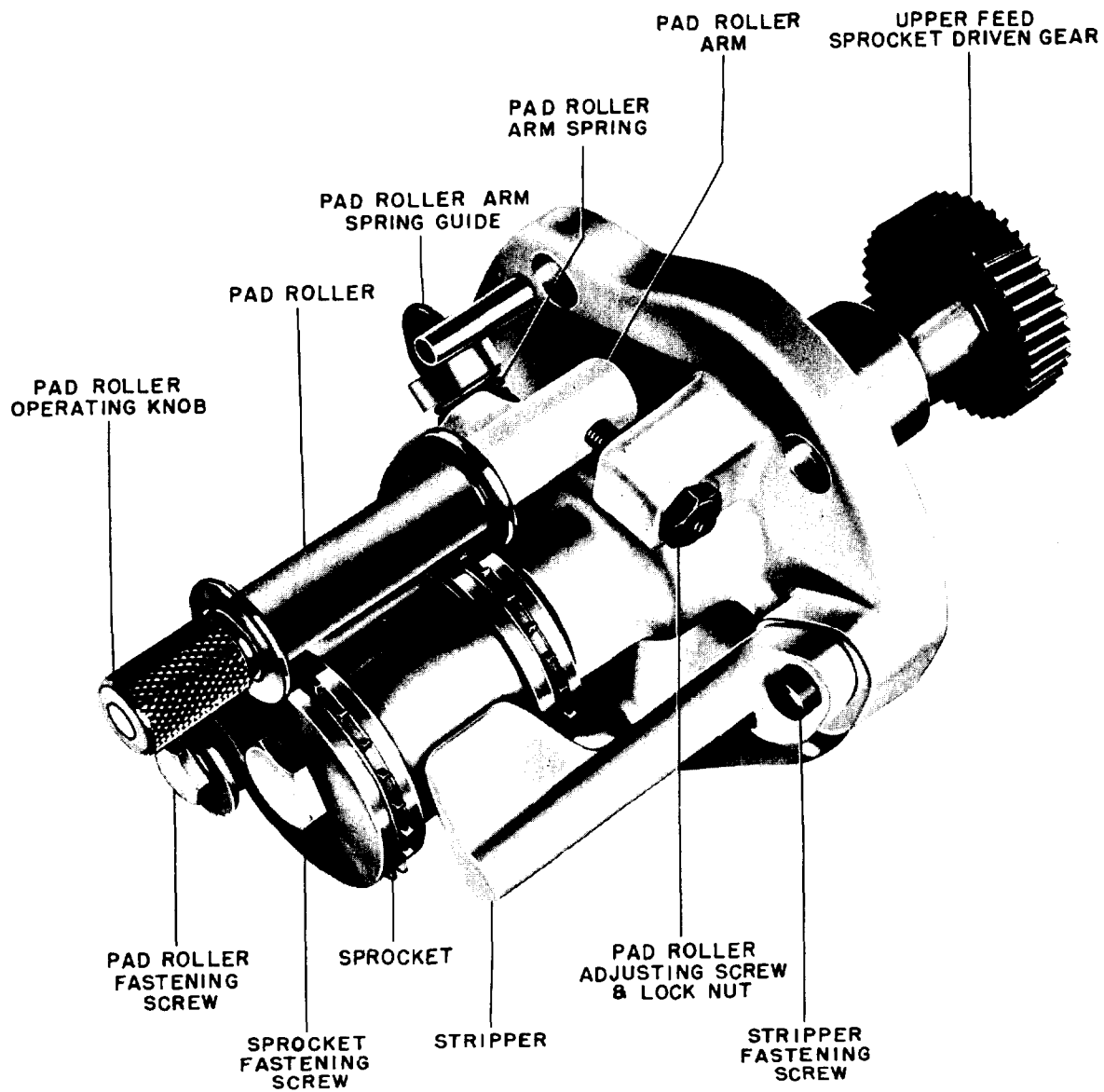
Remove the shutter guard. Disconnect the linkage to the changeover douser. Remove the (4) socket head mounting screws from the rear cover, and dismount the cover. Loosen the (2) shutter hub clamping screws and dismount shutter. Install replacement shutter and set shutter time as detailed above. Replace the rear cover, douser linkage, and shutter guard.

## AUTOMATIC LENS TURRET

NOTE: Lens Turrets are aligned at the factory, and should require no adjustment at the time of installation.

1. Check for correct contact between the turret drive tire and the driven indexing plate. Clean surfaces to prevent dust and dirt build-up; replace O-ring tire(s) if cracked or worn. **Do not lubricate.** Check the (2) coil expansion springs on the index stop pin; replace if stretched or worn.  
NOTE: Turret and aperture motors are energized and in a constant "stall" condition when the projector is running. It is normal for these motors to be warm to the touch.
2. The index stops are mounted to the lens indexing plate with (3) screws. Two of the screw holes are slotted to permit fine adjustment of the lens position. This adjustment affect the up-and-down position of the picture on the screen. Periodically check lens positioning and correct if required. When correct, securely tighten the mounting screws.
3. Left-to-right positioning of the picture on the screen is adjusted by loosening the (2) button head socket screws adjacent to the lens (on either side of the focus knob). When slightly loosened, rotate the large lock nut using a 1/2 inch wrench. This moves the eccentric adjustment. Securely tighten the (2) button head screws when the picture is correctly positioned.  
NOTE: The above adjustments are best performed using RP-40 Test Film.
4. A screw in the center of the turret catch acts as a deadstop for turret closure. Adjustment of this screw is to be used to remove "play" ONLY; **do not attempt to correct "keystoning" by use of this screw.**
5. If a lens change fails to occur when cued, press the desired override switch (FLAT, SCOPE, or SPECIAL) on the turret control box. Check the condition of the cuing material; foil tape may be worn, or bar code information may be obscured by scratches or dirt. Check for faulty cue detector or failed contact in automation controller.
6. A malfunction in aperture/turret logic indicates a problem in the turret control board. **Consult the factory.** There are no user-serviceable components on the printed circuit board.
7. Periodically check the condition and positions of the "flags" mounted to the index stops. These "flags" are sensed by the optical switch to determine aperture logic. A **silver** flag denotes FLAT, a **black** flag denotes SCOPE, and a black-edged flag indicates SPECIAL (TU2030 only). The flags are to be positioned close enough to the optical switch to permit accurate detection, but should not obstruct turret rotation.





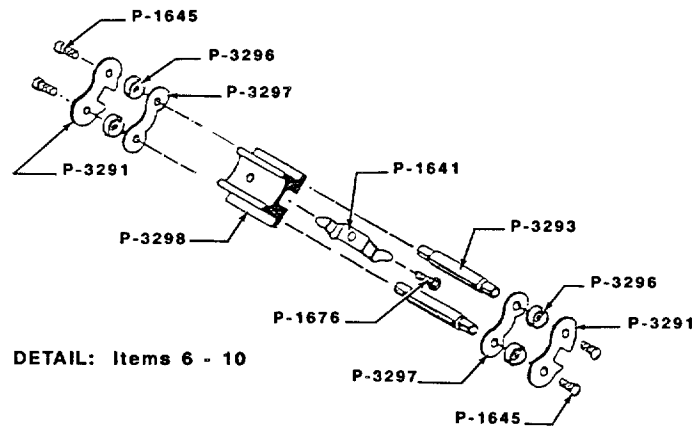
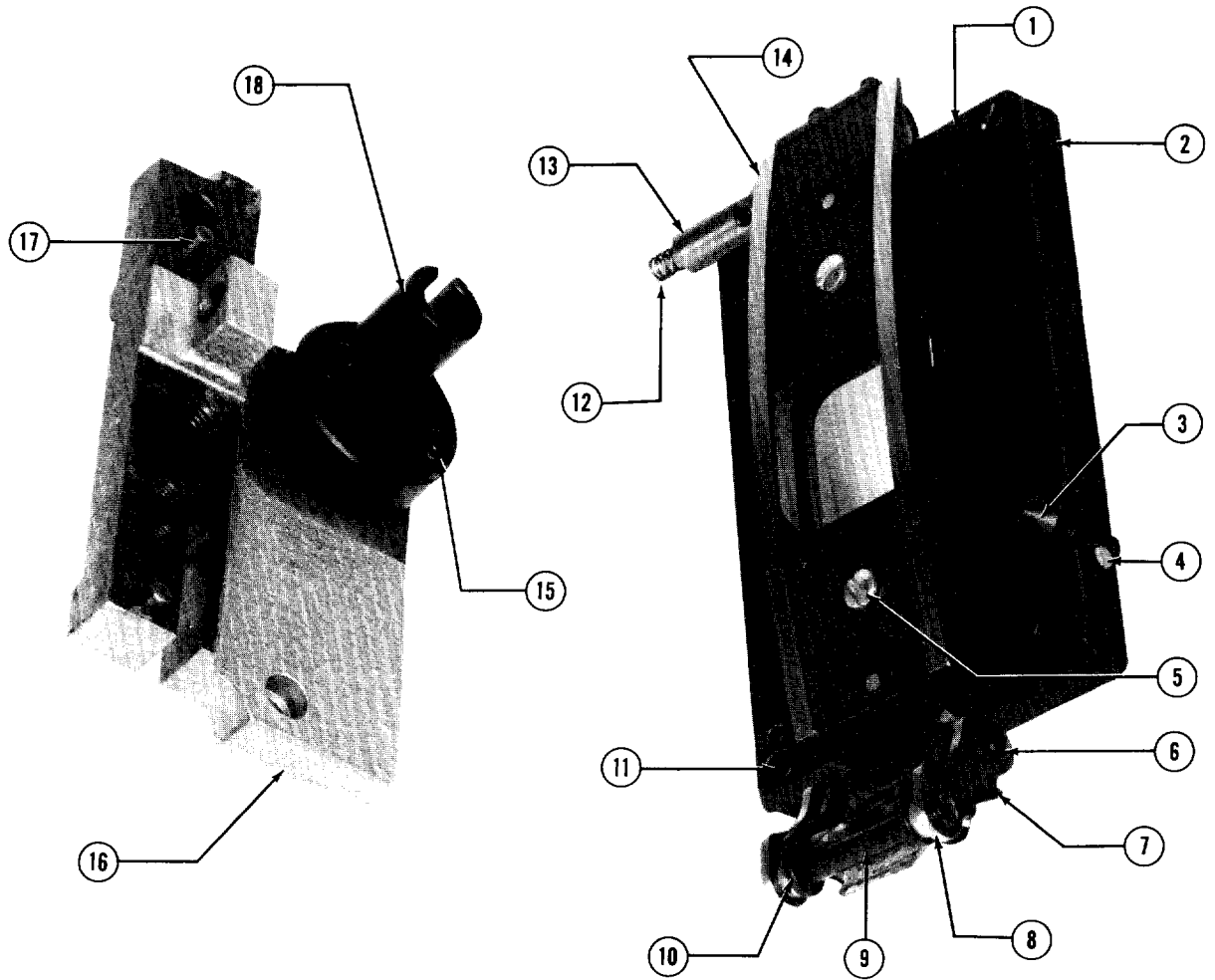
**SUPPLEMENTAL PARTS LIST**  
**SIMPLEX 35mm PROJECTOR**  
**Model PR1060**

THE FOLLOWING PAGES include a listing of parts unique to the PR1060 Projector with the TU2020 and TU2030 Turrets. Parts not listed in the following section will be shown in the SIMPLEX PARTS CATALOGUE which is supplied with each Simplex Projector.

WITH THE EXCEPTION of the Indexing Plate (Turret drawing, Items 4 & 5) and the Lens Lock (Item 11), the TU2020 and the TU2030 use the same mechanical parts. Turret Controllers utilize one of two IC chips (two-lens or three-lens logic), and the placement of jumpers differ. The Controller PC Board is generally *not user serviceable*.

SIMPLEX REPLACEMENT PARTS are available from authorized Strong International Dealers *only*. Specify Equipment Type and Serial Number when ordering parts.

ALL RETURN ITEMS shipped to Strong International must display a **Return Authorization Number** issued prior to such shipment. R.A. numbers must be requested through Strong International Dealers.



DETAIL: Items 6 - 10

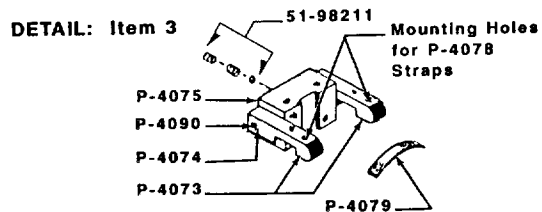
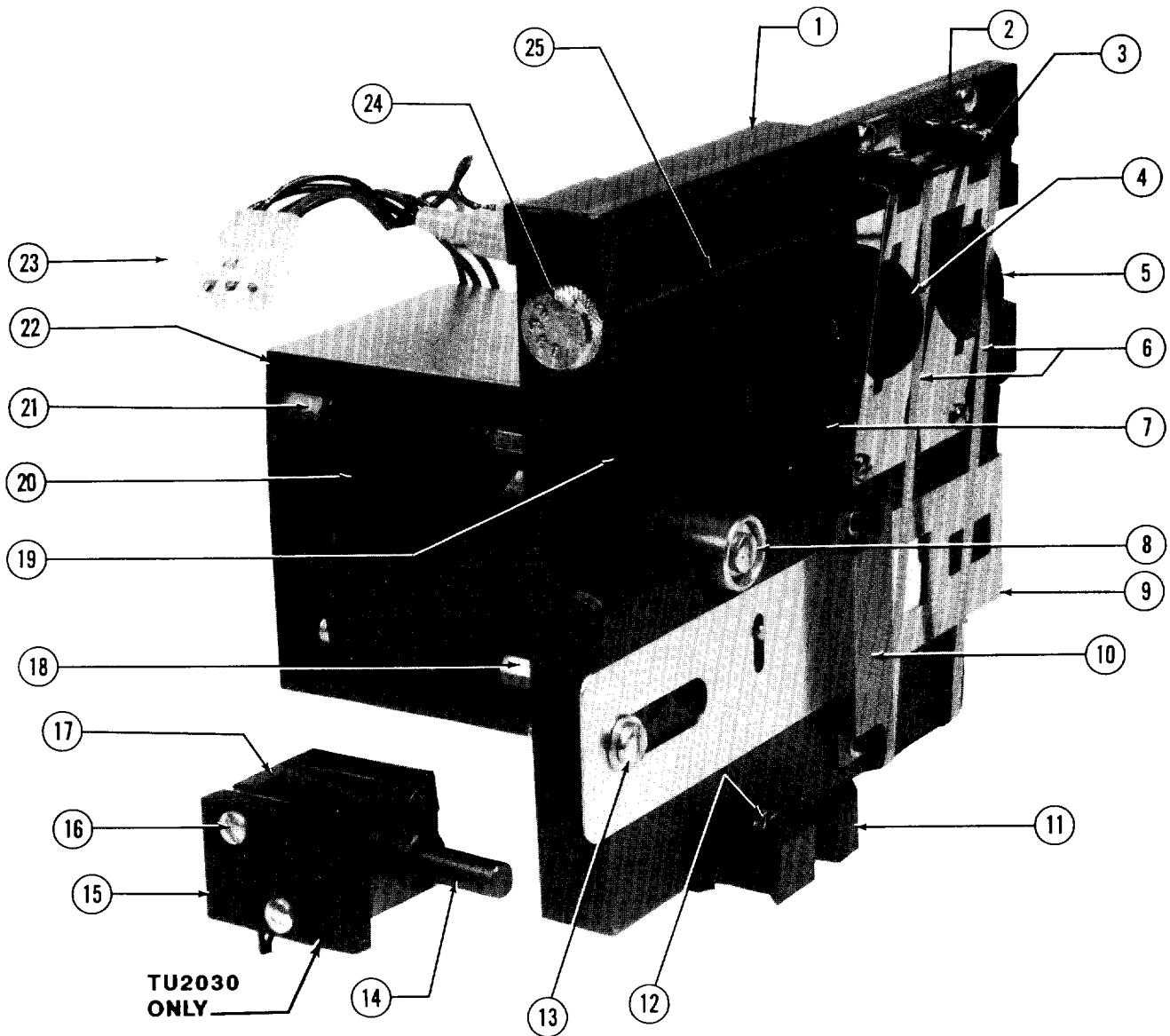
**PR1060 FILM GATE & PIVOT**

**SIMPLEX PR1060**

## Film Gate

Parts List

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
--	52-60302	Film Gate & Pivot Bracket Ass'y. (Items 1 - 18)
1	P-7824	Pressure Pad Mounting Plate
2	P-7808	Gate Pivot Plate
3	P-7802	Gate Catch Pin
4	21-51003	Set Screw, Nylon
5	H-2517	Screw, 6-32 x 3/8" Pan Head
6	P-1645	Shoe Mounting Screw
7	P-1641	Leaf Spring
--	P-1676	Spring Mounting Screw
8	P-3291 *	Outer Intermittent Sprocket Shoe
9	P-3293 *	Spacer Stud, Intermittent Shoes
10	P-3297 *	Inner Intermittent Sprocket Shoe
--	P-3296 *	Shoe Spacer
--	P-3298	Spacer Block
11	P-1663	Screw, 6-32 x 3/8" Special Fillister Head
12	P-2365	Compression Spring
13	P-7812	Gate Hinge Pin
--	21-37008	Dowel Pin, 1/8"
--	P-1757	Socket Head Set Screw, 4-40 x 1/4"
14	P-4068	Pressure Pad
15	41-51248	Screw, 10-24 x 3/4" Socket Head
--	41-51374	Screw, 10-24 x 1/2" Socket Head (concealed)
16	P-7885	Retaining Plate, Pivot Socket
17	P-1628	Dowel Pin, 1/4"
18	G-7805	Pivot Socket
<u>Not Shown</u>		
--	41-51269	Gate Closure Stop Screw, 10-32 x 1" Headless Allen Drive (located adjacent to Items 3 & 4)
--	41-35013	Lock Nut, 10-32
*	G-2350	Intermittent Shoe Assembly (Items 8 - 10, with Hardware)



**PR1060 FILM TRAP & APERTURE CHANGER**



**SIMPLEX PR1060**  
**Film Trap & Aperture Changer**  
Parts List

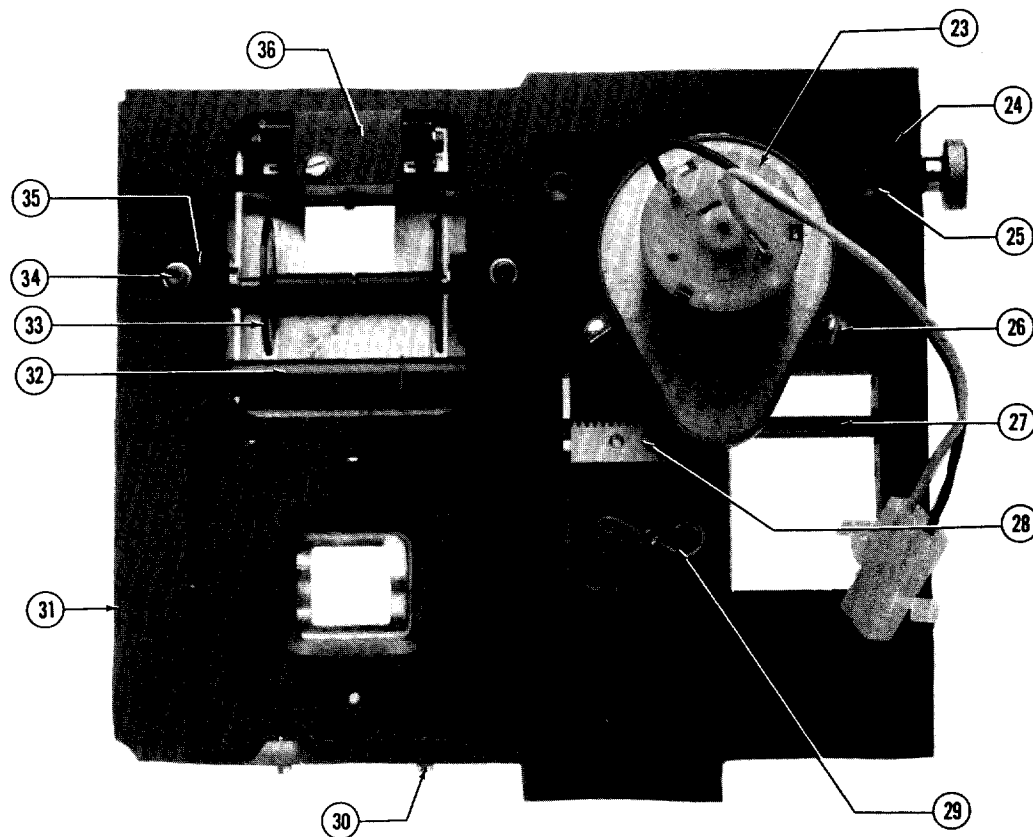
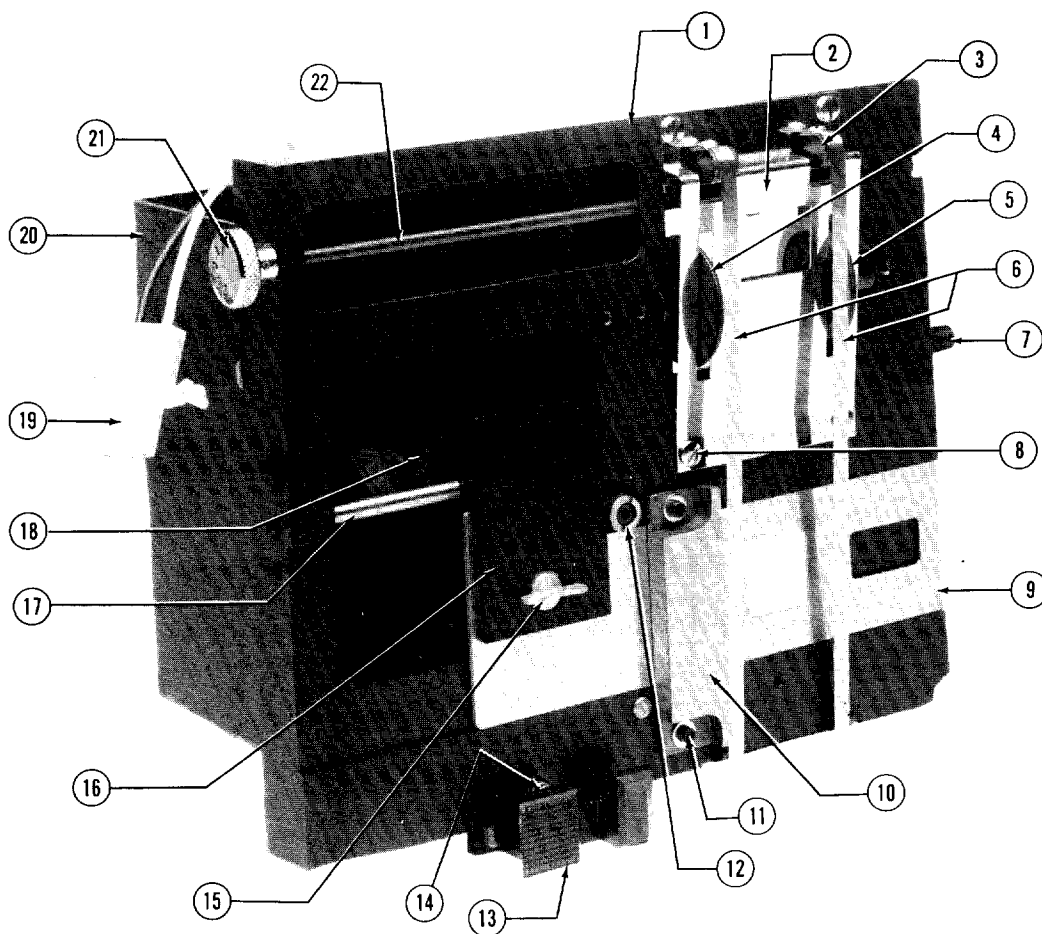
<u>Item</u>	<u>Part No.</u>	<u>Description</u>
--	52-60303	Film Trap & Aperture Changer Assembly, Two-Lens
--	52-60301	Film Trap & Aperture Changer Assembly, Three-Lens
1	P-9821	Trap Casting, Two-Lens (as shown)
--	P-7760	Trap Casting, Three-Lens
2	P-4071	Threading Guide (Framing Aperture)
--	41-51014	Screw, 4-40 x 3/16" Pan Head
3	P-4073	Tension Strap Mounting Arm
--	P-4075	Mounting Block, Tension Arms
--	P-4090	Retaining Ring
--	P-4074	Pivot Shaft
--	P-4079	Leaf Spring, Tensioning Cam
--	51-98211	NyLock Tension Spring
4	G-4435	Lateral Guide Roller, Fixed
5	P-4166	Lateral Guide Roller, Spring Loaded
--	P-1701	Compression Spring, Lateral Guide Roller
--	P-1698	Guide Roller Shaft Pivot (2 req'd.)
--	P-1435	Pivot Set Screw (2 req'd.)
--	P-4089	Retaining Ring
6	P-4078	Pressure Strap (2 req'd.)
--	H-2519	Retaining Screw
--	H-3108	Pin
7	P-1981	Trap Mounting Screw, Captive
--	P-1556	Retaining Ring
8	3346	Dual Aperture Drive Pin & Collar (TU2020)
8	P-7827	Triple Aperture Drive Pin & Collar (TU2030)
--	3347	Drive Shaft, Motor to Collar
--	7-111	Fibre Washer
--	3380	Compression Spring
--	41-51060	Collar Retaining Screw, 8-32 x 1/4" Pan Head
9	P-9654	Aperture Plate, Dual (as shown, .040" Thick; for TU2020)
--	P-7763	Aperture Plate, Triple (.040" Thick; for TU2030)
9	P-7997	Dual Aperture Plate, .125" Thick (after January 1996)
--	P-7996	Triple Aperture Plate, .125" Thick (after January 1996)
10	P-10027	Studio Guide (as shown) for .040" Aperture Plate
10	P-7993	Studio Guide for .125" Aperture Plate (after January 1996)
--	41-51336	Socket Head Screw, 2-56 x 1/4"
--	P-5193	Flat Washer, #2
11	P-7801	Gate Latch Lever
--	P-4968	Pivot Screw
--	2927	Pin, 1/8 x 1/2"
12	4703	Compression Spring

FILM TRAP & APERTURE CHANGER  
 Parts List (continued)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
13	41-51061	Pan Head Screw, 8-32 x 1-4"
--	41-70002	Flat Washer, #8
--	3358	Aperture Limit Stud
<i>Items 14 - 17 used on TU2030 (Three-Lens) Model ONLY</i>		
14	52-20614	Solenoid Armature
--	4461	Compression Spring, Armature
15	P-7781	Solenoid Mounting Bracket
--	41-51374	Bracket Mounting Screw, 6-32 x 3/4" Socket Head
16	41-51041	Solenoid Mounting Screw, 8-32 x 3/8" Pan Head
17	51-55003	Solenoid, Aperture Limit
18	3357	Aperture Motor Spacer, Long (4 req'd.)
--	41-51324	Socket Head Screw, 8-32 x 3/8"
19	41-51311	Socket Head Motor Mounting Screw, 8-32 x 1/2"
20	21-33009 *	Torque Motor, 715 Bodine (TU2020; Dual Aperture)
--	P-7886	Wire Harness, Motor to PCB (TU2020)
20	G-7854 *	Torque Motor Assembly (TU2030; Triple Aperture)
--	P-7853	Wire Harness, Motor to PCB (TU2030)
21	3360	Aperture Motor Spacer, Short (2 req'd.)
--	P-9933	Threaded Rod, 8-32 x 2"
22	P-9832	Aperture Motor Heat Shield
23	21-40060	Molex Plug (included with Wire Harness for Item 20)
24	P-4077	Knurled Knob, Tension Strap Adjustment
--	H-3107	Fastening Pin, 3/64 x 5/16"
25	P-9831	Shaft Extension, Tension Camshaft
--	P-4076	Tension Camshaft
--	P-4089	Camshaft Retaining Ring
--	P-4092	Tensioning Cam
--	H-3107	Cam Retaining Pin, 3/64 x 5/16"

\* Replacement Motor Capacitor included

**FILM TRAP and  
AUTO APERTURE  
CHANGER**  
Type 52-60099



## FILM TRAP & APERTURE CHANGER

Assembly No. 52-60099

Strong International adopted a redesigned Film Trap & Aperture Changer for use in the PR1060 projector in November 1996. The new trap assembly (52-60099) features a DC motor driving the aperture plate. If replacing an older trap assembly using the AC motor (as pictured on Page 28) with the newer 52-60099, *consult the factory*. The Turret Control PCB (Page 36) must be of a newer type ("REV. B") to operate the Aperture Changer without modification. The revised Control PCB is backward compatible (able to operate the AC aperture drive motor), but an older PCB requires field modification to operate the DC aperture drive motor.

To remove the 52-60099 Trap from the projector main frame, first cycle the aperture plate to the FLAT (non-anamorphic) format. Illustration photo shows SCOPE (anamorphic) format. Loosen the wing-head quarter-turn stud (Item 15) and raise the hinged portion of the aperture drive (Item 16). Lifting the hinged plate of the aperture drive will expose the slotted head of the trap mounting screw, and allow access for a common screwdriver.

The bearing blocks (Item 35) retaining the lateral guide rollers (Items 4 & 5) are slotted to permit adjusting the position of the rollers on the horizontal plane. Loosen the two socket head mounting screws (Item 34) and position the lateral guide rollers to center the film path at the picture aperture.

Gear mesh between the drive motor spur gear (Item 18) and the rack gear on the aperture slide (Item 28) can be set by loosening the 10-32 socket head screws (Item 25) and moving the motor mounting plate (Item 24) up or down. The motor plate mounting holes are slotted for this purpose.

Horizontal travel of the dual aperture plate is also adjustable. The inboard stop is set by loosening the socket head screw inside the eccentric bushing (Item 12) and rotating the bushing to the desired stop point. The outboard stop is fixed by positioning a set screw in the base plate immediately below the aperture slide rod (Item 17).

### Parts List

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
-	52-60099	Film Trap & Aperture Changer Assembly (Complete), Two-Lens
1	P-8000	Base Plate, Film Trap
2	P-4071	Threading Guide (Framing Aperture)
3	P-4073	Tension Strap Mounting Arm (see Item 3 DETAIL, Page 28)
-	P-4075	Mounting Block, Tension Arms
-	P-4090	Retaining Ring
-	P-4074	Mounting Block Pivot Shaft
-	P-4079	Leaf Spring, Tensioning Cam
-	51-98211	NyLock Tension Spring
4	G-4435	Lateral Guide Roller, Fixed
5	P-4166	Lateral Guide Roller, Spring Loaded (see Item 33)
6	P-4078	Pressure Strap (2 req'd.); Replace in <i>Matched Pairs</i>
-	H-2519	Strap Mounting Screw, 2-56 x 3/16" (41-51002; 4 req'd.)
7	P-1981	Trap Mounting Screw, Captive (see Item 32)
-	P-1556	Retaining Ring, Captive Screw

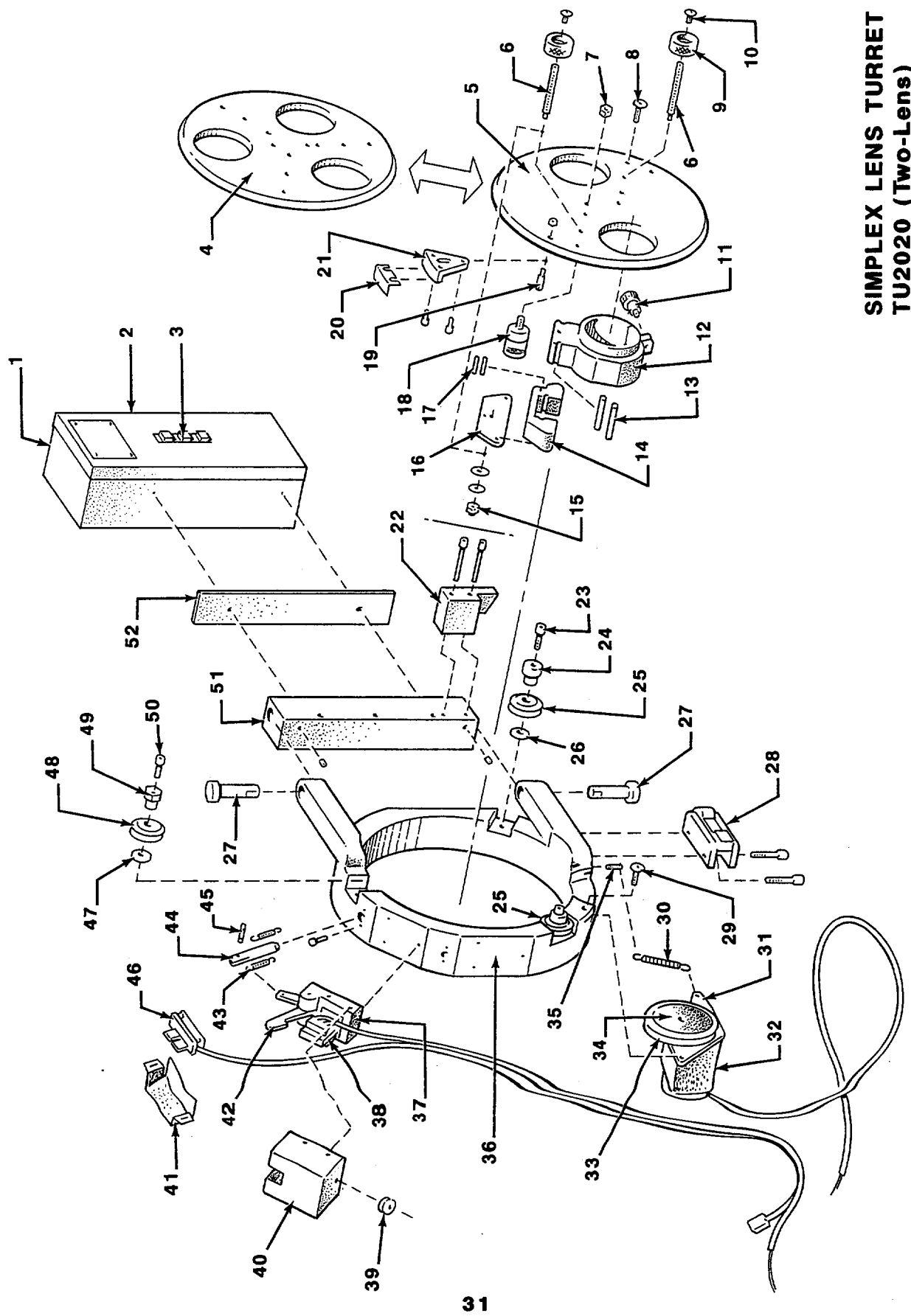
52-60099 Parts List (continued)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
8	41-51014	Screw, 4-40 x 3/16" Pan Head (4 req'd.)
9	P-8005	Dual Aperture Plate
10	P-10027	Studio Guide
11	41-51336	Screw, 2-56 x 1/4" Socket Head (2 req'd.)
--	P-5193	Flatwasher, #2
12	EC-0030	Eccentric Bushing, Aperture Plate Stop
--	SC-0578	Screw, 4-40 x 1/8" Socket Head (41-51489)
13	P-7801	Gate Latch Lever
--	P-4968	Pivot Screw
--	2927	Roll Pin, 1/8 x 1/2" (21-37004)
14	4703	Compression Spring, Gate Latch (21-58036)
15	ST-2474	Latching Stud, Quarter-Turn (with Item 29)
--	BU-1366	Bushing
--	RI-0627	Retaining Ring
16	CP-0921	Hinged Plate, Aperture Drive
--	BR-1371	Slider Bracket, Aperture Drive
--	PN-1294	Hinge Pin
17	RD-0626	Slide Rod, Aperture Drive
18	GR-0304	Spur Gear, Aperture Drive Motor
19	21-40019	Molex Plug, (2) Pin
--	21-62037	Pin (2 req'd.)
20	P-8003	Motor Cover & Heat Shield
--	41-51045	Cover Mounting Screw, 6-32 x 1/4" Bind Head (2 req'd.)
21	P-4077	Knurled Knob, Tension Strap Adjustment
--	H-3107	Fastening Pin, 3/64 x 5/16"
22	P-9831	Shaft Extension for Strap Tension Camshaft
--	P-4076	Tension Camshaft
--	P-4089	Camshaft Retaining Ring
--	P-4092	Tensioning Cam
--	H-3107	Cam Retaining Pin, 3/64 x 5/16"
23	MO-0114	Aperture Drive Motor, 12 V.DC, 72 rpm
24	P-8004	Motor Mounting Plate
25	41-51208	Screw, 10-32 x 1/2" Socket Head (2 req'd.)
26	41-51016	Motor Mounting Screw, 4-40 x 1/4" Bind Head (2 req'd.)
27	RD-0626	Slide Rod, Aperture Drive (see Item 17)
28	RK-0562	Rack Gear, Aperture Drive
--	41-51022	Rack Mounting Screw, 4-40 x 5/8" Bind Head (2 req'd.)
29	ST-2474	Latching Stud, Quarter-Turn (with Item 15)
--	41-51493	Screw, 3-48 x 3/16" Fillister Head (2 req'd.)
--	WA-0379	Flatwasher, #3 (2 req'd.)

52-60099 Parts List (continued)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
30	H-2519	Strap Retaining Screw, 2-56 x 3/16" (41-51002; 4 req'd.)
--	H-3108	Dowel Pin (51-37015; 4 req'd.)
31	P-8000	Base Plate, Film Trap (see Item 1)
32	P-1981	Trap Mounting Screw, Captive (see Item 7)
33	P-4166	Lateral Guide Roller, Spring Loaded (see Item 5)
--	P-1701	Compression Spring
34	SC-2117	Screw, 4-40 x 3/8" Socket Head (2 req'd.)
35	P-8002	Bearing Bracket (2 req'd.)
--	51-04020	Ball Bearing (2 req'd.)
--	P-8001	Stop Plate, Brass; "Fixed" Guide Roller Bearing Bracket
--	P-1757	Stop Plate Mounting Screw, 4-40 x 1/4" Socket Head
36	P-4075	Mounting Block, Tension Arms (see Item 3 DETAIL, Page 28)

*See SIMPLEX 35 PARTS CATALOGUE, Page 2-4 for Aperture Heat Shields*



**SIMPLEX LENS TURRET  
 TU2020 (Two-Lens)  
 TU2030 (Three-Lens)**

**SIMPLEX LENS TURRET**  
Parts List

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	P-7807	Cabinet, Control Printed Circuit Board
2	P-7806	Cover, Control Cabinet (as shown; Three-Lens)
-	P-7839	Cover, Control Cabinet; Two-Lens
3	51-61006	Switch, Lens Re-Set (with Printed Circuit Board)
-	52-70069	Control PC Board Assembly, Two-Lens, 115 V.AC
-	52-70047	Control PC Board Assembly, Two-Lens, 220 V.AC
-	52-70071	Control PC Board Assembly, Three-Lens, 115 V.AC
-	52-70033	Control PC Board Assembly, Three-Lens, 220 V.AC
4	P-7776	Indexing Plate, Three-Lens
5	P-7847	Indexing Plate, Two-Lens
6	P-7764	Lens Focus Screw
7	01405A	Hex Nut, 5/16-24 NyLock
8	41-51429	Button Head Screw, 5/16-24 x 3/4" Stainless Steel
9	22-21126	Knob, Lens Focus Screw
10	41-51097	Screw, 10-32 x 3/8" Pan Head
11	21-28022	Knob, Lens Locking Screw
-	P-7905	Lens Locking Screw (Two-Lens)
-	41-51269	Lens Locking Screw (Three-Lens)
12	P-7779	Lens Barrel Casting
13	P-7772	Slide Rod, Lens Barrel (2 req'd.)
14	P-7778	Base Mount, Lens Barrel
15	41-35006	Lock Nut, Focus Screw; 6-32 Acorn
-	21-70028	Wave Spring Washer, #6
-	01553	Flat Washer, #6 Stainless Steel
16	P-7780	Back Plate, Lens Base
17	41-51182	Set Screw, 10-32 x 5/8"
-	41-35012	Lock Nut, 10-32 Hex (not shown)
18	P-7775	Adjusting Screw, Eccentric (Horizontal)
19	P-7789	Adjusting Screw, Eccentric (Vertical)
20	P-7835	Aperture Cueing Flag, FLAT (Silver)
-	P-7836	Aperture Cueing Flag, "SPECIAL" (Black Edge; TU2030 only)
-	P-7837	Aperture Cueing Flag, SCOPE (Black)
21	P-7790	Catch Bracket, Index Stop Pin
22	P-7828	Pivot Stop Bracket
-	41-51226	Mounting Screw, 1/4-20 x 2" Socket Head
23	41-51579	Screw, 1/4-20 x 1-1/4" Stainless Steel Socket Head
24	51-07012	Straight Bushing, Lower (2) Bearings
		<i>See Item 49 for Adjustable Bushing (Top Position only)</i>
25	51-49010	Ball Bearing, Indexing Plate
26	41-70023	Flat Washer, 1/4"



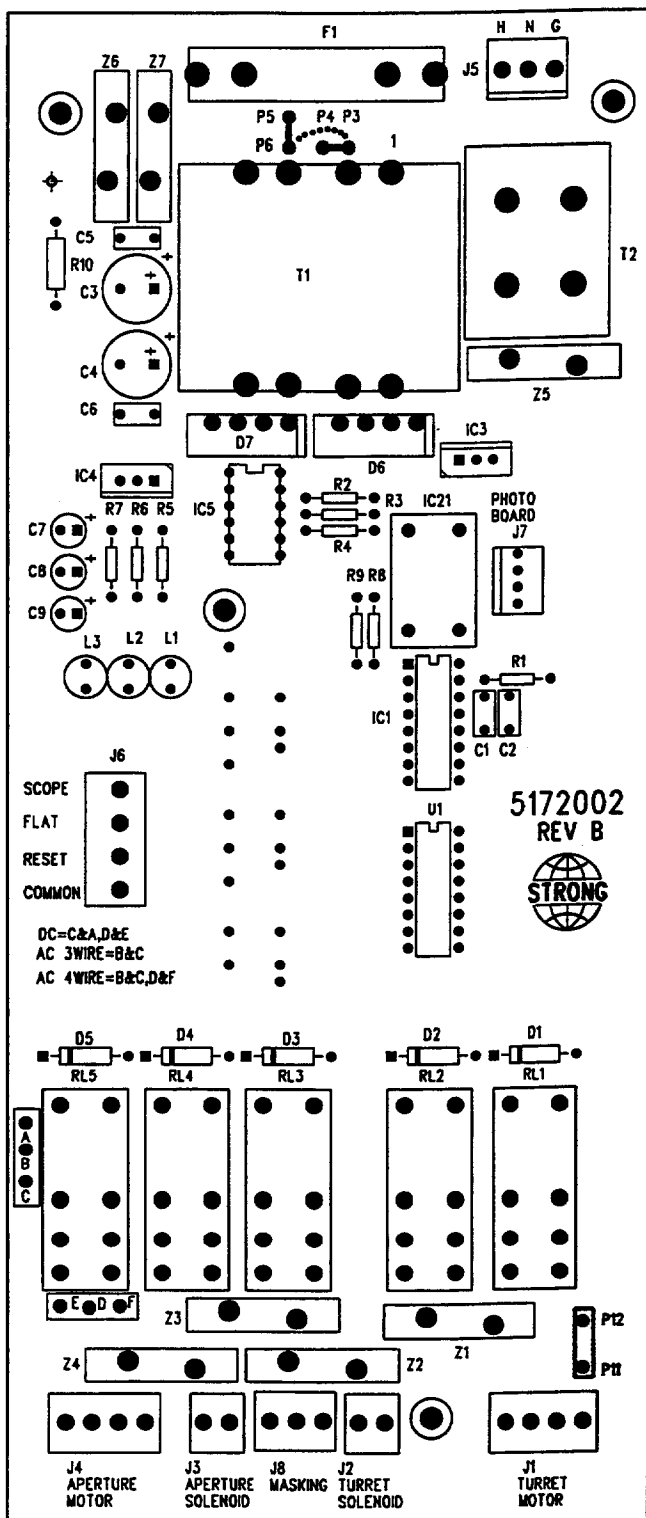
**TURRET PARTS LIST (continued)**

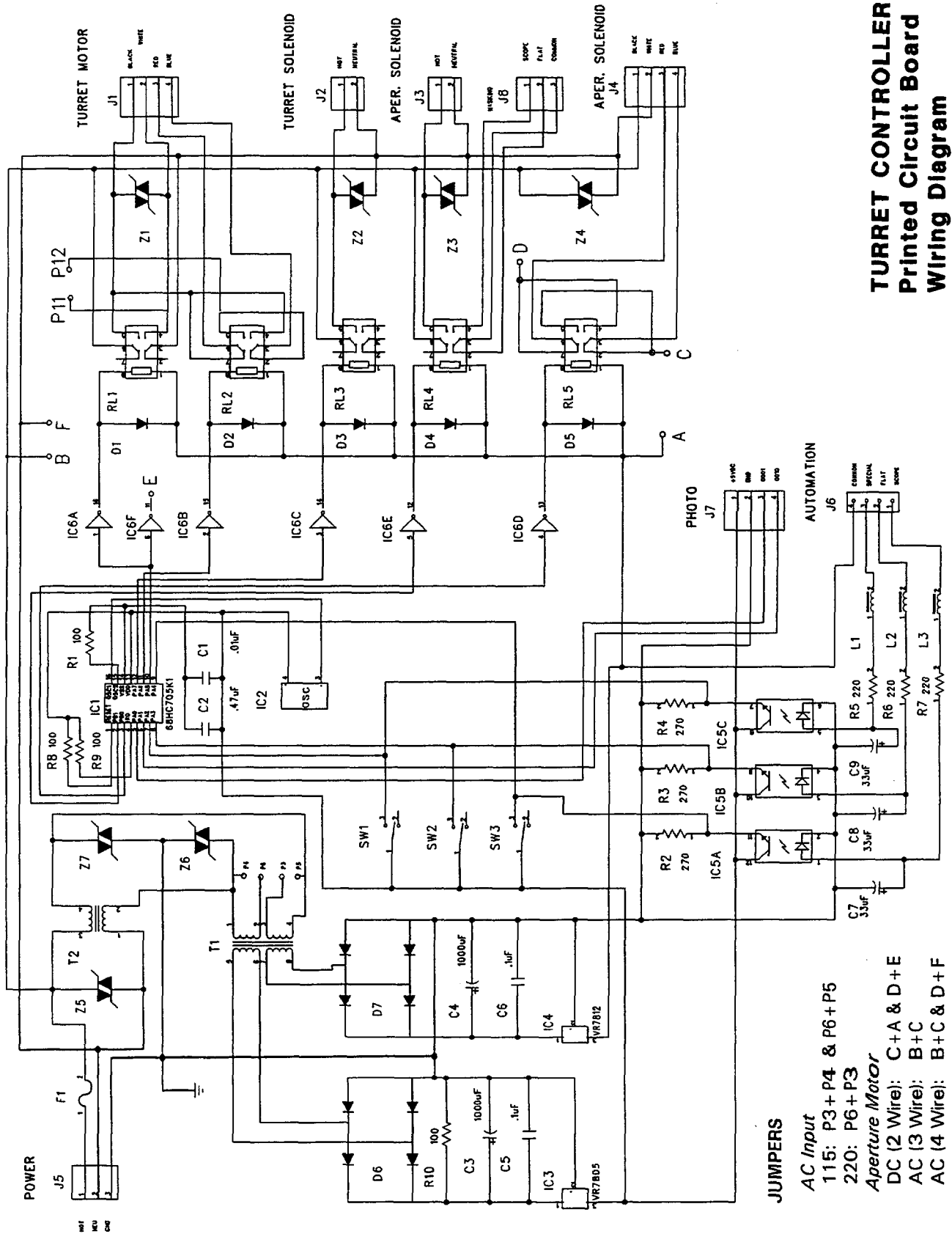
<u>Item</u>	<u>Part No.</u>	<u>Description</u>
27	P-7765	Hinge Pin, Turret Ring
-	41-51186	Set Screw, Hinge Pin Retaining; 1/4-20 x 3/8"
28	G-7770	Turret Latch Assembly
-	P-7770	Latch
-	21-37038	Stop Pin
-	21-58038	Compression Spring
-	P-7779	Base Plate
-	51-51011	Pivot Bolt
-	41-51564	Mounting Screw, 10-32 x 1/2" Stainless Steel Socket Head (2 req'd.)
-	P-7774	Turret Catch (not shown; mounts to Main Frame)
-	41-35024	Mounting Nut, Turret Catch; 1/2-13 Hex
-	41-51531	Turret Deadstop Screw, 1/4-20 x 2" Headless
29	51-51011	Shoulder Screw, Motor Mount Pivot
30	P-3045	Expansion Spring, Motor Tension
31	P-7793	Motor Mounting Plate
32	P-7888	Drive Motor, Wired Assembly (115 V.AC)
-	G-7859	Drive Motor, Wired Assembly (220 V.AC)
33	21-48001	O-Ring Drive Tire (2 req'd.)
34	P-7794	Drive Wheel Hub
35	52-20623	Spring Retaining Screw
36	P-7777	Turret Ring Casting
37	P-7783	Solenoid Mounting Block
38	P-7887	Solenoid, Wired Assembly (115 V.AC)
-	G-7857	Solenoid, Wired Assembly (220 V.AC)
39	41-98002	Grommet
40	G-7842	Solenoid Cover, Welded Assembly
-	41-51032	Cover Mounting Screw, 6-32 x 1/4" Pan Head
41	G-7831	Cover, Photo Switch
-	41-51032	Cover Mounting Screw, 6-32 x 1/4" Pan Head
42	P-7785	Lever, Index Pin Re-Set
43	P-7786	Expansion Spring (2 req'd.)
44	P-7784	Index Stop Pin, Tapered
45	P-7787	Spring Tension Shaft, Grooved
46	G-7858	Aperture Sensor Photo Switch, Wired Assembly
47	41-70023	Flat Washer, 1/4"
48	51-49010	Ball Bearing, Indexing Plate
49	51-07013	Eccentric Bushing (Top Bearing only)
50	41-51579	Screw, 1/4-20 x 1-1/4" Stainless Steel Socket Head
51	P-7766	Mounting Bar, Turret to Main Frame
-	41-51580	Bar Mounting Screw, 1/4-20 x 1-3/4" Stainless Steel Socket Head
52	P-7890	Shim Strip, Control Cabinet

# TURRET CONTROLLER

## Printed Circuit Board

### Component Layout





**TURRET CONTROLLER**  
**Printed Circuit Board**  
**Wiring Diagram**

## WIRING DIAGRAM

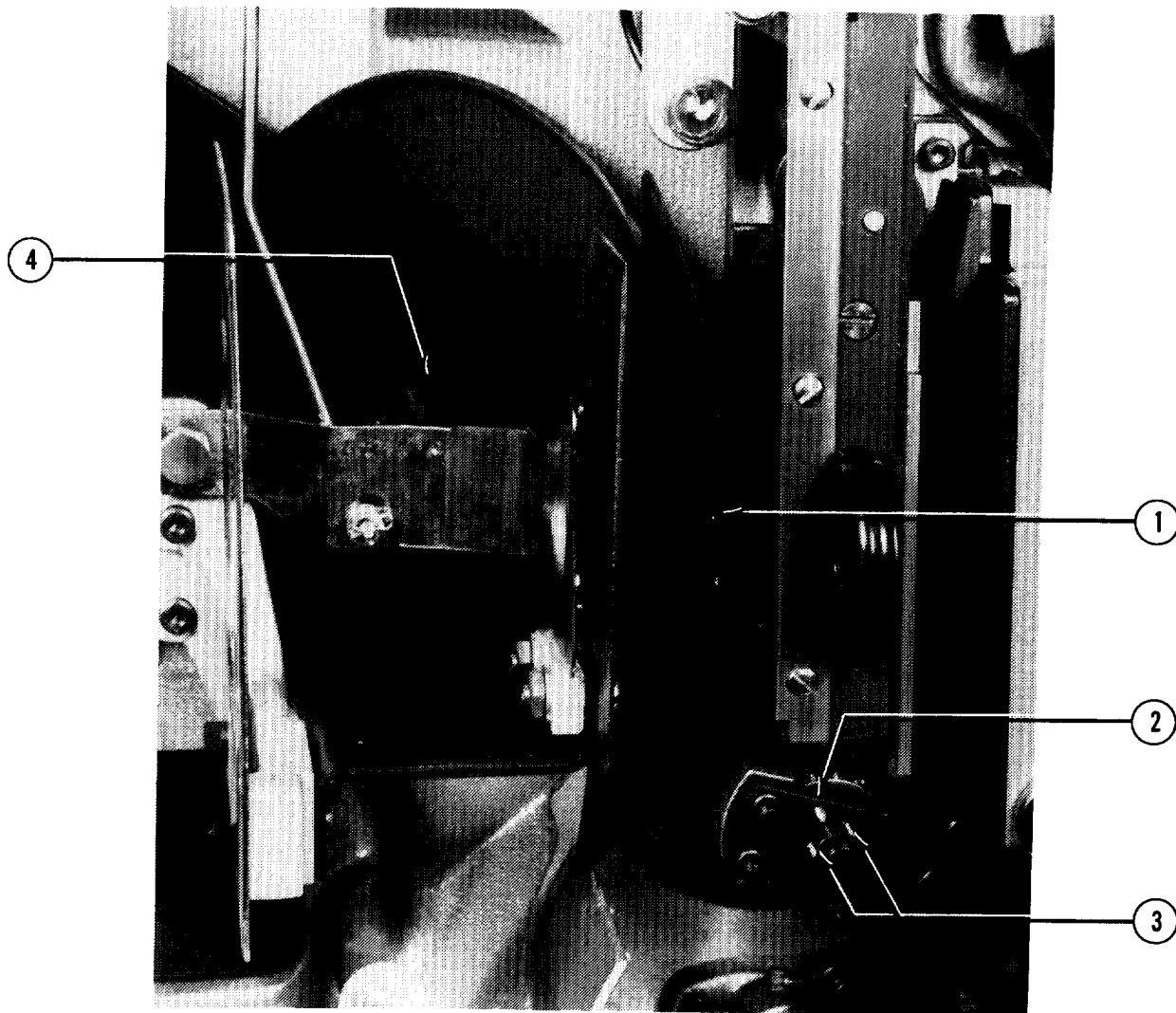
### Parts List

<u>Ref.</u> <u>Desig.</u>	<u>Part No.</u>	<u>Description</u>
C1	61-08040	Capacitor, .01 $\mu$ F
C2	61-08013	Capacitor, .47 $\mu$ F
C3,4	61-08023	Capacitor, 1000 $\mu$ F
C5,6	61-08009	Capacitor, 01 $\mu$ F
C7,8,9	61-08020	Capacitor, 33 $\mu$ F
D1-5	51-17001	Diode, 1N4007
D6,7	51-98239	Diode, 1.5 A. 100 V. Bridge
F1	21-21020	Fuse, 1 Ampere
--	21-21001	Fuse Clip, PCB Mount (2 req'd.)
IC1 *	51-98057	Integrated Circuit, 68HC705K1
--	61-13005	IC Socket, PCB Mount
IC2	51-73001	Crystal, 2 mHz.
IC3	51-73002	Integrated Circuit, VR7805
IC4	51-98240	Integrated Circuit, VR7812
IC5	51-73003	Optocoupler
IC6	51-98236	Integrated Circuit, ULN2003
J1,4	51-40025	AMP Insulation Displacement Plug
J2,3	51-40178	AMP Insulation Displacement Plug
J5	51-40176	AMP Insulation Displacement Plug
J6	61-62010	Terminal Block, (4) Position
J7	51-40029	AMP Insulation Displacement Plug
L1,2,3	51-98059	Inductor
PCB	51-72002	Printed Circuit Board (less components)
R1,8,9	51-46001	Resistor, 100 Ohm, 1/8 Watt
R2,3,4	51-46002	Resistor, 270 Ohm, 1/8 Watt
R5,6,7	61-46002	Resistor, 220 Ohm, 1/8 Watt
RL1-5	51-45004	Relay, DPDT
SW1,2,3	51-61006	Switch, SPDT
T1	51-64003	Stepdown Transformer, 120 - 12 V.
T2	51-98069	Transformer, EMI Filter
Z1-7	61-46065	MOV, 20K471U

#### Not Shown

--	52-70038	G-7858 Photo Switch, Aperture Sensor (Replaced as Assembly ONLY)
----	----------	---

\* Consult factory. IC1 requires programming per application.



### SHUTTER TIMING

THE SHUTTER is correctly timed if the center of the shutter blade (Item 1) is aligned to the center of the film aperture as shown when the index mark on the intermittent bearing arm (Item 2) appears directly between two of the index marks on the intermittent shaft collar (Item 3).

TO CENTER THE SHUTTER BLADE, loosen the (2) shutter hub clamping screws (Item 4) to permit the shutter blade to rotate freely on the shaft. Turn the projector by hand to position the index marks (Items 2 and 3) as shown. Position the shutter blade so the center of the blade aligns to the center of the film aperture. Tighten the (2) clamping screws (Item 4).

PROJECT A PICTURE, and make fine adjustment to eliminate "Travel Ghost" using the shutter adjusting knob on the top of the projector.