Film-Tech

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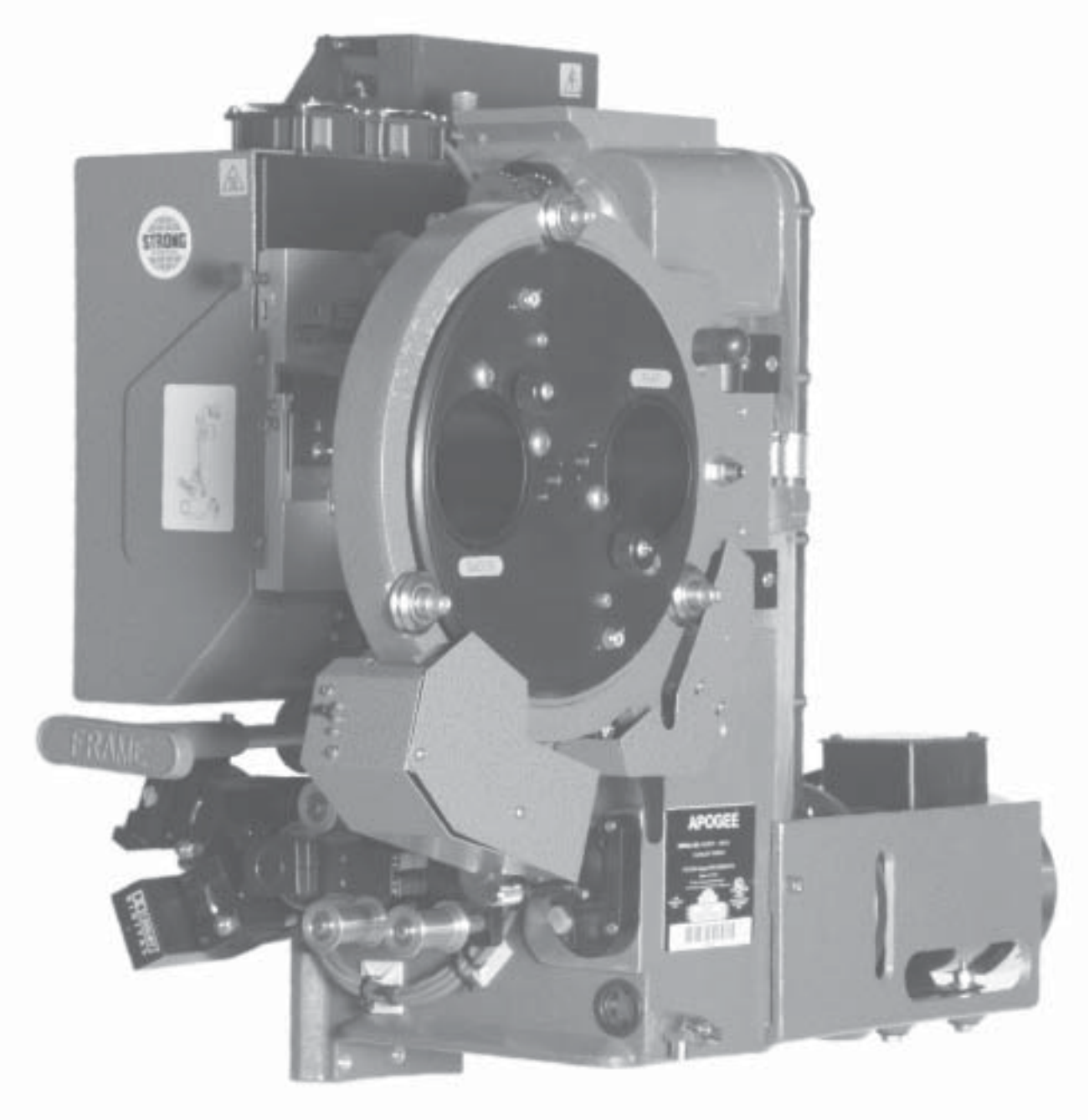
Simplex
APOGEE

35mm UNITIZED PROJECTOR



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INSTRUCTION MANUAL and PARTS LIST

SAVE THESE INSTRUCTIONS

This equipment is intended

FOR PROFESSIONAL USE ONLY

Read and understand all instructions before using

WARNING

To avoid risk of fire, do not use nitrate or other flammable film.

Use safety film only.

EXERCISE CAUTION WHEN WORKING AROUND MOVING PARTS

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STRONG INTERNATIONAL
a division of Ballantyne of Omaha, Inc.
Engineering/Sales
July 1, 2004

PREFACE

THE SIMPLEX APOGEE PROJECTOR, 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 Apogee 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.

SOUND READER

The analog and digital sound reader components are mounted to the same main frame as the optical elements, insuring a straight film path. Minimal flutter and "wow" comply with all SMPTE standards.

MAIN DRIVE

The projector main drive is connected directly to the drive motor without pulleys and belts, eliminating the need to adjust tension and/or replace these components.

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 Apogee Lens Turret is available in either Automatic or Manual configurations. The standard turret accommodates (1) each 2-25/32" (71mm) diameter Wide Screen (flat) and Anamorphic (CinemaScope) lens without use of a MagnaCom. A three-lens turret is available for export applications. 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 and service.

MAIN FRAME

The main frame casting forms a single unit that is noteworthy for its simplicity and strength. A single thread path serves all film-handling elements for both precise projection and sound reproduction.

FILM SPROCKETS

The upper feed and lower holdback sprockets, having twenty-four teeth each, reduce shaft speeds to prolong operating life, permit smoother wraparound, and lessen the danger of splice breakage. Exclusive use of VKF® 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 lens turret. 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. Gate curvature provides compensation for heat-induced warping of the film at the aperture, thus insuring a sharper image on the screen. The film gate runner 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® 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 full-vision, oil-sealed plexiglass window on the off-operator side of the mechanism. 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 Apogee Projector includes a heat sink positioned behind the shutter blade and aperture to absorb radiant heat and protect the trap and film. Cooling fans further reduce heat at the film plane.

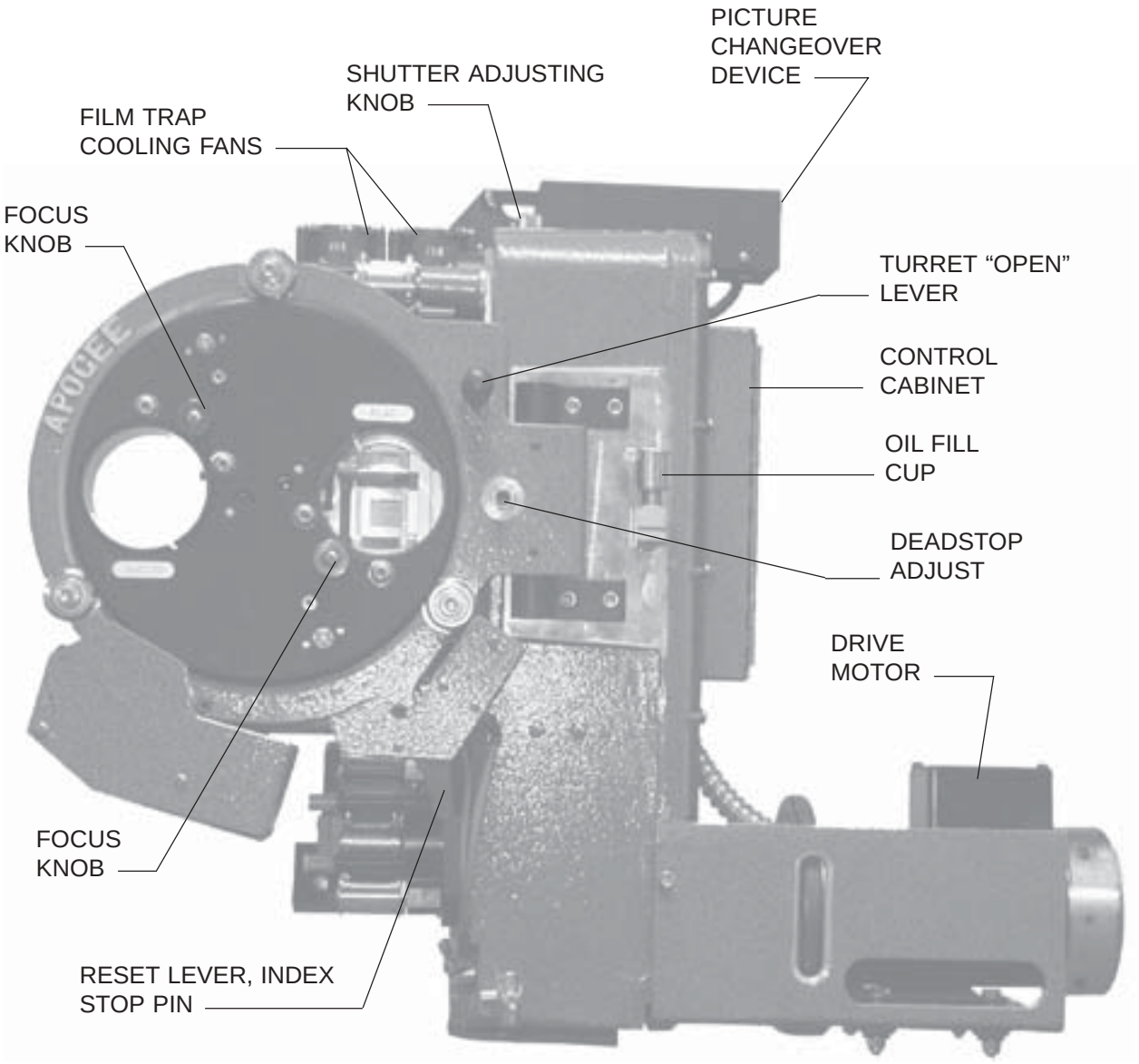

PICTURE
CHANGEOVER
DEVICE
SHUTTER ADJUSTING
KNOB
FILM TRAP
COOLING FANS
FOCUS
KNOB
TURRET “OPEN”
LEVER
CONTROL
CABINET
OIL FILL
CUP
DEADSTOP
ADJUST
DRIVE
MOTOR
FOCUS
KNOB
RESET LEVER, INDEX
STOP PIN
APOGEE

FIGURE 1

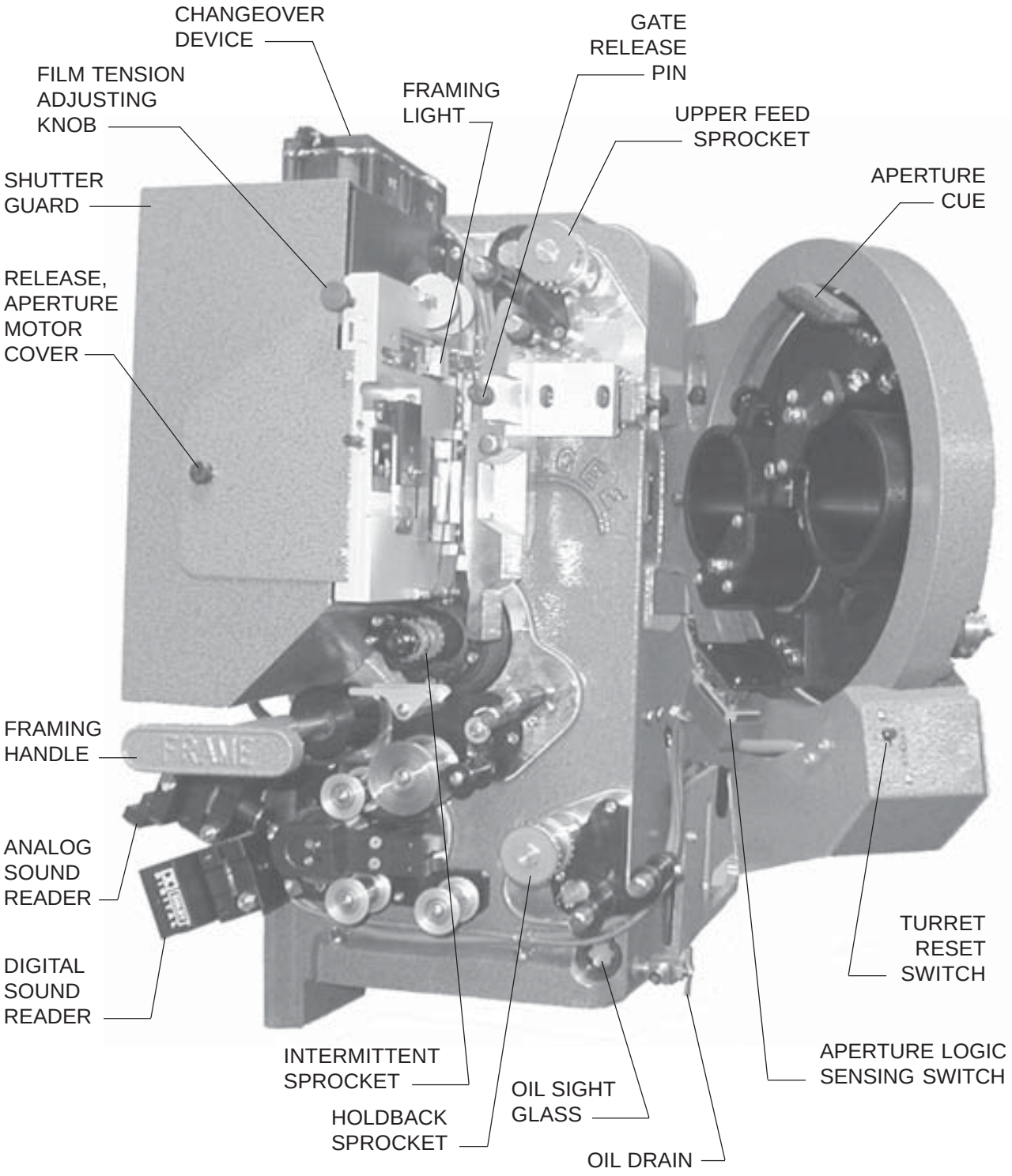

CHANGEOVER DEVICE
FILM TENSION ADJUSTING KNOB
SHUTTER GUARD
RELEASE, APERTURE MOTOR COVER
FRAMING HANDLE
ANALOG SOUND READER
DIGITAL SOUND READER
FRAMING LIGHT
GATE RELEASE PIN
UPPER FEED SPROCKET
APERTURE CUE
TURRET RESET SWITCH
APERTURE LOGIC SENSING SWITCH
INTERMITTENT SPROCKET
HOLDBACK SPROCKET
OIL SIGHT GLASS
OIL DRAIN

FIGURE 2

INSTALLATION

EACH SIMPLEX APOGEE 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 or its dealers, to file such claims.

THE FOLLOWING RECOMMENDATIONS should be studied carefully prior to installation. Even if received mounted and prewired to a Strong console, it is advisable to review and inspect the following steps prior to energizing the system. Your Strong International Dealership may wish to assist in installing those projection booth products supplied by their firm.

UNPACKING

The Simplex Apogee 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) 5/16-18 hex head screws.

An accessory kit is shipped with each Simplex Apogee projector. The kit includes the following:

(1) Can Simplex Projector Oil
(1) Oiler
(1) Set Allen Wrenches

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

MOUNTING

Mount the Apogee to the mounting arm on the front of the console or pedestal. Some consoles will require spacer block(s) to position the projector's picture aperture at the correct working distance; see the console installation instructions. Start the top two bolts, through the washers and spacer block (if required), into the back of the main frame casting. The projector can then be lifted into place, and the top two bolts into the casting lowered into the slotted holes in the projector mounting arm. In this manner, the mounting arm will bear the weight of the projector while the two bottom bolts are started.

To avoid crossthreading, the 3/8-16 mounting bolts should be screwed in fingertight as far as possible. Before tightening the bolts, check that both the lamphouse/console and projector are on the same, level plane.

Terminals for the drive motor power leads are provided in the projector control cabinet. See the following section detailing Electrical Connections.

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 to the optical center of the lamphouse. *Never* operate the lamphouse with the douser open unless the projector is running.

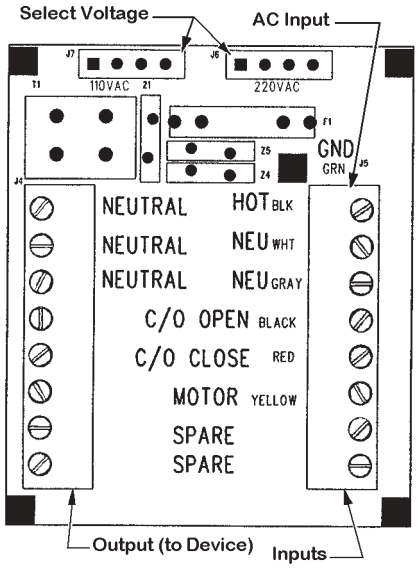
LAMPHOUSE LIGHT SHIELD

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.

ELECTRICAL CONNECTIONS

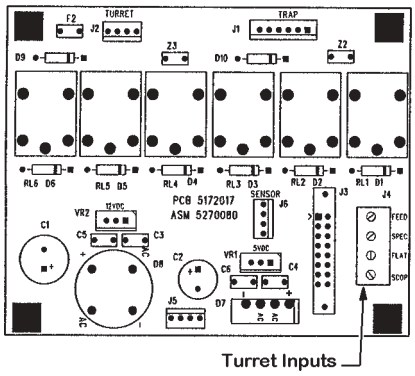
All electrical connections to the Apogee terminate in the cabinet mounted on the side of the projector adjacent to the gear compartment. Loosen the quarter-turn fastener and open the door to access the terminals.

Input voltage is user-selectable by connecting the transformer plug to one of the two receptacles located on the top of the "Power" printed circuit board. Connect the plug to J7 for 110 volt operation, or to J8 for 220 volt. After selecting the voltage, apply AC phase and neutral to the two uppermost terminals on the right barrier strip. This AC input powers the turret controller, the turret and aperture motors, and the L.E.D. framing light. An earth ground must be connected to the ground lug at the lower right corner of the cabinet.



The lower five terminals of the right barrier strip allow power connections from the automation controller to the picture changeover and the projector drive motor. The lower five terminals of the left barrier strip provide connection points to the devices. Voltage to these devices is generally supplied by, or switched through, the automation controller. All NEUTRAL connections are common.

Turret inputs connect to the (4) marked terminals on the lower part of the turret control PCB mounted to the cabinet door.



Picture Changeover

The Apogee is normally shipped with a Strong International 115 V.AC (52-60325) or 230 V.AC (52-60326) picture changeover device. If ordered separately, connect the changeover leads as follows:

Blk - OPEN	Wht - COMMON
Red - CLOSE	Grn - GROUND

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

Lens Turret

The MANUAL lens turret requires no electrical connections. Installer connections to the AUTOMATIC turret are made to the J4 terminals located on the printed circuit board on the control box door adjacent to the gear compartment cover on the side of the projector. The inputs (FEED, SPECIAL, FLAT, and SCOPE) 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 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," or non-anamorphic). Lens barrels on the three-lens turret are marked SC (CinemaScope), FL (Flat), and SP (Special). The lenses must be installed in their designated barrels for correct aperture logic. Magnacom lenses are not required in any configuration.

Rotate the turret to the SCOPE position. The automatic turret can be indexed to this position by pressing the reset switch; 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 rotate the lens and adapter to set the anamorphic correction on the horizontal plane. Securely tighten the lens locking knob on the top of the SCOPE barrel. Close the lamphouse douser.

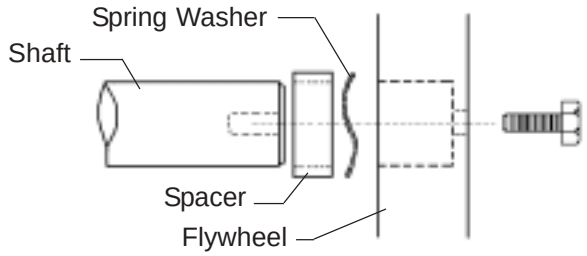
Reset the turret to FLAT format, and make certain the FLAT aperture is in position. Install the FLAT lens, and center its focus adjustment screw. Open the lamphouse douser and move the lens inside the barrel until a sharply focused picture is projected. Tighten the lens locking knob above the FLAT barrel.

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 an acceptable image.

SOUND READER FLYWHEEL INSTALLATION



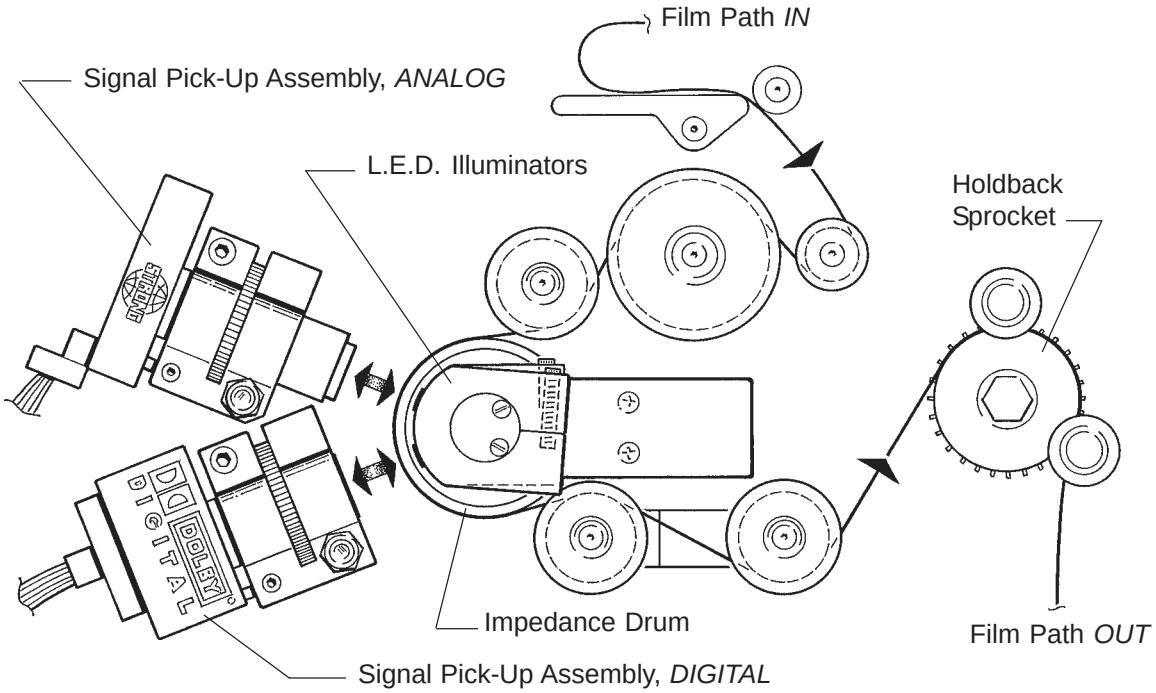
The sound reader flywheel is dismounted for shipping to avoid damage to the impedance drum shaft. Assemble the flywheel to the end of the impedance drum shaft using the wave spring washer and spacer in the sequence shown (spring washer against the flywheel, spacer next to bearing seal). Secure the flywheel to the shaft with the 1/4 inch hex head screw. Note *LEFT-HAND THREAD;* turn *counterclockwise* to tighten.

SOUND READER ASSEMBLY

ADJUSTMENTS to those components relevant to scanning the optical soundtrack are best performed by qualified personnel equipped with the necessary test equipment. Attempts to effect field repairs without use of the required test equipment are generally detrimental to sound quality.

1. An L.E.D. (Light Emitting Diode) is positioned directly behind the film plane to illuminate the soundtrack. The horizontal and vertical positioning is adjustable. The distance of the L.E.D. from the film plane is factory set. The L.E.D. is powered by a remote, low-voltage, current regulated power supply.
2. An Analog Signal Pick-Up Assembly is mounted in front of the film plane, and contains the lensing, the solar cells, pre-amps, and terminals for the cell output. This assembly is factory-set to maximize the reception of the signal generated by the L.E.D.
3. A second L.E.D. illuminator and signal pick-up are required for scanning Dolby® digital prints. These components are mounted adjacent to the analog elements, 45° off the analog axis. A second L.E.D. power supply is also required.

An L.E.D. features a much longer life than an incandescent exciter lamp, and eliminates signal loss because of sagging or aging bulb filaments. The one-piece Signal Pick-Ups detect only L.E.D. inputs, and stray booth lighting does not affect the solar cell output. Channel separation is enhanced by incorporating the solar cells within the sealed lens assembly.



The duty cycle (time ON) of the L.E.D. is the same as the projector motor and should parallel that of the xenon bulb; the lamphouse elapsed hour meter should indicate approximate L.E.D. hours. L.E.D. manufacturers have noted a 10-20% drop in light output after prolonged operation. If a sound signal loss cannot be corrected by fader gain, it may be necessary to replace the L.E.D. head.

WIRING

Install the LS-40 L.E.D. Power Supply to the projection console, pedestal, or to a rack adjacent to the soundhead. Set the slide switch for the desired AC power, and connect to AC source. Route the power leads to the soundhead-mounted L.E.D. illuminator assembly using 18 gauge wires for short runs; 16 gauge wires for excessively long runs. Other installer connections are made to the clearly-marked terminals on the back of the unit.

The L.E.D.'s are bipolar; the power supply cannot damage an L.E.D. through reversed polarity. It is safe to try reversing the polarity if you have power but no light. **Accidental connection of the L.E.D. to the pre-amp power terminals will damage the L.E.D.** The pre-amp power to the analog reader (Signal Pick-Up) is 12 V.DC+, ground, and 12 V.DC-. The ground must be connected at both ends as it is circuit reference zero volts.

It is recommended to use (2) shielded two-conductor cables to connect the solar cell outputs, but use of a three-conductor, single-shield cable is permitted. If using three-conductor cable, strap the two "LO" terminals together. Since very little current is required, 22 gauge wire is adequate. DO NOT interconnect *input* and *output* grounds.

Digital readers utilize a second LS-40 Power Supply. Use 16 or 18 gauge hookup wire between the L.E.D. and the LS-40 power supply, depending on the length of the run. Pre-terminated digital output cables (51-98272) are supplied, and should be connected to the processor as instructed in the Dolby manual.

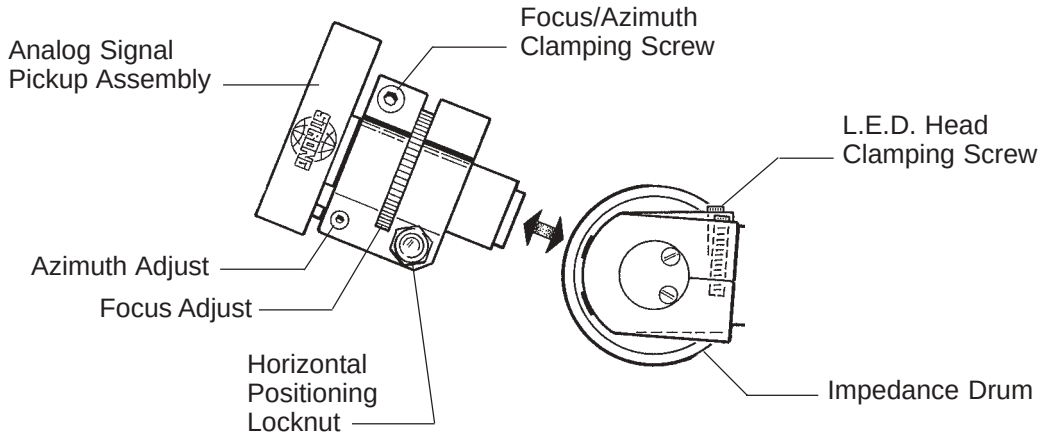
ANALOG ALIGNMENT

Energize the LS-40 and check for 450 mA output to the analog (inner) L.E.D. Connect test equipment to solar cell output terminals. Turn the sound processor's *level* and *high frequency* adjustment to minimum settings.

Loosen, but do not remove, the socket head screw clamping the inner L.E.D. head to its mounting post and bracket. Loosening this screw permits moving the L.E.D. head up and down, and on the horizontal plane (in and out). Position the L.E.D. head to visually locate the light source directly opposite the lens opening of the analog signal pickup assembly.

Run a loop of level set ("Dolby Tone") film and observe the output of the LEFT and RIGHT channels. When the highest output is seen, move the L.E.D. head horizontally (in and out) inside the impedance drum. DO NOT permit the L.E.D. head to touch the inside of the impedance drum. Observe the output and secure the L.E.D. head when the highest output is achieved. Refer also to the sound processor manual.

Run a "Buzz Track" (SMPTE No. 35-BT) loop and check for correct sound track alignment. It is recommended to splice together a loop of half "Buzz Track" film and half "Left/Right Alignment" (Dolby Cat. No. 97) test film. This permits centering the soundtrack and checking for cross-talk simultaneously. If correction is required, loosen or tighten the 1/4-20 locknut to move the spring-loaded pickup assembly horizontally.

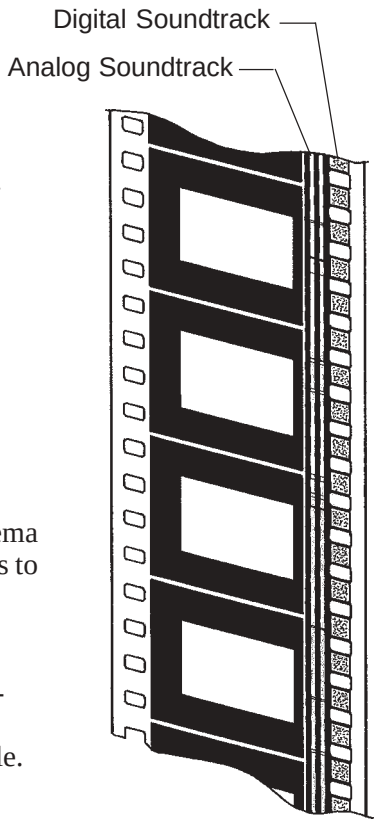


Loosen the focus/azimuth clamping screw and set the focus and azimuth by running the "pink noise" loop and adjusting the signal pickup assembly in the same manner as a conventional slit lens. Finalize the "A" chain installation by again checking the L.E.D. adjustment using Dolby Cat. No. 566 "illumination uniformity" test film. Perform a final "Dolby" level set, and complete any other steps specified by the manufacturer of the sound processor.

DIGITAL ALIGNMENT

Preliminary Adjustment

- Power up the second LS-40 Power Supply and the Audio Processor.
- Check for 550 mA output to the digital (outer) L.E.D.
- Connect a dual-trace oscilloscope to the left and right test points of the processor pre-amp.
- Thread and run Dolby *Tone Test* film (Cat. No. 96t).
- Observe oscilloscope traces and "Dolby" level indicators in the processor.
- If tone is visible on both channels, set to "Dolby" level.
- If not, check the L.E.D. alignment and focus the optics. Then set "Dolby" level.
- Thread and run SMPTE "Buzz" track.
- Adjust horizontal positioning locknut as required to obtain (2) very low, equal residual signals.



Analog L.E.D. Alignment

The analog L.E.D. *must* be aligned before the digital.

- Turn both left and right channel pre-amp gain adjustments on your cinema processor to *full down;* if using a Dolby CP-500, turn to 50%. The goal is to have equal gain on both channels.
- Thread and run Dolby Tone Test film (Cat. No. 96t).
- View the pre-amp outputs on the oscilloscope screen.
- Rotate the analog L.E.D. mount assembly to reach the maximum amplitude of both traces.
- Move the assembly laterally to get both traces as high and equal as possible.
- Complete the standard "A" chain alignment.

To minimize microphonics, the L.E.D. must be very accurately aligned.

- With the power amplifiers OFF, turn the processor and monitor gains FULL UP. Select a film format and the correct projector on the processor. Run the projector with no film. Fine-adjust the L.E.D. mount rotation to a point where the sound of the projector running is not heard through the sound system. The optimal adjustment will be found between two positions where the projector vibration can be heard quite clearly. Run Dolby Tone again to give the system a final adjustment. The final result will be projector noise that is below the noise floor of the processor.
- Optionally, connect an AC millivolt meter to one of the pre-amp test points. Rotate the L.E.D. mount to achieve highest output to three decimal places on the AC millivolt meter. Careful peaking will achieve the same result.

Digital Reader Alignment

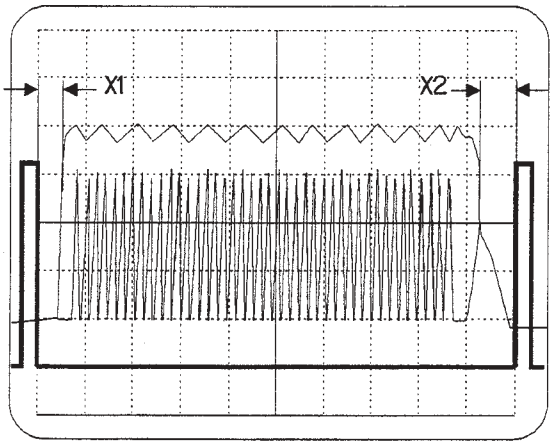
- Thread and run a reel of Dolby-encoded film.
- Connect a dual-trace oscilloscope to the Dolby Digital Processor per the following instructions.
- Refer to the oscilloscope traces "A" - "D" on the following page in reference to the following instructions:

Figure B is in optimal alignment.

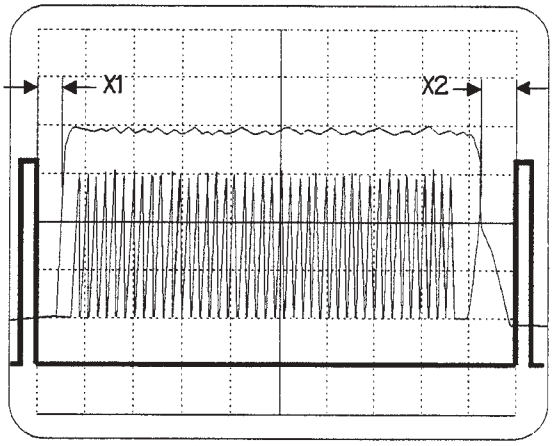
- In Figure A, the top of the sprocket hole has (12) large saw teeth. The differential between the high and low points is 1/3 volt.
- Figure B shows *more* saw teeth with *less* differential. This is obtained by fine-adjusting the rotation of the L.E.D. holder.
- In Figure C, the sprocket hole is falling off on the left, indicating uneven light. This is improved by moving the L.E.D. holder laterally until a flatter trace is obtained.
- In Figure D, the CCD board is misaligned laterally. Dimension X2 is smaller than X1. This can be improved by loosening the moving the board until the X1 and X2 dimensions look like Figure B. The correct alignment is offset to the left by one minor division. That is, the sprocket hole will be 1/5 of a square off-center toward the left "goal post"on the 'scope screen.

Instructions for Alignment of Readers for Dolby Digital

1. Connect a dual-trace oscilloscope to test points on Video Acquisition Card (Cat. No. 605 or 670). Oscilloscope should be 20 MHz. minimum.
    a) Connect Channel 1 to **Video** test point; connect this probe ground only to **Gnd.** test point.
    b) Connect Channel 2 to **Clamp** test point.
    c) Set both channels *Volt/Div.* controls to 1 volt/div. Set vernier to calibrate. Ensure that probes are *not* at X10.
    d) Set horizontal sweep rate to 2 usec/div.
    e) Set trigger to channel 2 and positive polarity, adjust trigger level, and lock on signal.

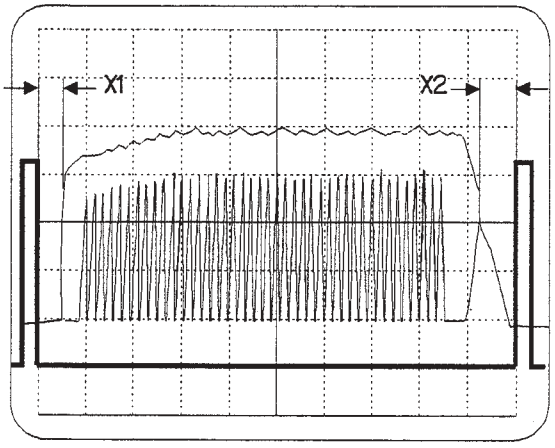


A

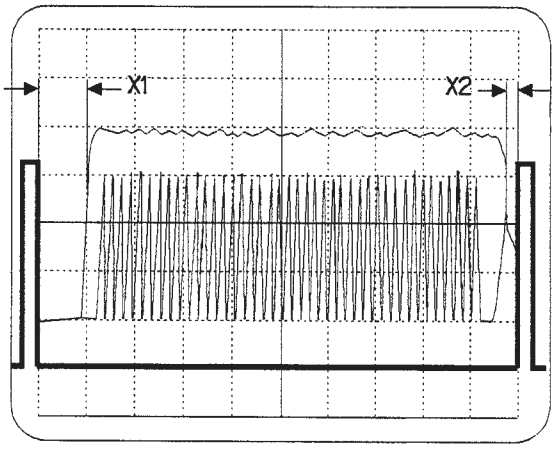


B

(Figure B is in optimal alignment)



C



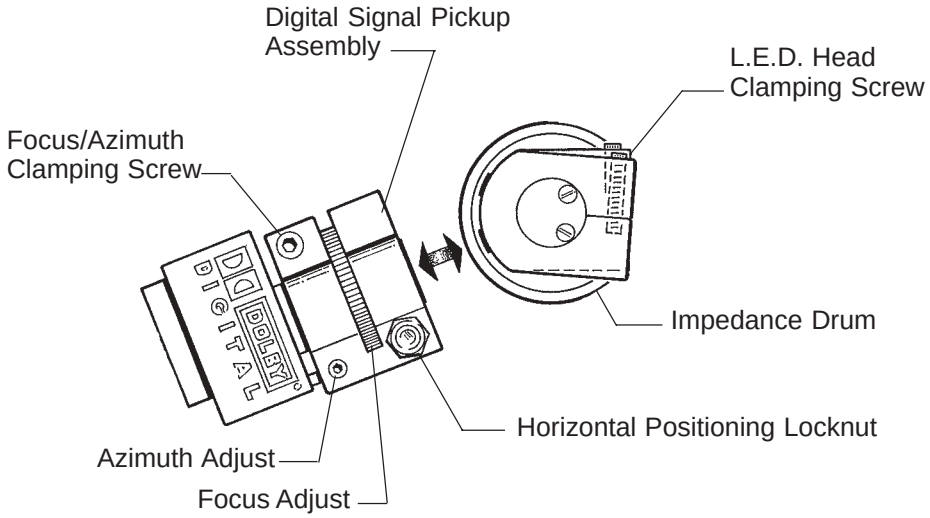
D

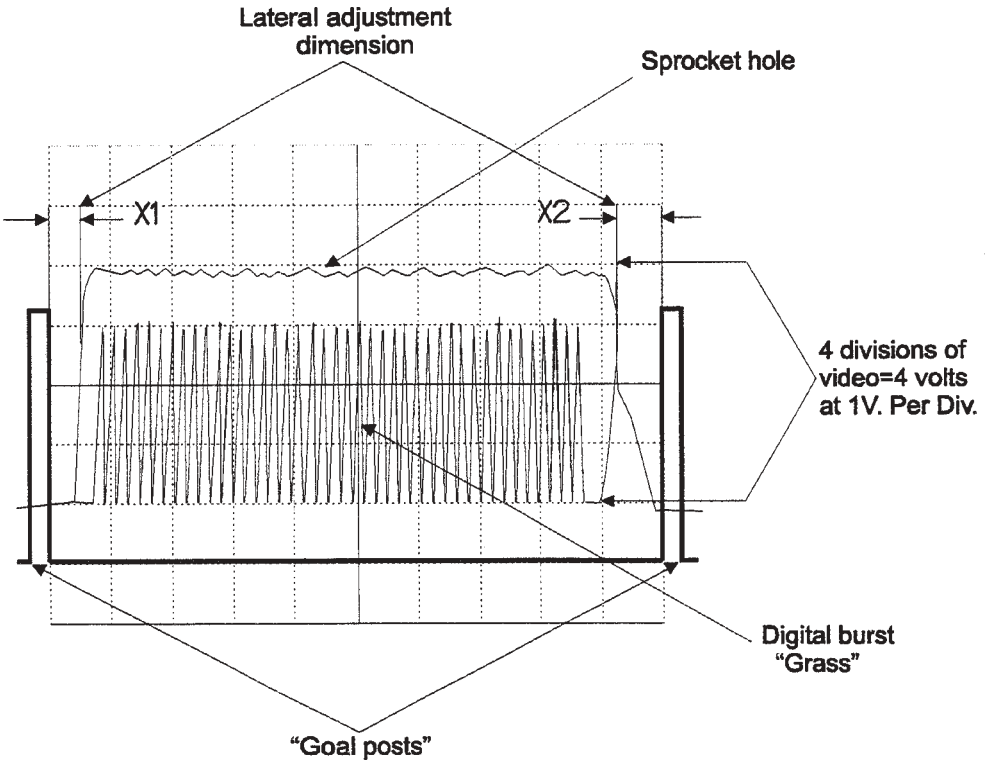
2. Calibrate oscilloscope to processor:
    a) Thread a loop of Cat. No. 69P test film into projector and reader; start machine.
    b) Select Channel 2 for display.
    c) Adjust the horizontal position to line up the inside edge of the left "goal post" with the left edge of the graticule.
    d) Adjust the sweep vernier to line up the inside edge of the right "goal post" with the right edge of the graticule.
    e) Adjust the vertical position for the baseline of the clamp signal (Channel 2) to coincide with a line in the lower section of the graticule.
    f) Select either *Alternate* or *Chop* to give the brightest display of both channels.
    g) Adjust the vertical position of the video signal (Channel 1) to coincide with the same line as the clamp signal.

3. Alignment of the Reader:
    a) Rotate the horizontal positioning locknut and roughly adjust the lateral position of the CCD board so that the outer trace (perf) is centered between the "goal posts." This is approximate, and will be repeated later for accurate positioning.
    b) Rotate the L.E.D. mounting assembly for maximum amplitude on the upper trace without sacrificing flatness. The trace should vary one block or less (± .5 volt). As shown, Figure B is improved from Figure C. Amplitude, as measured with the top trace, should be between 2-5 volts from baseline. Adjust the digital L.E.D. for minimum ripple on the upper trace of the video signal. As shown, Figure B is improved from Figure A.
    c) If available, use DRAS10 software and a laptop computer to view the adjustment of azimuth for a zero degree reading. Or, center the reader rotation between sync lost points using the error rate of the Digital Processor to indicate lost sync.
    d) Adjust focus for darkest center in area of bits (grass). Confirm highest reading with DRAS.
    e) Confirm calibration of oscilloscope as above. Readjust the lateral position to align the outer trace to one minor division (2/10) left of center between the "goal posts." Figure B is improved from Figure D.

4. Final Analog:

    Check the lateral alignment, as initially set using the "Buzz Track," and correct as required. Confirm the L.E.D. positioning by setting the oscilloscope for "X-Y" display and running the Dolby Cat. No. 97 loop. A "cross" should appear on the screen. When both the horizontal and vertical lines are straight and of uniform length, the optimum position has been reached. Repeat the tests for focus, azimuth, equalization, and "Dolby" level set. A difference may be noted in that the high frequency range is extended, and very little high frequency boost will be required.


Digital Signal Pickup Assembly
L.E.D. Head Clamping Screw
Focus/Azimuth Clamping Screw
Impedance Drum
Horizontal Positioning Locknut
Azimuth Adjust
Focus Adjust


Lateral adjustment dimension
Sprocket hole
X1
X2
4 divisions of video=4 volts at 1V. Per Div.
Digital burst "Grass"
"Goal posts"

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.

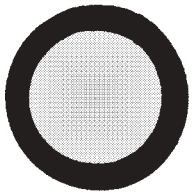
INITIAL OILING

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 oil pump operation and damage moving parts. Additional oil is available through authorized Strong International Dealers; order Simplex Part No. 52-00400 for one-quart quantities, 52-00410 for a half-gallon can, or 52-00420 for a one-gallon can.

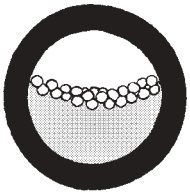
⚠ *DO NOT, at any time, operate the projector without oil.* ⚠

With the projector level (0° projection angle), add oil through the filler located at the front of the gear compartment. Look into the gear compartment while adding oil; the correct amount of oil will touch the bottom of the horizontal drive shaft. No air bubble should be visible in the sight glass inside the film compartment.

Unless the machine is operated at a severe upward angle, no air should be visible in the sight glass. If bubbles are seen, add oil to maintain a safe level. Always check the oil level with the motor *off*.



Normal

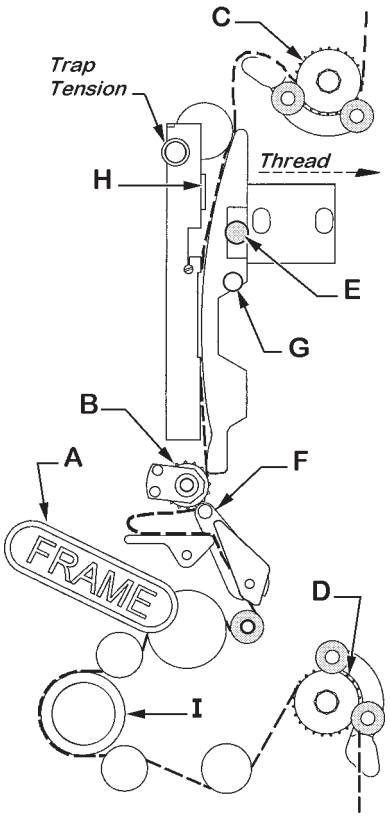


Add Oil

Rotate the motor 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 handle (A) to position the intermittent sprocket (B) at the center of its adjustment range. Using the motor flywheel, turn the mechanism by hand to rotate the intermittent sprocket (B) to its "rest" position. In the "rest" position, the intermittent sprocket is in a locked, stationary stage while the other sprockets continue to rotate.

Open the feed (C) and holdback (D) sprocket pad roller assemblies. Open the film gate by pulling the gate opening pin (E) and sliding the film gate forward to the threading position. Open the intermittent sprocket roller arm (F).

At this time, it is advisable to dismount the film gate pressure pad by sliding the gate to its full forward position, and loosening the thumb screw (G). Withdraw the pressure pad runner from the film compartment and use a clean, dry cloth to wipe down all film-bearing surfaces of the gate and trap. Replace the pressure pad after cleaning and secure thumb screw (G). This procedure should be performed at least once every day.

Thread the film as illustrated. Engage first the intermittent sprocket (B), and check for correct frame position at the lighted framing aperture (H). When correct, close the intermittent roller arm (F). Secure the gate by pushing the gate into the trap until the spring-loaded gate latching pin (E) engages. Form a two-finger loop above the gate as illustrated, and on the loop chute below the intermittent sprocket. Draw the film over the impedance drum (I) and close the pad rollers over sprockets (C) and (D).

Rotate the motor flywheel by hand to advance a few frames of film. *Do not* "inch" the mechanism by momentarily switching the drive motor on and off; in the event of a threading error, film may be damaged. Run fingers over each sprocket (B, C, & D) to insure that the sprocket teeth are centered in the film perforations, and the film is centered between the flanges of the pad rollers. Check again the position of the film in the framing aperture (H). With the intermittent sprocket in its "rest" position, a correct frame image in the framing aperture insures correct frame positioning in the picture aperture and on the screen. Use the framing handle (A) to correct misframes. Close and latch the lens turret.

A slight degree of film tension is required above the upper feed sprocket (C) and below the holdback sprocket (D). This measure prevents the film from snapping upon 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 graduated from "minus" (-) to "plus" (+). Rotate this knob counterclockwise to its stop. The "minus" (-) setting 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
or
www.smpte.org

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 or masking 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 projector 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 Apogee includes a solenoid which pulls the pin when the turret is in motion. A compression spring seats 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 proximity switch on the turret ring will sense the cueing magnet mounted to the index stop bracket and set the correct picture aperture: one magnet mounted inboard = FLAT, one magnet mounted outboard = SCOPE, two magnets = SPECIAL (third lens).

In the event of a turret or aperture 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, provide reliable performance, and minimize downtime.

LUBRICATION

Drain and discard the projector oil after six months of initial operation, and at least annually thereafter. Clean the oil pump intake filter and the oil reservoir. Replace with genuine Simplex Projector Oil (Part No. 52-00400 Quart; 52-00410 Half Gallon; 52-00420 Gallon) available from Strong International Dealers.

SPROCKETS

Clean sprocket teeth daily with a typewriter brush or used toothbrush (with softened bristles). 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 to the film trap.

PAD ROLLERS

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

FASTENING HARDWARE

Check all fasteners (screws, nuts) for tightness. Normal operating vibration over prolonged periods may cause fasteners to loosen. Tighten as required.

FILM GATE

Remove all foreign matter (dirt, wax) by cleaning thoroughly. Examine film runners and straps for wear; replace if required. Check gate opening and closing slide for smooth operation; clean linear bearing to relieve binding. The gate mount is adjustable horizontally by means of slotted mounting holes; check periodically to insure secure gate closure.

FILM TRAP

Examine the inboard spring-loaded studio guides for free motion. Clean carefully, adjust, or replace if grooved. Remove all foreign material from tension straps. Inspect for wear; replace if required.

To remove the trap from the main frame, release the quarter-turn fastener securing the aperture motor cover to the shutter guard. Loosen the slotted head of the trap mounting screw. This screw is captive, and cannot be removed. When the trap mounting screw is loose, grasp the trap plate and withdraw the trap from the film compartment. Carefully align the electrical pins before replacing the trap.

LENS TURRET

Periodically check the condition of the (2) O-ring drive tires on the auto turret drive wheel. Clean the surfaces of the O-rings and replace if worn or cracked. DO NOT LUBRICATE. Check the tension of the motor mount expansion spring and replace if stretched.

The indexing plate of the lens turret rotates on (3) grooved 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 end 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 a compression spring mounted between the stop pin and the solenoid (or lever). Make certain the spring is 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. See the following ADJUSTMENTS & REPLACEMENTS section for detailed information regarding lens alignment and positioning.

Magnets are mounted to brackets on the index stops to actuate the ring-mounted proximity switch and establish lens/aperture logic. Periodically clean the exposed surfaces of these magnets to insure good magnetic conduction. Keep mounting hardware tight to maintain correct alignment.

L.E.D. indicators next to the reset switch display operation of the aperture-sensing proximity switch. When the center L.E.D. is illuminated, the proximity switch is sensing the *inboard* magnet, and setting the FLAT aperture. The lower L.E.D. glows when the proximity switch senses the *outboard* magnet, and actuates the SCOPE aperture. The uppermost L.E.D. glowing indicates that the proximity switch senses *two* magnets, thereby setting the SPECIAL aperture (third lens, when used).

Clean the turret hinge to allow free operation. Make certain that the turret is fully closed when latched. The deadstop screw in the front center of the turret casting 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 latch the turret after cleaning the lenses.

OVERALL APPEARANCE

Clean all enameled surfaces of the projector regularly. Surfaces coated with oil will attract and hold dust and film particles.

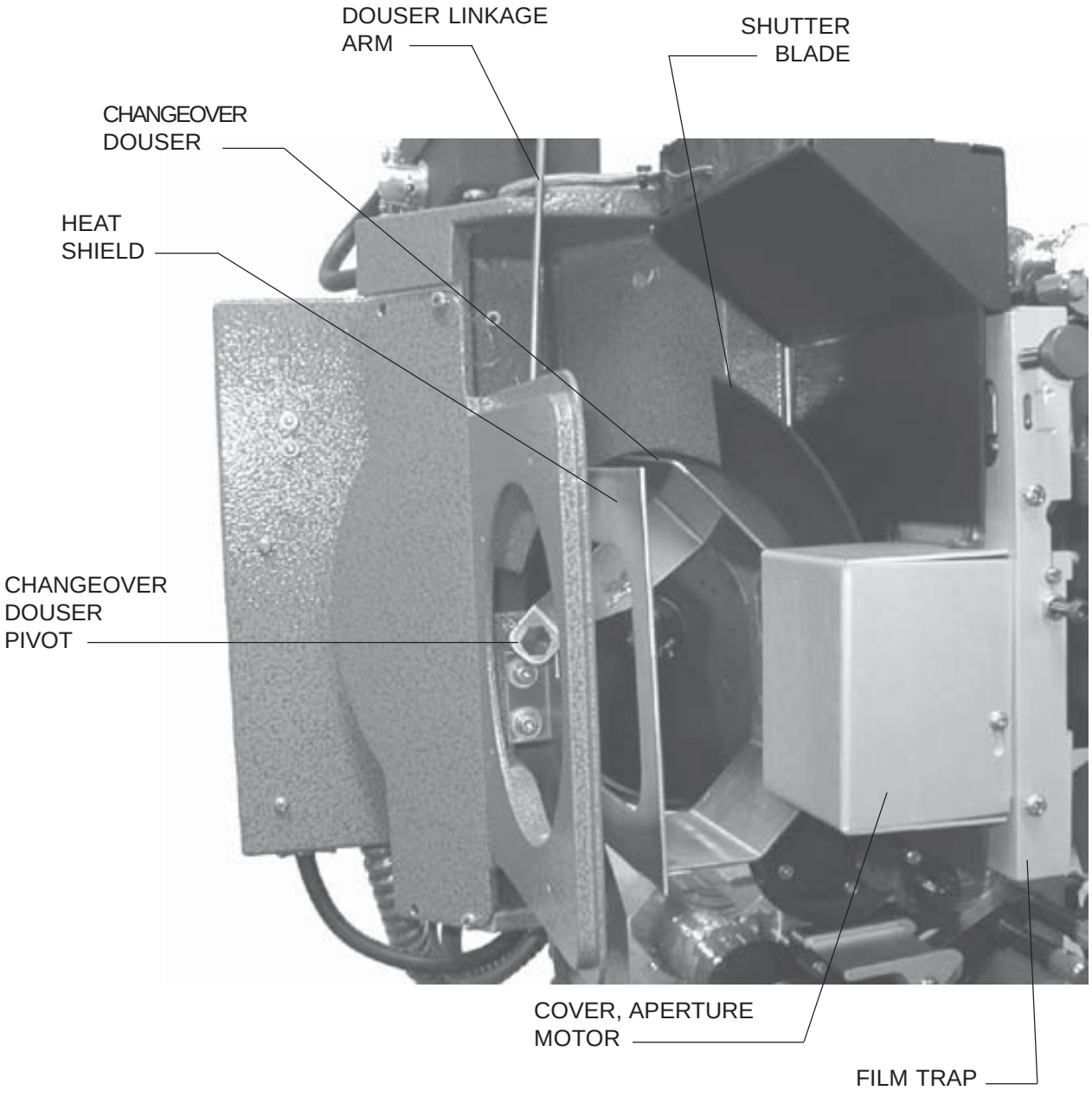

DOUSER LINKAGE ARM
SHUTTER BLADE
CHANGEOVER DOUSER
HEAT SHIELD
CHANGEOVER DOUSER PIVOT
COVER, APERTURE MOTOR
FILM TRAP

FIGURE 3

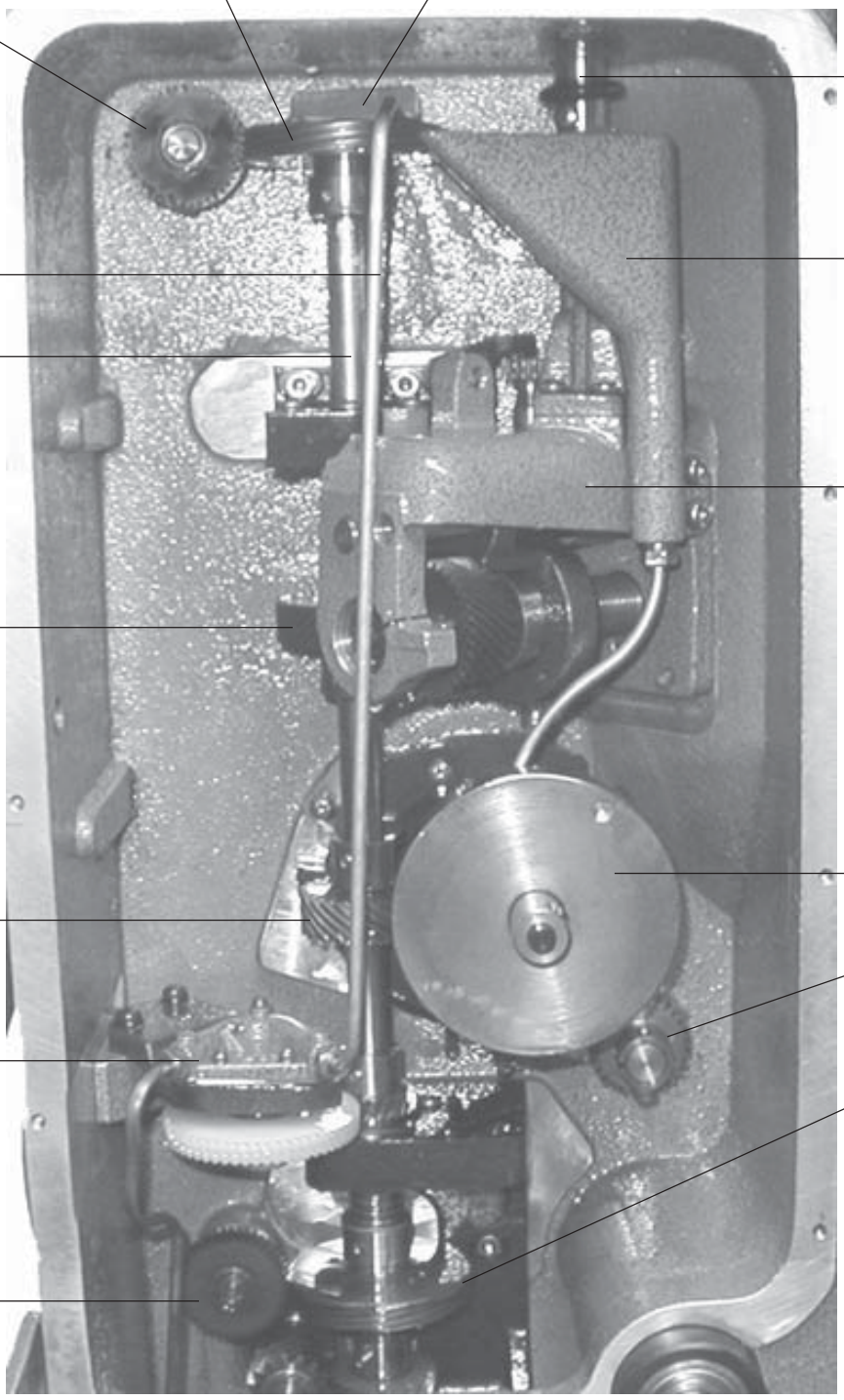

UPPER FEED SPROCKET DRIVE GEAR
OIL SLINGER
UPPER FEED SPROCKET DRIVEN GEAR
SHUTTER ADJUSTMENT KNOB
INTERMITTENT MOVEMENT OIL TRAP
MAIN OIL SUPPLY LINE
VERTICAL SHAFT
SHUTTER SHAFT SUPPORT
SHUTTER SHAFT DRIVE GEAR
INTERMITTENT MOVEMENT FLYWHEEL
INTERMITTENT DRIVE GEAR
FRAMING GEAR
OIL PUMP
HOLDBACK SPROCKET DRIVE GEAR
HOLDBACK SPROCKET DRIVEN GEAR

FIGURE 4

ADJUSTMENTS AND REPLACEMENTS

REFER TO THIS SECTION in conjunction to performing the steps in the MAINTENANCE section. Conscientious maintenance and service of the Simplex Apogee Projector Mechanism 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.

FILM TRAP AND APERTURE CHANGER ASSEMBLY

Dismount the aperture motor cover plate (see Parts List, "Film Trap" drawing, Item 53) by releasing the quarter-turn fastener (Item 54) and loosening the (2) phillips head screws (Item 44). Loosen the captive, slot head mounting screw (Item 34) and remove the trap assembly from the film compartment.

To replace, make certain that the contacting surfaces on both the mounting plate and the trap casting are clean. Align the pins of the electical connector pins and slide the film trap in so that it registers with the (2) dowel pins in the main frame. Carefully guide the electrical plug into its receptacle for the the aperture change motor and framing light PC board connection. Securely tighten the captive mounting screw.

Check the alignment of the intermittent sprocket to the film trap (see INTERMITTENT MOVEMENT section following).

PRESSURE STRAP REPLACEMENT

Dismount the film trap and associated components. Rotate the trap tension knob fully counterclockwise to the "minus" (–) position. 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

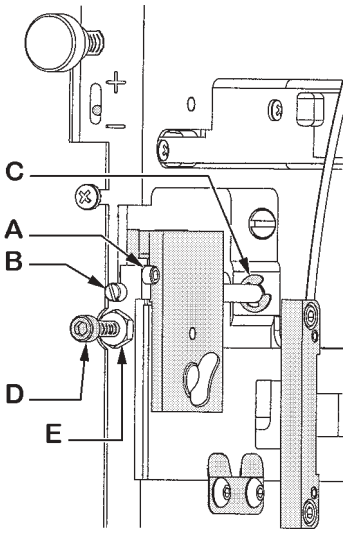
Remove the film gate runner and open the turret assembly. Remove the (2) socket head screws to dismount the fixed, outboard studio guide. Position and install the replacement outboard studio guide. The two spring-loaded inboard studio guides, which serve as lateral guides, can be dismounted by removing the (2) slot-headed shoulder screws. Clean the spring channels and inspect the springs for proper tension before replacing. Close the turret and replace the film gate.

APERTURE PLATE ADJUSTMENT

Gear mesh between the aperture drive motor spur gear and the rack gear on the aperture slide can be set by loosening the (2) 10-32 socket head screws and moving the motor, on its mounting plate, up or down. The motor plate mounting holes are slotted for this purpose.

APERTURE PLATE ADJUSTMENT (continued)

Horizontal travel of the aperture plate is also adjustable. The inboard stop is set by loosening the clamping screw (A) and rotating the slotted end of the slide shaft (B) to position the snap ring (C) at the desired stop point. Secure the clamping screw (A) after the adjustment is correct. The outboard stop is fixed by tightening or loosening stop screw (D) against the aperture slide bracket. Secure lock nut (E) after the outer stop adjustment is correct.



GEAR COMPARTMENT COVER REMOVAL

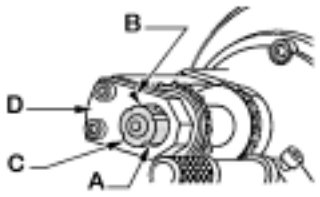
Remove the gear compartment cover only when absolutely necessary, and only after the machine has been at rest for at least (10) minutes to allow all oil to drain into the reservoir. Remove the cover fastening screws. Make certain no foreign material deposits in the gear compartment while the cover is 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 screws equally and in sequence, and secure enough to form an oil-tight seal.

INTERMITTENT MOVEMENT REPLACEMENT

1. Open the film gate. Rotate the framing handle fully clockwise.
2. Set the shutter adjusting knob in mid-position. The shutter adjusting knob travels three complete turns. To locate mid-position, rotate the knob to either stop, and reverse 1½ 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. Press firmly to seat the O-ring.
8. Rotate the intermittent retaining clamps to retain the intermittent assembly and tighten the fastening screws securely.
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 the 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 REPLACEMENT

1. Remove the film gate runner. Dismount the film trap. Open the intermittent sprocket pad arm.
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 (A) aligns with the index mark on the outboard arm (B), 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 (C).
6. Remove the (2) outboard arm socket head mounting screws and dismount the outboard arm (D).
7. Remove the worn intermittent sprocket. Slide the replacement sprocket onto shaft.
8. Position the intermittent outboard bearing arm (D) on the intermittent sprocket shaft 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.
10. Slide the intermittent outboard collar (C) onto the intermittent shaft and align one of its index lines (A) to the index mark on the outboard bearing arm (B). Pull the intermittent sprocket *out* while pressing the outboard collar *in*, so that shaft end play is just perceptible.
11. Securely tighten the (2) set screws in collar (C). Check that the shaft end play is just perceptible.
12. Replace intermittent sprocket film stripper.
13. Align the intermittent sprocket (see below).
14. Replace film trap and install the film gate runner.



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 (i.e. machinist's steel pocket ruler) placed on the outside face of the lower holdback sprocket. Securely tighten the intermittent sprocket fastening screw. Thread a length of scrap film through the trap between the upper sprocket and the intermittent sprocket to verify correct alignment.

FRAMING LIGHT REPLACEMENT

Remove the film trap. Dismount the L.E.D. Printed Circuit Board assembly from the trap plate (three screws); replace with new unit (Part No. 52-00353). Align the pins of the electical connectors and slide the film trap in so that it registers with the (2) dowel pins in the main frame; secure the captive mounting screw.

FEED AND HOLDBACK SPROCKET PAD ROLLER ADJUSTMENT

For coarse adjustment, loosen the three socket head mounting screws securing the pad roller assembly to the main frame. Position the pad roller assembly so the rollers are at an equal distance from the face of the film sprocket. Secure the three screws.

For fine adjustment, loosen the socket head screws securing the roller shafts to the roller arm. The shafts are eccentric; rotating the shaft will move the roller closer to or farther from the sprocket face. Rotate each roller shaft to position each roller (2) film thicknesses from the face of the sprocket. If the roller cannot be placed at this position, reset the coarse adjustment. Secure the shafts after reaching the correct setting.

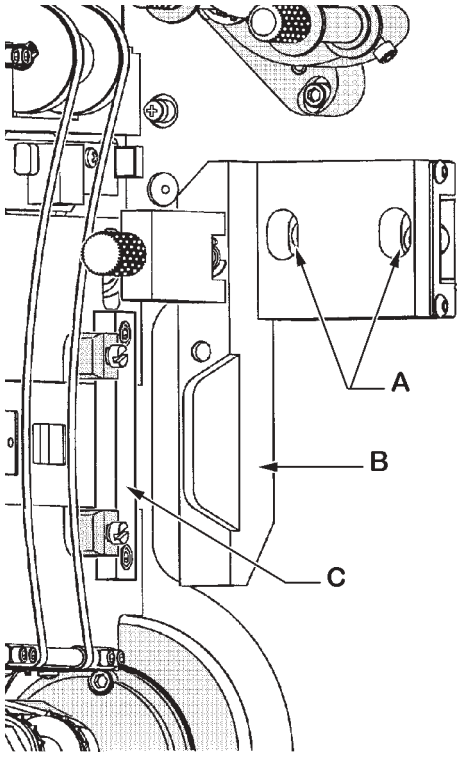
SHUTTER TIMING

1. Place the shutter adjusting knob in its mid-position. To locate mid-position, rotate the knob to its stop, and reverse 1½ turns. Remove the shutter guard.
2. 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.
3. Loosen the (2) socket head shutter hub clamping screws. With the screws loosened, the shutter blade should rotate freely on its shaft while the shaft remains stationary.
4. Hold the motor flywheel to "freeze" the mechanism, so the shutter shaft remains stationary. Rotate the shutter to the fully closed position (one blade completely covering the picture aperture).
5. Tighten the (2) hub clamping screws while the shutter shaft remains stationary.
6. Replace the shutter guard. Project a picture and check the screen; a slight adjustment of the shutter fine adjustment knob on the top of the projector may be required to eliminate travel ghost (see preceding 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 casting, and dismount the cover. Loosen the (2) shutter hub clamping screws and dismount shutter. Install the replacement shutter and set shutter time as detailed in the preceding section. Replace the rear cover, douser linkage, and shutter guard.

FILM GATE PRESSURE PAD & CARRIAGE REPLACEMENT



1. Open the turret. Dismount the gate pressure pad runner by loosening the captive thumb screw and removing the runner from the gate carriage.
2. Remove the sliding gate carriage and bearing assembly after dismounting the pressure pad runner. Slide the film gate carriage back to the "closed" position to expose the two socket head mounting screws (A). Remove the mounting screws and withdraw the carriage and bearing assembly (B) from the film compartment.
3. To replace the film gate carriage assembly, install it to the main frame using the two socket head mounting screws (A). Do not tighten the mounting screws until aligning the gate carriage (B) to the trap.
4. Close the film gate carraige and check the alignment between the gate carriage and the trap. The pressure pad plate must be parallel to the trap. Set the spacing between the gate carriage and the trap by placing a 9/64 inch allen wrench between the face of the inner studio guide spring block (C) and the gate carriage (B) with the carriage closed. Hold the carriage in place (against the allen wrench) and securely tighten the two mounting screws (A).
5. Replace the pressure pad runner. Close and latch the turret. Set the trap tension to "minus" (–). Project some film and check the picture for stability. Reset trap tension as required.

FILM SPROCKET REPLACEMENT

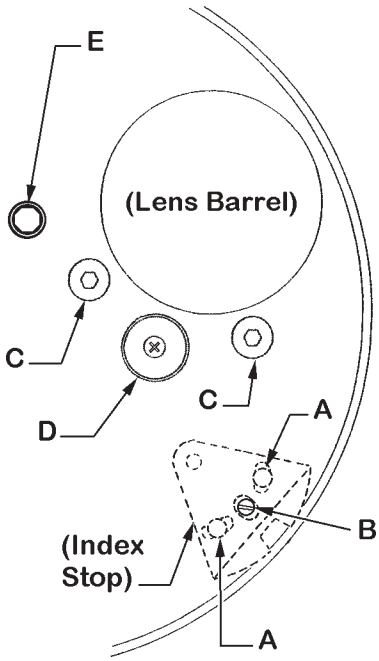
1. Open the pad roller arm.
2. Remove the hex head sprocket fastening screw from the outboard end of the sprocket shaft and slide the sprocket from the shaft. Leave the spring washer and flat washer on the shaft.
3. Slide the replacement sprocket onto the sprocket shaft, aligning the key in the sprocket with the keyway in the shaft. Secure with the sprocket fastening screw.

FILM SPROCKET DRIVEN GEAR REPLACEMENT

1. Remove the gear compartment cover (see previous).
2. Remove gear fastening screw and slide gear from shaft.
3. Hold the film sprocket in place and slide the replacement gear onto the shaft. Insert the fastening screw, position the gear to allow slight end play, and securely tighten the fastening screw.
4. Replace the gear compartment cover.

AUTOMATIC LENS TURRET

1. Check for correct contact between the turret drive tires 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.*
2. Clean the grooves in the (3) indexing plate ball bearings. The top bearing is mounted to an eccentric bushing to permit adjustment; take up any slack as required.
3. Check the compression spring on the index stop pin. Replace with new, or stretch to length. Check the expansion spring on the motor mount and replace if excessively stretched and allowing slippage.
4. A headless set screw in the front center of the turret casting (see Figure 1) acts as a deadstop for turret closure. Tighten this screw as required to remove any play from the turret hinge when closed, yet allowing the turret to latch securely. Tighten the hex nut to lock this adjustment.
   NOTE: *Do not attempt to correct "keystoning"* by setting this deadstop screw to offset the projection lenses. Lenses must remain on optical center for correct focus.
5. Periodically check lens positions and correct as required. Project RP-40 Test Film to the screen and alternate between formats. If the picture noticeably shifts up and down or left to right between formats, the lenses should be re-positioned.



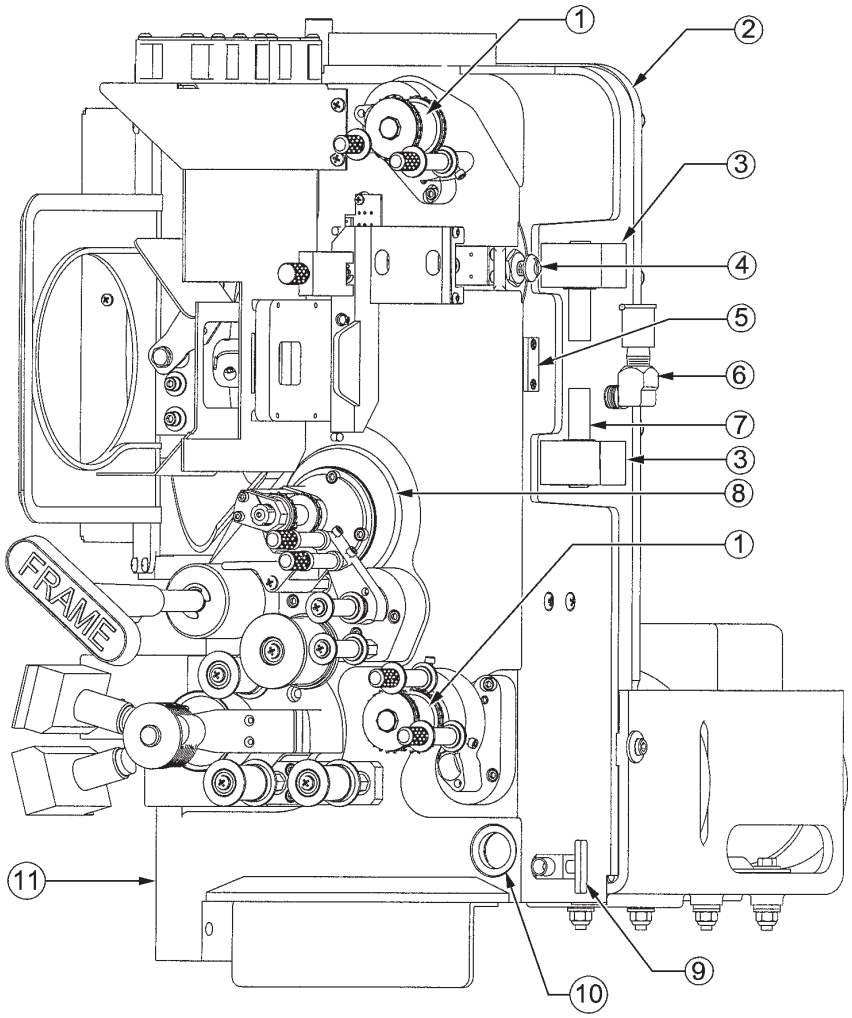
5a. The index stops are mounted to the inside of the lens indexing plate with three screws. Two of the screw holes are slotted to permit fine adjustment of the vertical lens position. Adjust the up-and-down position of the picture on the screen by loosening the two locking screws (A) and turning the slot-headed eccentric stud (B). When the up-and-down lens position is correct, securely tighten the two locking screws (A).

5b. Left-to-right positioning of the picture on the screen is adjusted by setting the two button head socket screws (C) adjacent to the lens on either side of the focus knob (D). Loosen the screws (C) slightly using a 3/16" allen wrench, and adjust the side-to-side position using a 7/32" allen wrench to rotate the adjusting screw (E). This moves the horizontal eccentric adjustment. Securely tighten the two button head screws (C) when the picture is correctly positioned horizontally.

AUTOMATIC LENS TURRET (continued)

6. If a lens change fails to execute when cued, press the reset switch until the desired format is in place. 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.
7. 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.
8. Periodically check the condition of the magnets mounted to the index stops; clean the surfaces of the magnets to allow good conduction. These magnets are sensed by the proximity switch on the turret ring to determine aperture logic. A single magnet mounted *inboard* denotes FLAT, a single magnet on the *outboard* edge denotes SCOPE, and two magnets (inboard and outboard) indicate SPECIAL (three-lens turret only). The magnets are to be positioned close enough to the proximity switch to permit accurate detection, but should not obstruct turret rotation.
9. L.E.D. indicators next to the reset switch display operation of the aperture-sensing proximity switch. When the center L.E.D. is illuminated, the proximity switch is sensing the inboard magnet, and setting the FLAT aperture. The lower L.E.D. glows when the proximity switch senses the outboard magnet, and actuates the SCOPE aperture. The uppermost L.E.D. glowing indicates that the proximity switch senses *two* magnets, thereby setting the SPECIAL aperture (third lens, when used). Failure of the L.E.D. indicator, and/or failure of the aperture to cycle, means that the magnet(s) or the proximity switch are loose or out of alignment; adjust as required.

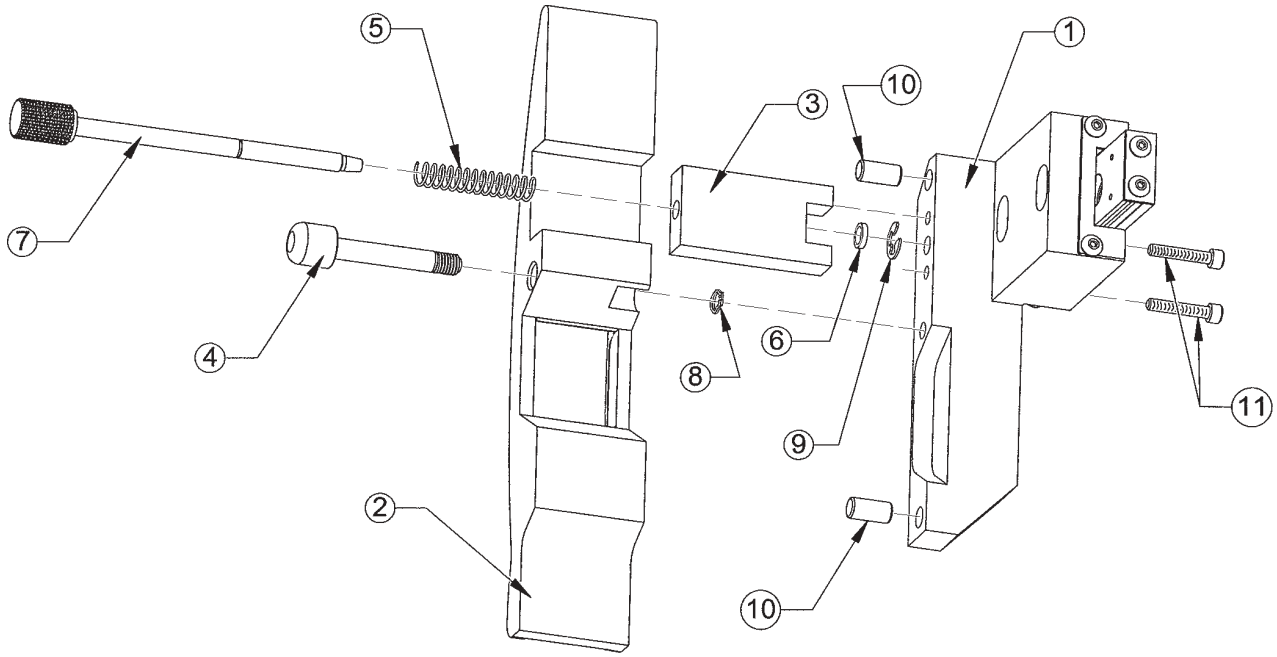
PARTS LISTS
Simplex Apogee



Item	Part No.	Description	Item	Part No.	Description
1	51-59005	Film Sprocket, Type VKF®	4	52-00323	Turret Catch
-	51-51033	Sprocket Retaining Screw	-	52-00396	Lock Nut, 1/2-13 Hex
-	51-70023	Wave Spring Washer	5	52-00291	Strike Plate, Deadstop Screw
-	51-70024	Thrust Washer	-	4040253	Screw, 4-40 x 1/4"
-	51-52017	Sprocket Shaft, Upper & Lower	6	21-38016	Brass Elbow, 90°
-	51-04025	Shaft Bearing, Film Side	-	21-36005	Oil Fill Cup
-	52-00370	Shaft Bearing, Gear Side	-	21-38017	Threaded Nipple
-	51-00185	Driven Gear, Upper & Lower	7	51-37032	Turret Hinge Pin (2 req'd.)
2	52-00284	Gear Compartment Cover	-	425050A	Set Screw, 1/4-20 x 1/2"
-	31-71017	Oil Seal Cord (order 4 feet)*	8	52-00050	Framing Cam
-	4110751	Mounting Screw, 10-24 x 3/4"	9	51-98201	Petcock, Oil Drain
-	41-07102	Black Fiber Washer, #10	-	51-26001	Drain Hose (order by foot)
3	52-00282	Turret Hinge Bracket (2 req'd.)	10	51-98200	Oil Sight Glass
-	4250755	Mounting Screw, 1/4-20 x 3/4"	11	52-00325	Main Frame Casting

* To prevent oil leakage, begin installing replacement cord at the *top* of the cover, and *do not* stretch the cord

FILM GATE
Assembly No. 52-00214



Item	Part No.	Description
1	52-00209	Gate Carriage & Bearing Assembly
2	52-00212	Film Gate Runner
3	52-00211	Support Plate, Gate Release
4	52-00213	Gate Runner Retaining Screw
5	81-58016	Compression Spring, Gate Release
6	81-56012	Gate Release Spacer
7	52-00350	Pin Assembly, Gate Release
8	21-48016	Retaining Ring, 1/4" External
9	81-48007	Snap Ring, Truarc
10	21-37001	Dowel Pin, 1/2" x 1/4" Diameter
11	4060751	Screw, 6-32 x 3/4" Socket Head

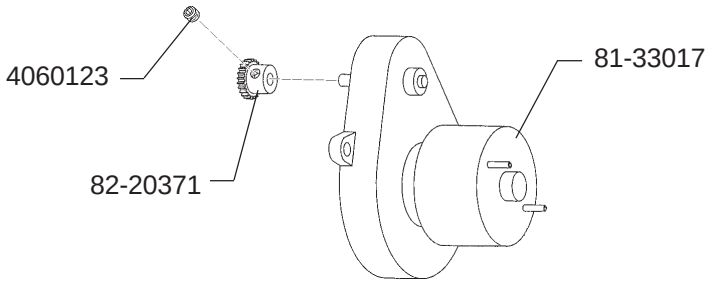
FILM TRAP
Assembly No. 52-00223

FILM TRAP & APERTURE CHANGER
Parts List

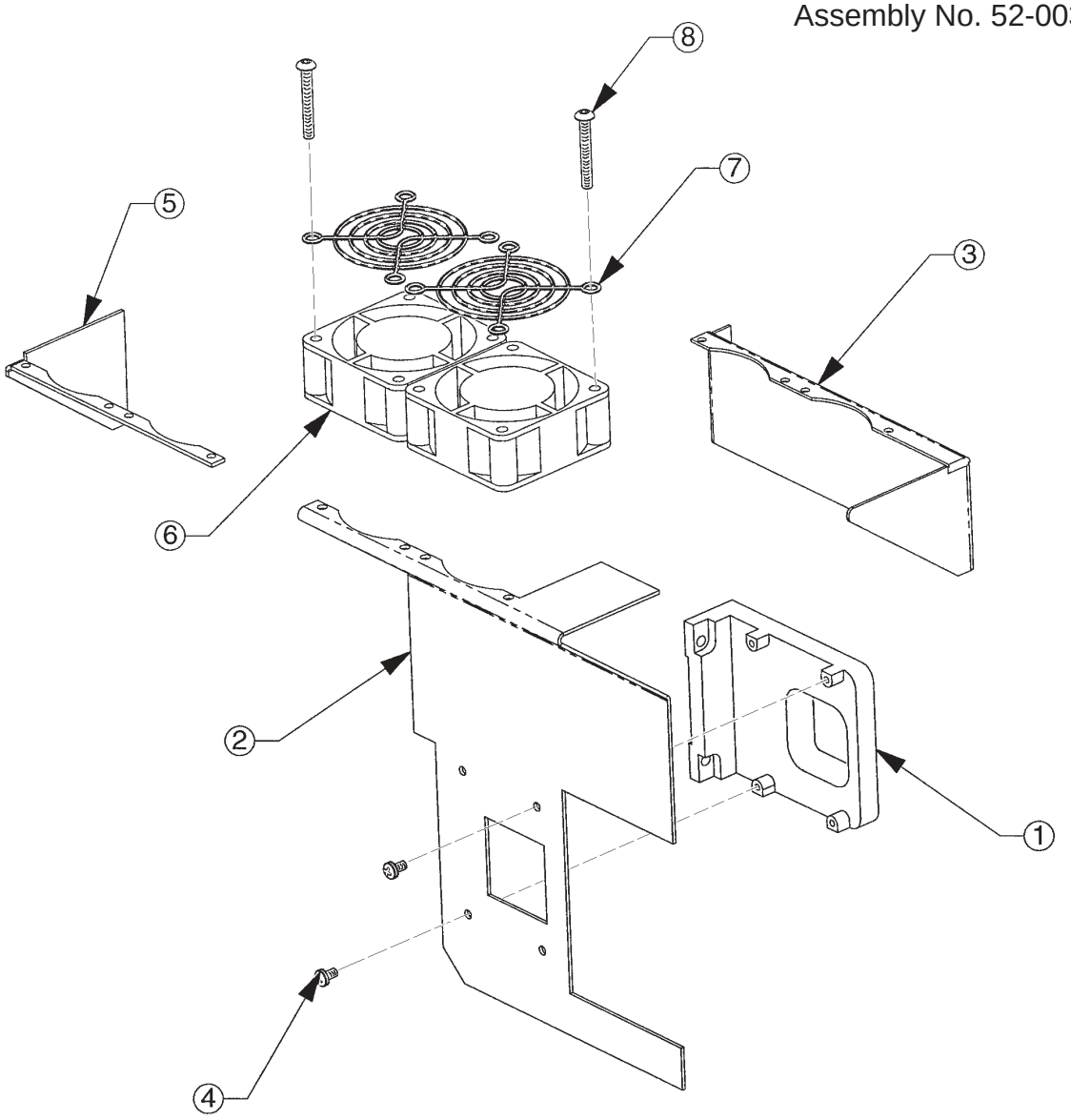
Item	Part No.	Description
1	52-00215	Film Trap Base Plate
2	52-00217	Tension Strap Shaft, Lower
3	52-00218	Tension Strap Shaft, Upper
4	52-00219	Upper Tension Shaft Spacer
5	52-00220	Tension Spring Shaft
6	52-00221	Dual Aperture Plate
7	52-00222	Tension Strap (2 req'd.)
8	52-00224	Studio Guide, Fixed
9	82-00115	Slider Bracket
10	81-98141	Rack Gear
11	81-10016	Clamp Plate
12	52-00225	Tension Lever
13	52-00226	Tension Indicator
14	52-00227	Aperture Motor Mount
15	52-00228	Motor Cover
16	52-00229	Studio Guide, Movable (2 req'd.)
17	52-00230	Spring Holder, Studio Guides
18	52-00216	Upper Tension Strap Mount (2 req'd.)
19	71-37002	Dowel Pin, 1" x 1/4" Diameter
20	51-10013	Aperture Clamping Spring
21	52-00345	Dual Aperture Plate Slide Rod
22	4040621	Screw, 4-40 x 5/8" Socket Head
23	4040373	Screw, 4-40 x 3/8" Socket Head (8 req'd.)
24	4080253	Screw, 8-32 x 1/4" Button Head (2 req'd.)
25	4060372	Screw, 6-32 x 3/8" Socket Head (4 req'd.)
26	21-51032	Shoulder Screw, .25" x .25" 10-24 Thrd.
27	4040252	Screw, 4-40 x 1/4" Socket Head (2 req'd.)
28	4100500	Screw, 10-32 x 1/2" Socket Head (2 req'd.)
29	408037C	Set Screw, 8-32 x 3/8"
30	21-37030	Roll Pin, 3/8" x 1/16" Diameter (4 req'd.)
31	21-48016	Snap Ring, Truarc 5100-25 (2 req'd.)
32	21-58032	Compression Spring (2 req'd.)
33	81-48002	Retaining Ring
34	52-00352	Trap Mounting Screw, Captive
35	51-48017	Retaining Ring (for Item 34)
36	52-00231	Tension Adjusting Knob
37	4252002	Set Screw, 1/4-20 x 2"
38	52-00232	Shoulder Screw, Studio Guide (2 req'd.)
39	4040120	Screw, 4-40 x 1/8" Pan Head (7 req'd.)
40	52-00353	Printed Circuit Board Assembly, Motor/Frame Light
-	52-00357	Wire Harness, Trap PCB to Controller Cabinet

Item	Part No.	Description
41	21-37008	Dowel Pin, 1/2" x 1/8" Diameter (2 req'd.)
42	52-00359	Aperture Plate Drive Motor Assembly
-	81-33017	Gear Motor; 12 V.DC, 72 rpm
-	82-20371	Spur Gear
-	4060123	Set Screw, 6-32 x 1/8
-	21-37055	Molex Plug, (2) Pin
-	41-98055	Grommet, Rubber
43	51-37009	Groove Pin, 1/4" x 1/8" Diameter
44	4060250	Screw, 6-32 x 1/2" Pan Head (4 req'd.)
45	81-37011	Spring, Aperture Catch
46	4030181	Screw, 3-48 x 3/16" Socket Head (2 req'd.)
47	51-70037	Washer, #3 (2 req'd. with Item 46)
48	4040620	Screw, 4-40 x 5/8" Pan Head (2 req'd.)
49	82-20448	Bushing
50	81-98121	Latching Stud, Wing Head
51	81-37022	Dowel Pin, 1.125" x .125" Diameter
52	51-58007	Expansion Spring, Strap Tension
53	52-00375	Aperture Motor Cover
-	52-00452	Sticker, "Threading Diagram" (not shown)
54	31-98209	Fastener, Quarter-Turn

DETAIL, Item 42



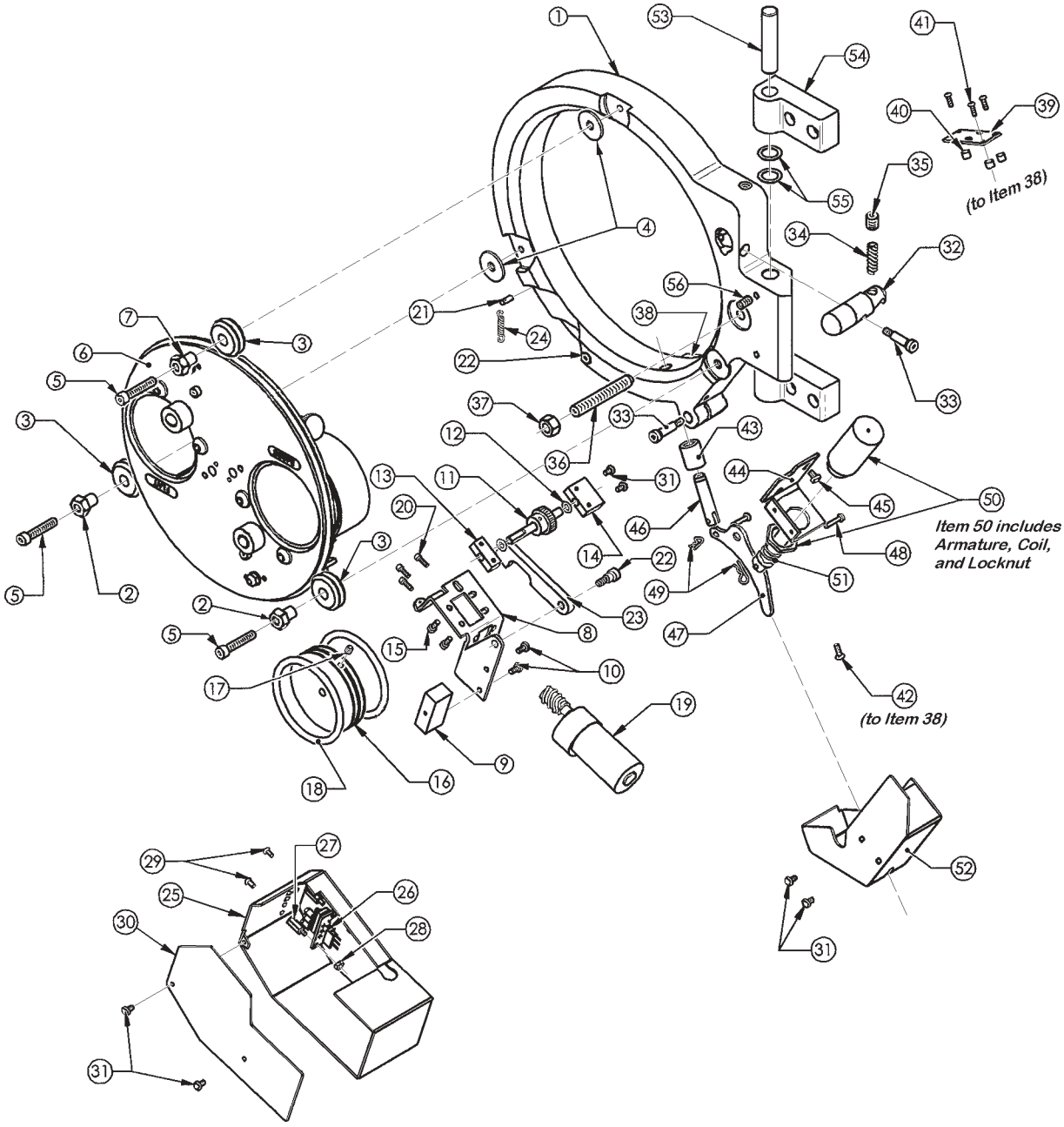
TRAP BLOWER
Assembly No. 52-00387



Item	Part No.	Description	Item	Part No.	Description
1	52-00338	Trap Heat Sink	5	52-00379	Plug, Air Channel
2	52-00339	Heat Shield	6	51-02002	Blower, 12 V.DC
3	52-00343	Air Channel	7	51-02003	Blower Grille
4	4060250	Screw, 6-32 x 1/4" Pan Head (4 req'd.)	8	4081250	Screw, 8-32 x 1-1/4" Button Head, (8 req.d.)

Blower Power Supply 51-98422 (OMROM Type S85K, *not shown)* not included with 52-00387; order separately

APOGEE LENS TURRET
Assembly No. 52-00279



APOGEE LENS TURRET
Parts List

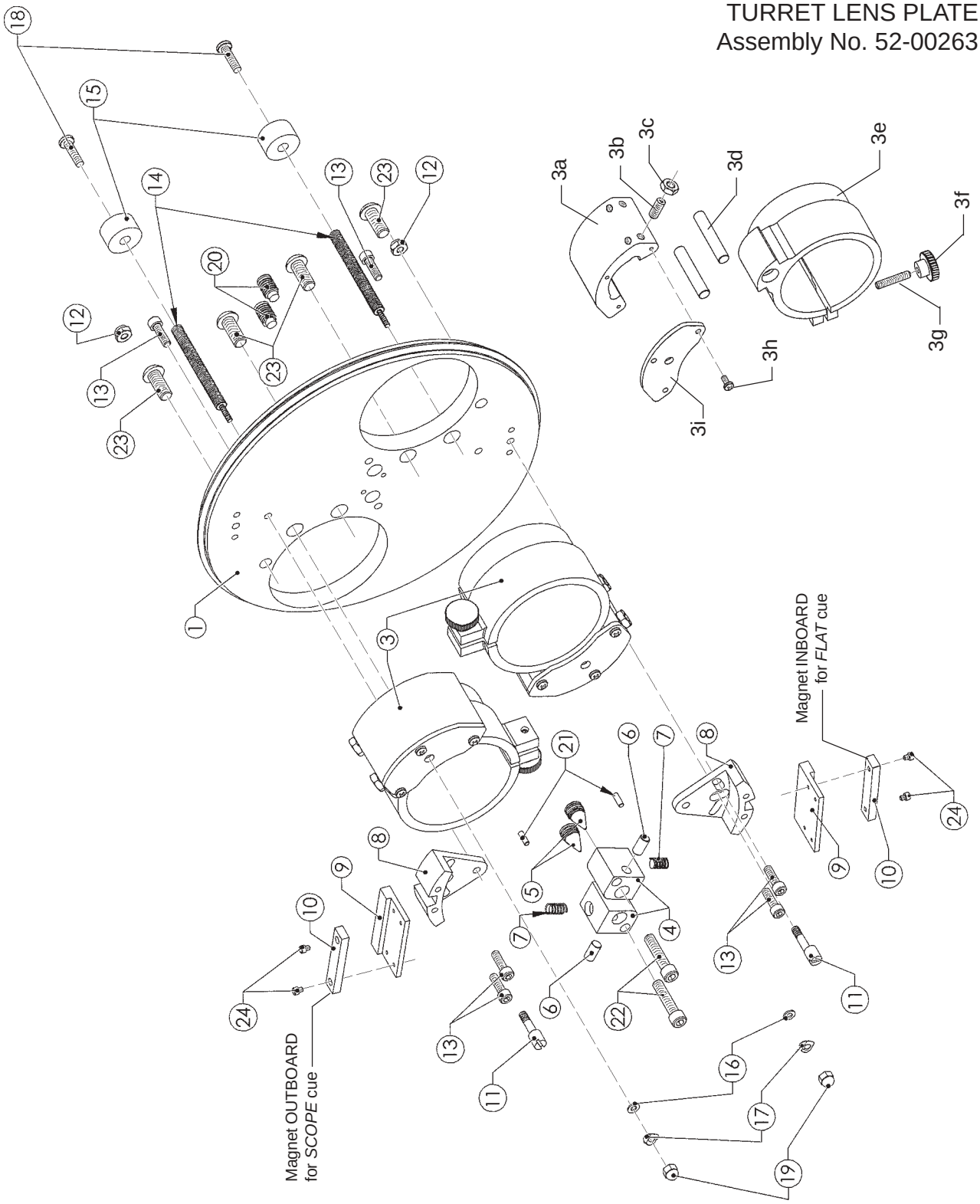
Item	Part No.	Description
1	52-00272	Turret Ring Casting
2	51-07012	Straight Bushing (2 req'd.)
3	51-49010	V-Groove Bearing (3 req'd.)
4	4257102	Washer, 1/4" I.D. 5/8" O.D. (3 req'd.)
5	4251250	Screw, 1/4-20 x 1-1/4" Socket Head (3 req'd.)
6	52-00263	Turret Lens Plate Assembly, Two-Lens
-		Turret Lens Plate Assembly Three-Lens (not shown)
7	51-07013	Eccentric Bushing (Top Position only)
8	52-00268	Motor Bracket
9	52-00267	Motor Spacer Bracket
10	4060310	Screw, 6-32 x 5/16" Pan Head (3 req'd.)
11	52-00355	Turret Drive Gear Assembly
-	51-23005	Driven Gear
-	52-00265	Shaft, Drive Gear
-	51-37011	Roll Pin, 3/32" x 9/16"
12	4257108	Shim Washer, .021" Thick (2 req'd.)
13	52-00269	Motor Bracket Spacer
14	52-00270	Drive Wheel Positioning Block
15	4060372	Screw, 6-32 x 3/8" Socket Head (4 req'd.)
16	52-20613	Turret Plate Drive Wheel
17	4100252	Set Screw, 10-32 x 1/4"
18	21-48001	Drive Tire (2 req'd.)
19	52-00271	Turret Drive Motor Assembly
-	51-33004	Motor, 12 V.DC
-	21-40019	Molex Plug, (2) Pin
-	31-62007	Molex Pin (2 req'd.)
-	51-23011	Worm Gear
-	21-37026	Roll Pin, 3/32" x 3/8"
20	4040250	Screw, 4-40 x 1/4" Pan Head (3 req'd.)
21	52-20641	Spring Retaining Rod (P-7843)
22	21-51032	Shoulder Screw, 1/4" x 1/4" Dia. 10-24 Thrd. (2 req'd.)
23	52-00480	Motor Stabilizing Bracket
24	51-58018	Motor Tensioning Spring (P-2807)
25	52-00337	Motor Housing Assembly
26	52-00363	Turret Switch & L.E.D. Assembly
27	41-98049	Standoff, 4-40 x 1/2" Nylon (2 req'd.)
28	4048001	Hexnut, 4-40 (2 req'd.)
29	4040251	Screw, 4-40 x 1/4" Button Head (2 req'd.)
30	52-00340	Cover, Motor Housing

Item	Part No.	Description
31	4060250	Screw, 6-32 x 1/4" Pan Head
32	52-00322	Turret Latch
33	51-51011	Shoulder Screw (2 req'd.)
34	21-58060	Compression Spring
35	4370500	Set Screw, 3/8-16 x 1/2"
36	4372005	Deadstop Set Screw, 3/8-16 x 2-1/4"
37	4378001	Deadstop Lock Nut, 3/8-16 Hex
38	52-00277	Sensor Board Mounting Bracket
39	52-00278	Aperture Logic Sensor Board
40	51-56002	Spacer, Nylon (3 req'd.)
41	4040372	Screw, 4-40 x 5/8" Button Head (3 req'd.)
42	4060370	Screw, 6-32 x 3/8" Pan Head (for Item 38)
43	51-04015	Oilite Bushing, Index Stop Pin
44	52-00275	Solenoid Mounting Bracket
45	4080250	Screw, 8-32 x 1/4" Pan Head
46	52-00273	Index Stop Pin
47	52-00274	Index Stop Pin Pivot Plate
48	51-98254	Clevis Pin, 1/8" (P-7966), 2 req'd.
49	01704000	Spring Pin (2 req'd.)
50	52-00397	Solenoid, 12 V.DC
51	51-58059	Compression Spring
52	52-00346	Solenoid Cover Assembly
53	51-37032	Hinge Pin, 2-1/4" x .5" Dia. (2 req'd.)
54	52-00282	Hinge Bracket (2 req'd.)
-	4250755	Mounting Screw, 1/4-20 x 3/4" Socket Head
55	21-70016	Fiber Washer, .505" I.D. x 3/4" O.D.
56	425050A	Set Screw, 1/4-20 x 1/2" (2 req'd.)

NOT SHOWN

52-00451	Wire Harness, Motor & Solenoid to Controller
52-00453	Wire Harness, Selector Switch to Controller

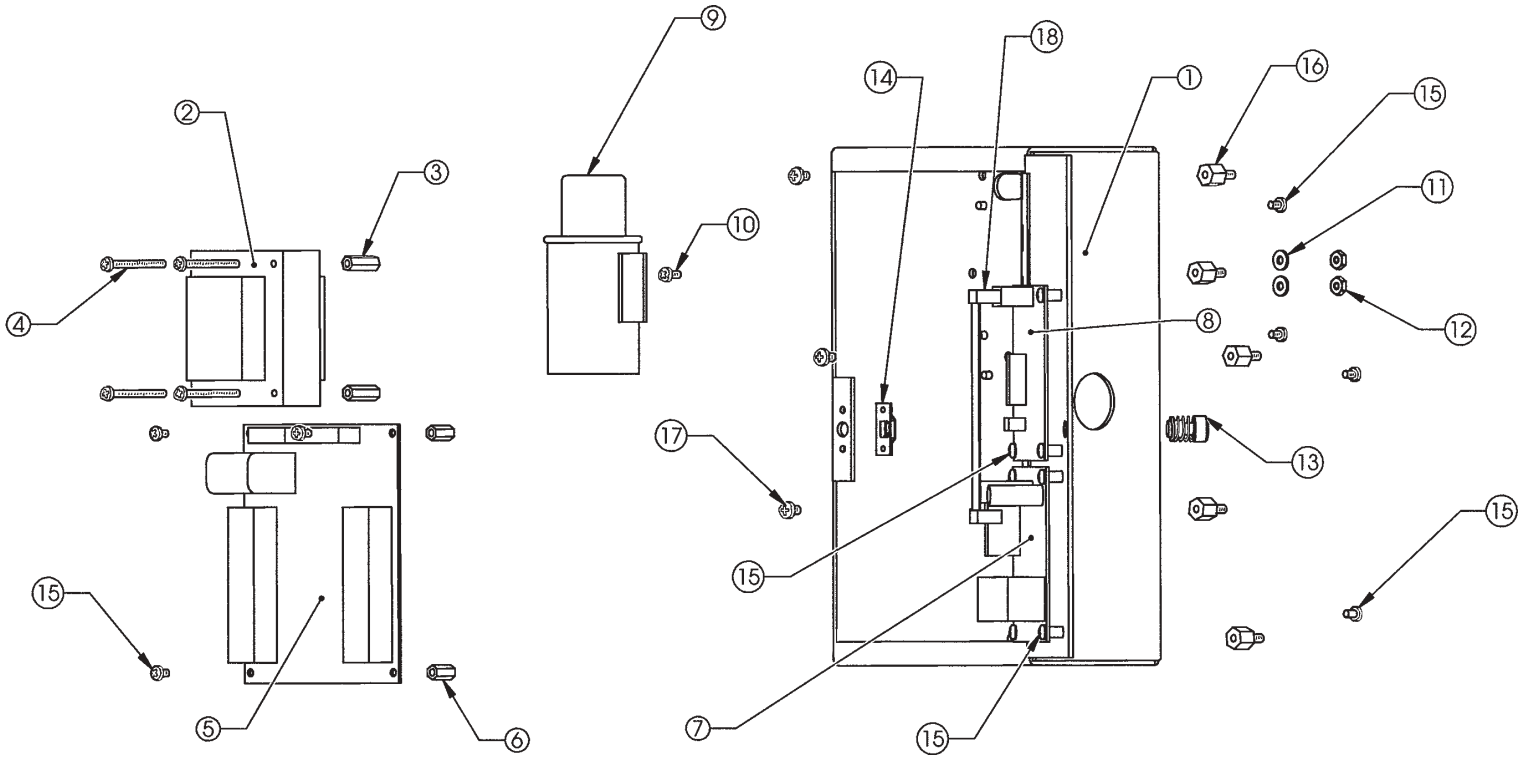
TURRET LENS PLATE
Assembly No. 52-00263



TURRET LENS PLATE ASSEMBLY
Parts List

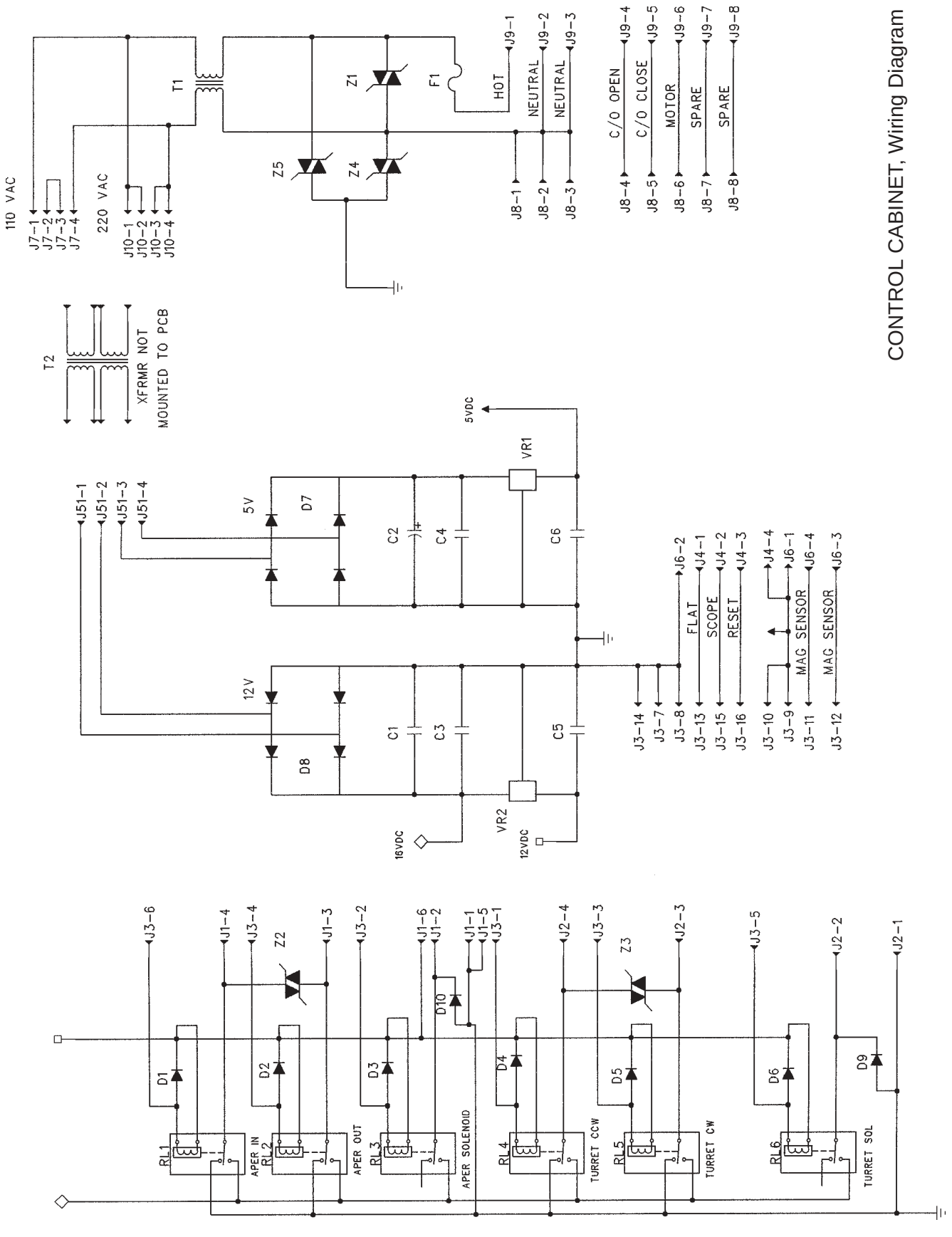
Item	Part No.	Description
1	52-00258	Indexing Plate, Two-Lens
-	52-00259	Indexing Plate, Three-Lens (not shown)
2	52-00320	Labels (not shown) FLAT - SCOPE
3	52-00257	Lens Barrel Assembly (includes Items 14,16,17,19)
3a	52-00255	Slide Mount
3b	4100626	Set Screw, 10-32 x 5/8" (4 req'd.)
3c	4108001	Lock Nut, 10-32 (4 req'd.)
3d	52-20596	Slide Rod (2 req'd.)
3e	52-00254	Lens Barrel Casting
3f	21-28022	Knob, Black Plastic
3g	4101005	Set Screw, 10-32 x 1"
3h	4060310	Screw, 6-32 x 5/16" Pan Head (3 req'd.)
3i	52-00256	Lens Mount, Rear Cover Plate
4	52-00260	Spring Housing Block
5	52-00261	Horizontal Adjust Screw
6	52-00262	Push Rod
7	21-58040	Compression Spring
8	52-20769	Catch Bracket, Index Stop
9	52-00281	Magnet Mounting Bracket
10	51-61017	Bar Magnet
11	52-20618	Eccentric Screw, Index Stop Adjust
12	4108002	Hexnut, 10-32 NyLock
13	4100620	Screw, 10-32 x 5/8" Socket Head
14	52-20604	Focus Shaft
15	21-28010	Focus Knob
16	4067101	Flatwasher, #6
17	21-70028	Wave Spring Washer, #6
18	4100751	Screw, 10-32 x 3/4" Pan Head
19	4068002	NyLock Nut, 6-32
-	4068004	Hexnut, 6-32 (not shown)
20	4370620	Set Screw, 3/8-16 x 5/8" Dog Point
21	01513210	Roll Pin, 1/16 x 5/8"
22	4251250	Screw, 1/4-20 x 1-1/4" Socket Head
23	4320750	Screw, 10-32 x 5/8" Button Head
24	4040121	Screw, 4-40 x 1/8" Socket Head

TURRET CONTROL BOX
Assembly No. 52-00385

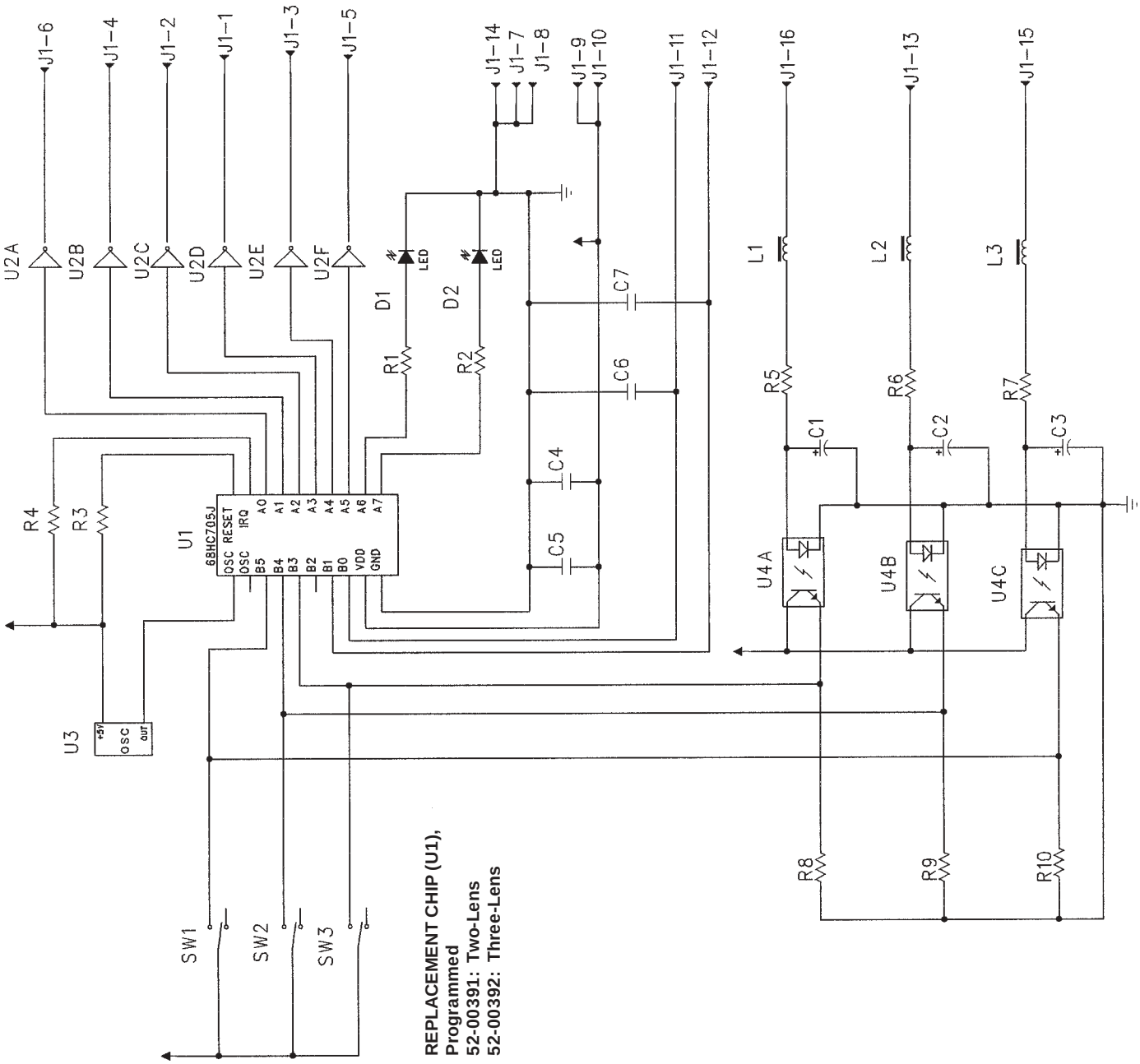


Item	Part No.	Description
1	52-00383	Box, Welded Assembly
2	52-00386	Transformer
3	41-98097	Standoff, 1/4" x 3/4" 6-32 Thrd. (4 req'd.)
4	4061500	Screw, 6-32 x 1-1/2" Pan Head (4 req'd.)
5	52-70077	PC Board Assembly, "Power"
6	61-98022	Standoff (4 req'd.)
7	52-70080	Relay PC Board Assembly
8	52-70081	PC Board Assembly, "Control"
9	---	Capacitor, 7.5 µf, 370 V.AC (with Motor)

Item	Part No.	Description
10	4060310	Screw, 6-32 x 5/16" Pan Head (2 req'd.)
11	4067100	Flatwasher, #6 (2 req'd.)
12	4068001	Hexnut, 6-32 (2 req'd.)
13	31-98209	Fastener, Quarter-Turn
14	31-98200	Receptacle, Quarter-Turn Fastener
15	4060250	Screw, 6-32 x 1/4" Pan Head (20 req'd.)
16	41-98090	Standoff (5 req'd.)
17	408025D	Screw, 8-32 x 1/4" Pan Head (5 req'd.)
18	51-13006	Ribbon Cable Connector

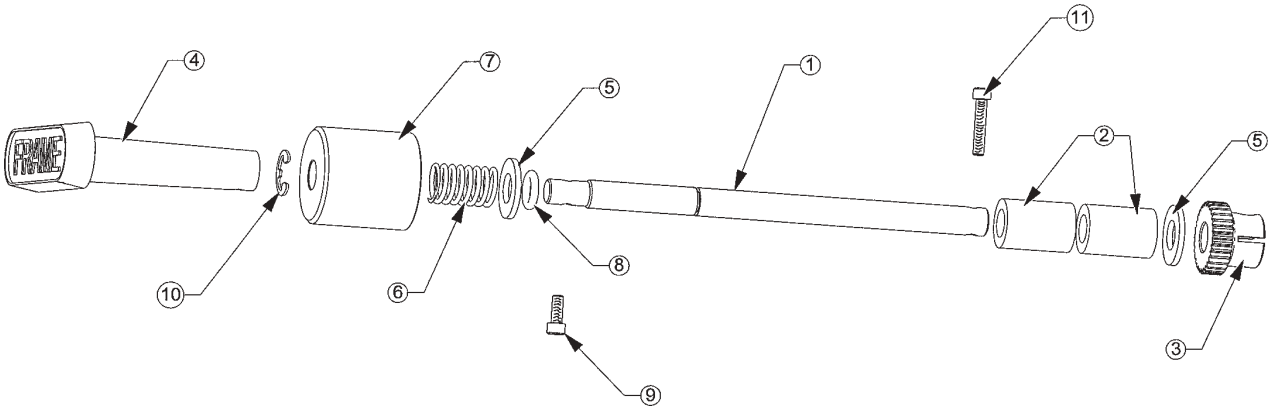


CONTROL CABINET, Wiring Diagram



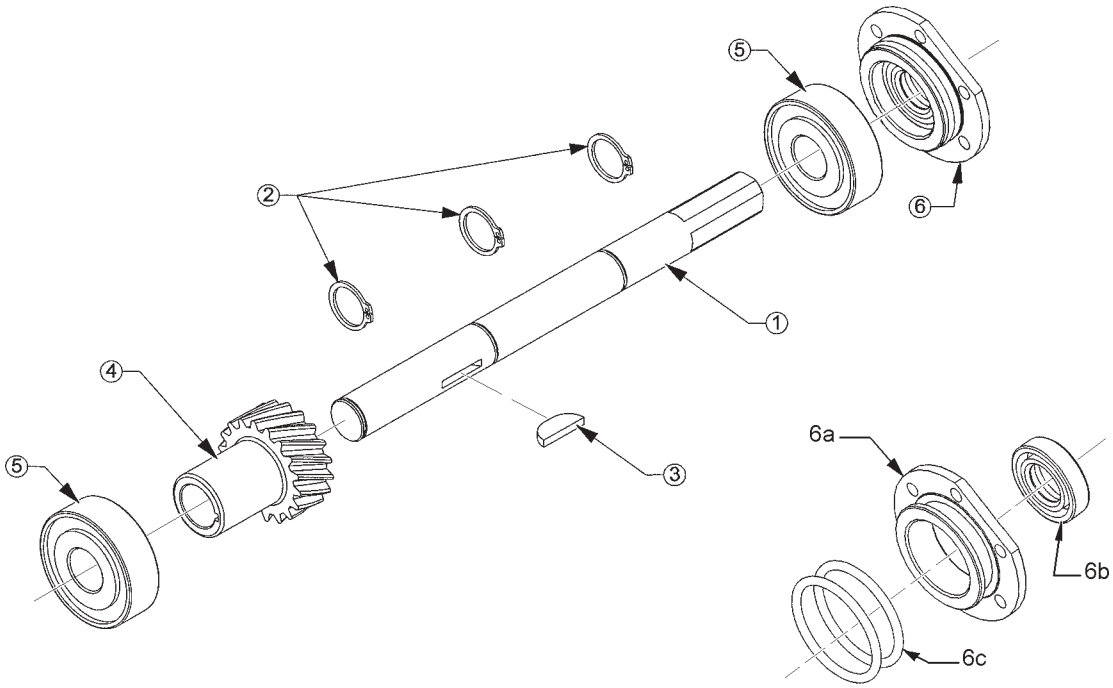
TURRET CONTROL PRINTED CIRCUIT BOARD
Wiring Diagram

FRAMING SHAFT
Assembly No. 52-00205



Item	Part No.	Description
1	52-00207	Framing Shaft
2	51-04004	Linear Bearing (2 req'd.)
3	52-00206	Framing Gear
4	51-28028	Framing Handle
5	4507100	Flatwasher, 1/2" (2 req'd.)
6	51-58036	Compression Spring
7	52-00336	Framing Cover
8	21-48024	O-Ring
9	4100500	Screw, 10-32 x 1/2" Socket Head
10	51-48010	Snap Ring, Truarc
11	4101000	Screw, 10-32 x 1" Socket Head

HORIZONTAL DRIVE SHAFT
Assembly No. 52-00235

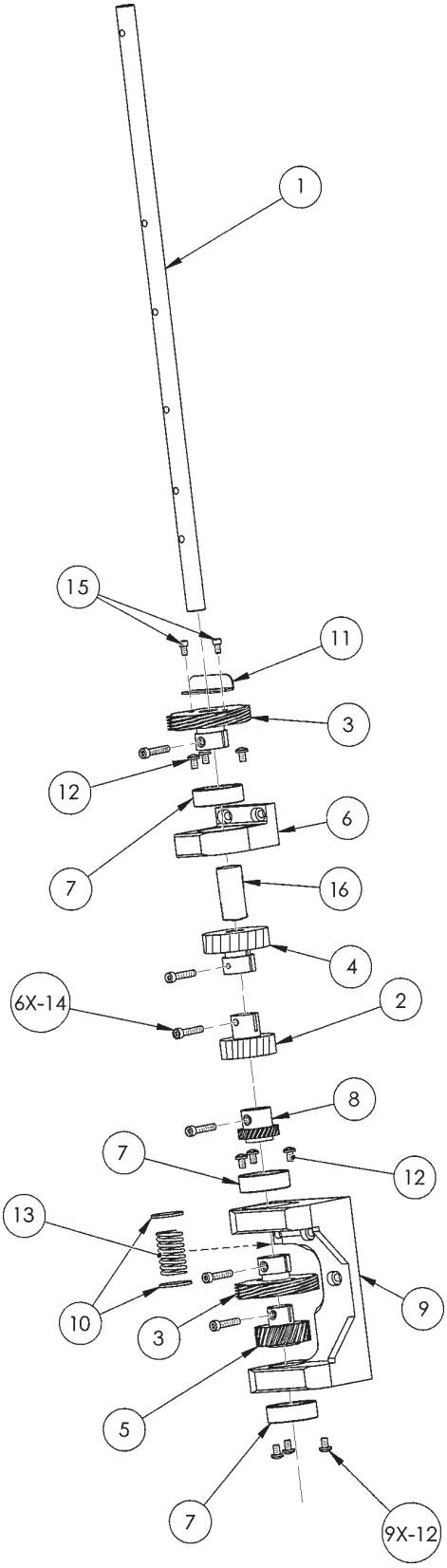


Item	Part No.	Description
1	52-00234	Horizontal Drive Shaft
2	21-48027	Snap Ring, Truac 5100-50 (3 req'd.)
3	51-27004	Woodruff Key (P-1537)
4	52-00166	Main Drive Gear
5	51-04007	Ball Bearing (2 req'd.)
6	52-00335*	Seal Plate Assembly
-	4080375	Mounting Screw, 8-32 x 3/8" Pan Head
6a	52-00233	Seal Plate
6b	51-36011	Oil Seal
6c	51-48007	O-Ring (2 req'd.)

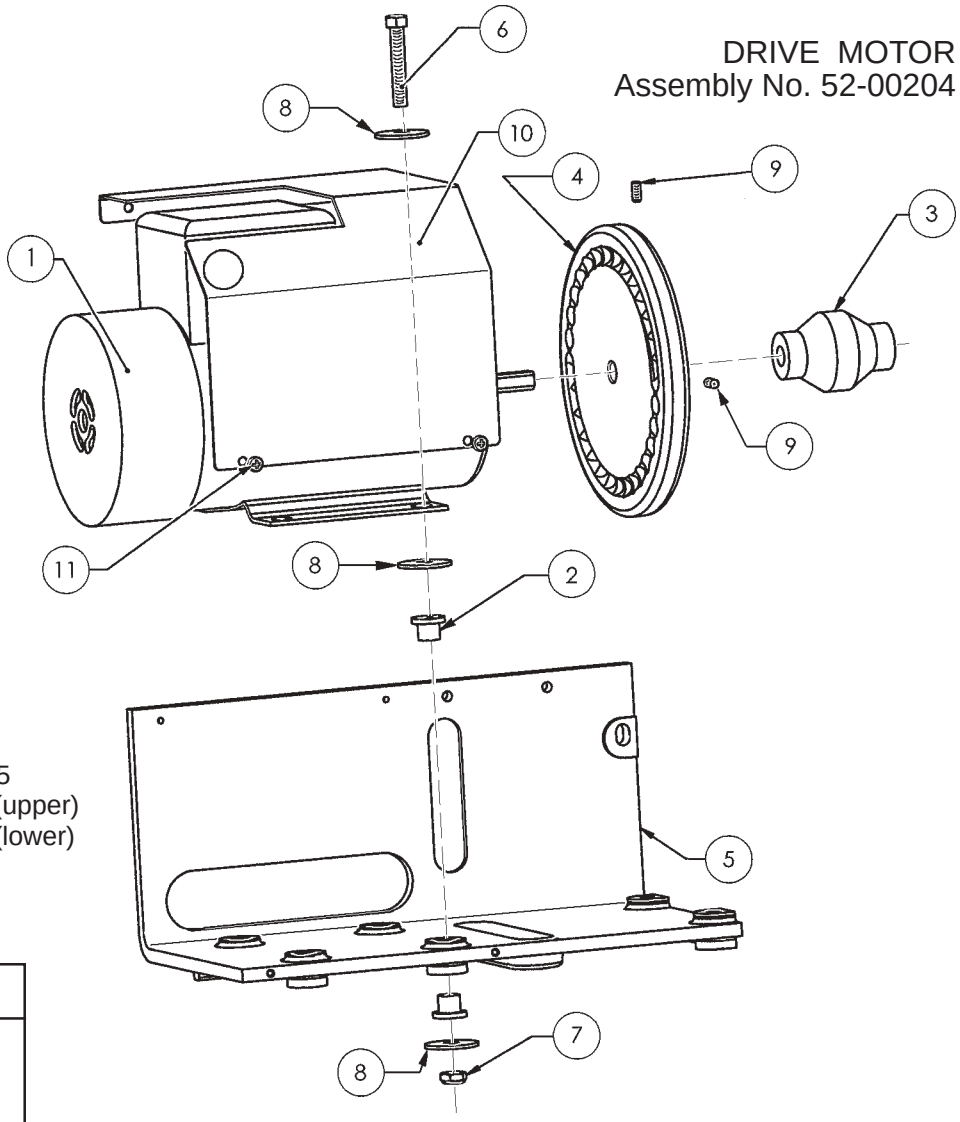
* Item 6 not included with 52-00235; order separately

VERTICAL SHAFT
Assembly No. 52-00253

Item	Part No.	Description
1	52-00248	Vertical Shaft
2	51-23018	Intermittent Movement Drive Gear (P-1418)
3	52-00186	Sprocket Shaft Drive Gear (2 req'd.)
4	51-23009	Shutter Shaft Drive Gear (G-1803)
5	52-00167	Vertical Shaft Main Driven Gear
6	52-00249	Bearing Block, Upper
7	51-04007	Ball Bearing (3 req'd.)
8	52-00250	Oil Pump Drive Gear
9	52-00251	Bearing Block, Lower
10	4507106	Flatwasher, 1/2" Brass (2 req'd.)
11	52-40181	Oil Slinger (P-7815)
12	408025D	Screw, 8-32 x 1/4" Pan Head (9 req'd.)
13	51-58036	Compression Spring
14	4080870	Screw, 8-32 x 7/8" Socket Head (6 req'd.)
15	4060250	Screw, 6-32 x 1/4" Pan Head (2 req'd.)
16	52-00384	Spacer, 1.56" x .75" Diameter



DRIVE MOTOR
Assembly No. 52-00204

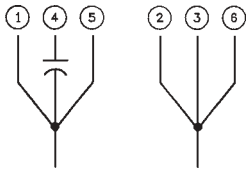


Mounting Screws for Item 5
(1) 4250620 1/4-20 x 5/8" (upper)
(2) 4250755 1/4-20 x 3/4" (lower)

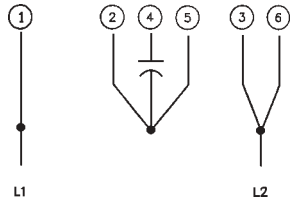
Item	Part No.	Description
1	51-33003	Motor, 115/230 V.AC, 50/60 Hz.
2	51-07011	Grommet, Shock Mount (8 req'd.)
3	51-16003	Coupler
4	52-00344	Inching Wheel
5	52-00203	Motor Bracket
6	4251500	Screw, 1/4-20 x 1-1/2" (4 req'd.)
7	4258001	Nut, 1/4-20 FlexLock (4 req'd.)
8	4257102	Flatwasher, 1/4" SAE (12 req'd.)
9	408037C	Set Screw, 8-32 x 3/8" (2 req'd.)
10	52-00464	Motor Guard
-	41-13004	Wire Clamp Bushing (not shown)
11	4060180	Screw, 6-32 x 3/16" Pan Head (4 req'd.)

Capacitor (7.5µf, 370 V.AC) included with Item 1 Motor

MOTOR HOOK-UP



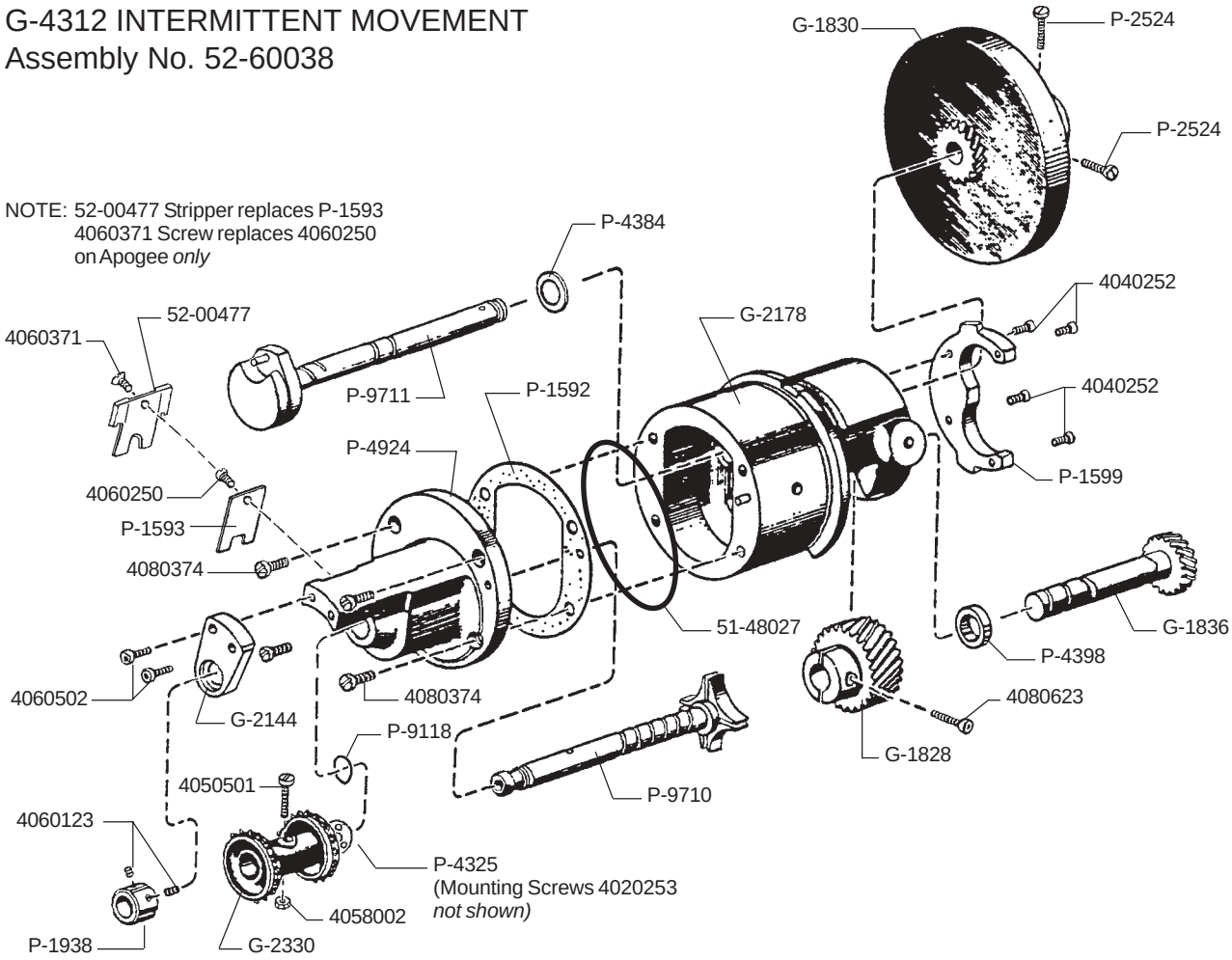
115 Volt



230 Volt

Fuse AC Input at 4 A.

G-4312 INTERMITTENT MOVEMENT
Assembly No. 52-60038

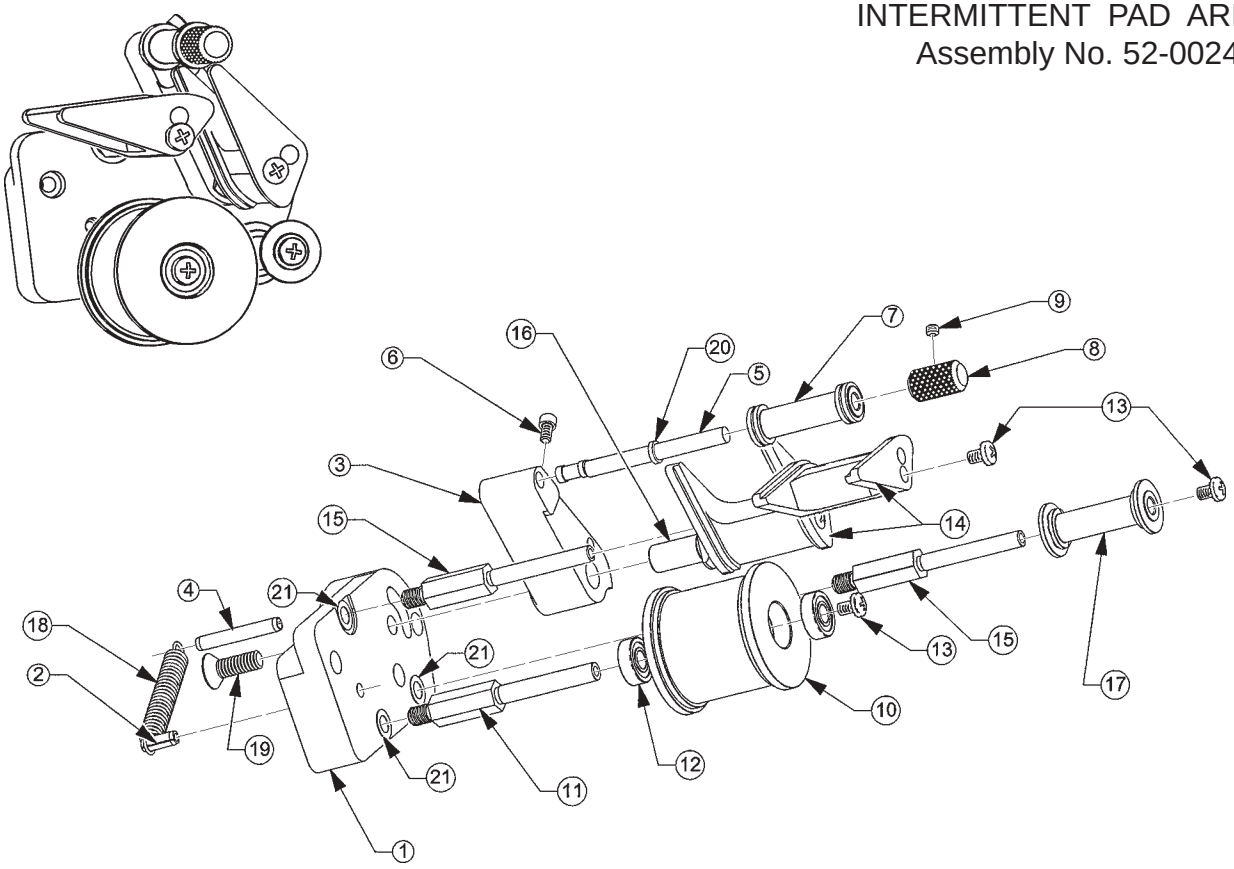


G-1828	Main Drive Gear (51-23014)
G-1830	Intermittent Flywheel & Gear (52-00061)
G-1836	Main Drive Shaft & Gear (51-52005)
G-2144	Outboard Bearing Arm (52-20078)
G-2178	Intermittent Case & Bearings (52-20094)
G-2330	Intermittent Sprocket, VKF® (21-59004)
P-1592	Cover Gasket (51-22005)
P-1593	Intermittent Film Stripper (52-40027)
P-1599	Oil Trap (52-20075)
P-1938	Starwheel Shaft Collar (51-11002)
P-2524	Flywheel Screw (51-51047; 2 req'd.)
P-4325	Cap (51-98176)
P-4384	Camshaft Spacer (51-70030)
P-4398	Drive Gear Spacer (52-20169)
P-4924	Intermittent Cover (52-00128)
P-9118	O-Ring (51-48020)
P-9710	Starwheel Shaft (51-98197)
P-9711	Camshaft (51-98198)
4020235	Screw, 2-56 x 1/2" (3 req'd.)
4040252	Oil Trap Screw (4 req'd.)
4050501	Sprocket Retaining Screw
4058002	Hex Nut, NyLock
4060123	Collar Set Screw (2 req'd.)
4060250	Stripper Mounting Screw
4060371	Stripper Mounting Screw
4060502	Mounting Screw (2 req'd.)
4080374	Fastening Screw (4 req'd.)
4080623	Gear Retaining Screw
51-48027	O-Ring
52-00477	Film Stripper (Apogee only)

ORDER P-9710 & P-9711 IN MATCHED PAIRS

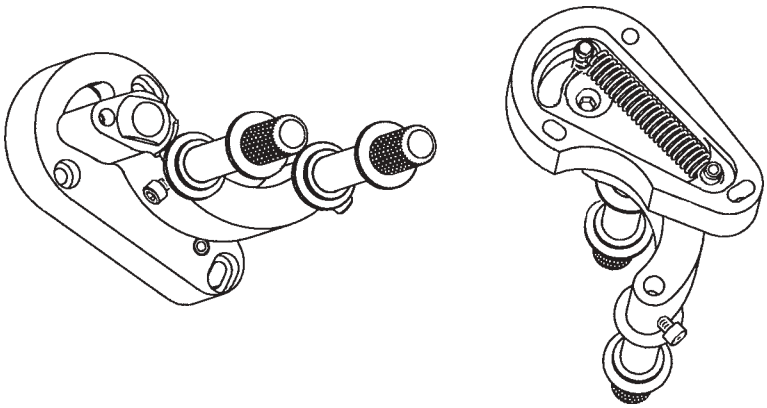
Rebuilt Simplex Intermittent Movements are available from the factory under a Repair/Exchange program. Contact an authorized Strong International Dealer for details.

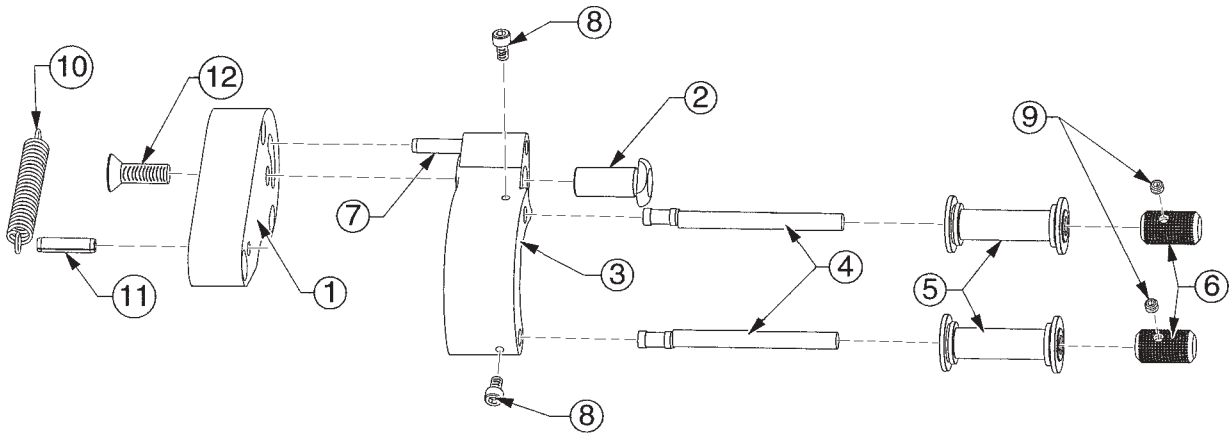
INTERMITTENT PAD ARM
Assembly No. 52-00243



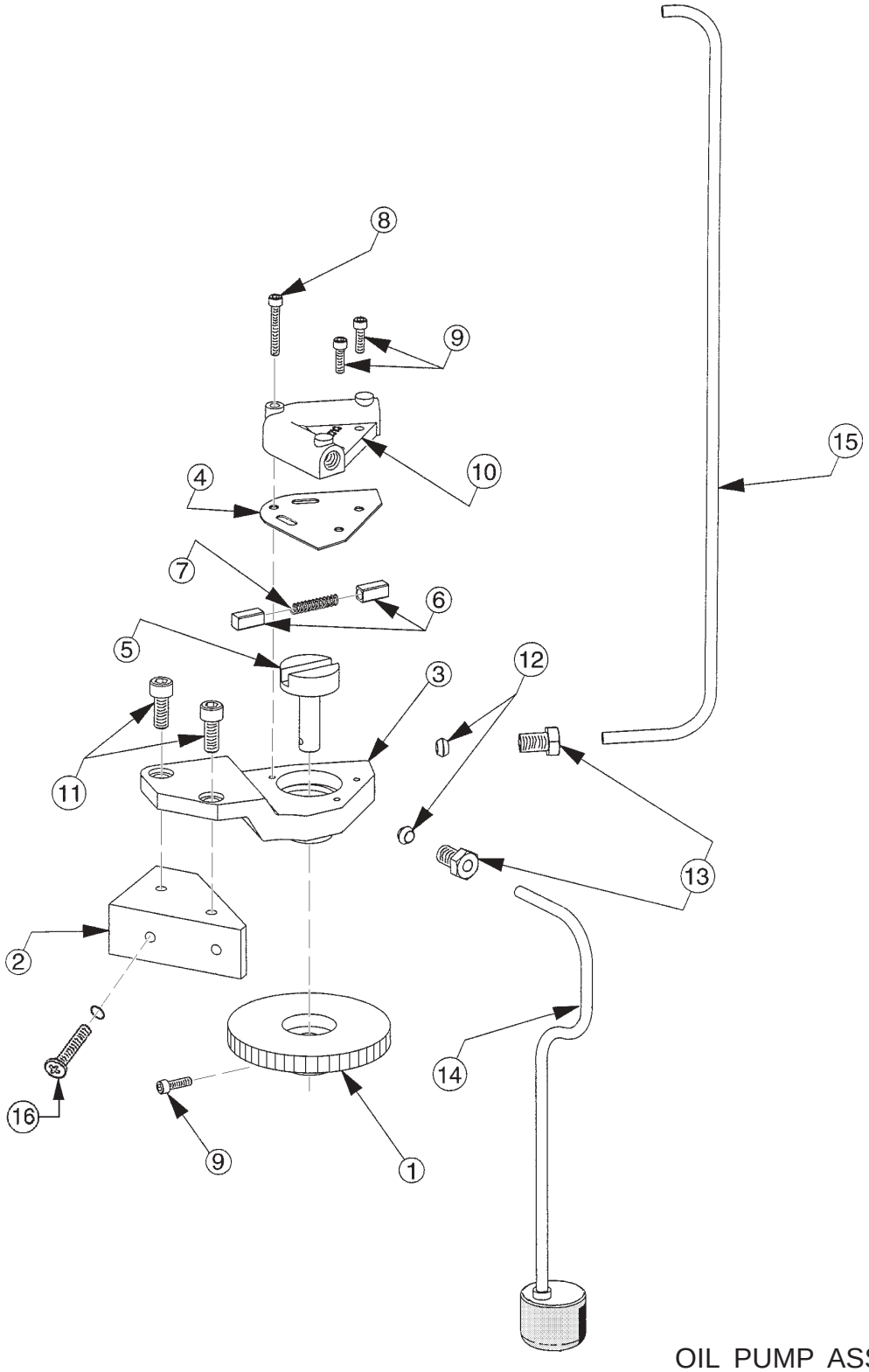
Item	Part No.	Description	Item	Part No.	Description
1	52-00236	Base, Upper Guide	12	21-04003	Ball Bearing (2 req'd.)
2	31-37001	Spring Pin, 3/4" x .1875"	13	408025D	Screw, 8-32 x 1/4" Pan Head (4 req'd.)
3	52-00237	Intermittent Pad Arm	14	52-00239	Intermittent Loop Chute
4	21-37009	Spring Pin, 1-1/2" x .1875"	15	52-00241	Shaft "A" (2 req'd.)
5	51-98099	Shaft, Eccentric (P-3135)	16	52-00246	Pad Arm Pivot Shaft
6	4060253	Screw, 6-32 x 1/4"	17	21-49004	Pad Roller (2 req'd.)
7	52-00327	Intermittent Guide Roller	18	51-58039	Expansion Spring (H-3719)
8	52-00019	Knob (P-3134)	19	4110370	Screw, 1/4-20 x 3/4" Flat Head
9	4080120	Set Screw, 8-32 x 1/8"	20	81-56012	Spacer (SA-2442)
10	52-00238	Weighted Roller	21	51-70007	Shim Washer (3 req'd.)
11	52-00280	Shaft "B"			

UPPER/LOWER PAD ROLLER
Assembly No. 52-00247





Item	Part No.	Description
1	52-00244	Mounting Bracket
2	52-00246	Shaft, Pad Roller Arm
3	52-00245	Pad Roller Arm
4	51-98099	Shaft, Eccentric (P-3135), 2 req’d.
5	21-49004	Pad Roller (P-3085), 2 req’d.
6	52-00019	Knob (2 req’d.)
7	21-37009	Spring Pin, 1-1/4" x .1875"
8	4060253	Screw, 6-32 x 1/4" Socket Head (2 req’d.)
9	4080120	Set Screw, 8-32 x 1/8" (2 req’d.)
10	51-58039	Expansion Spring
11	51-37028	Spring Pin, 3/4" x .1875"
12	4250750	Screw, 1/4-20 x 3/4" Flat Socket Head

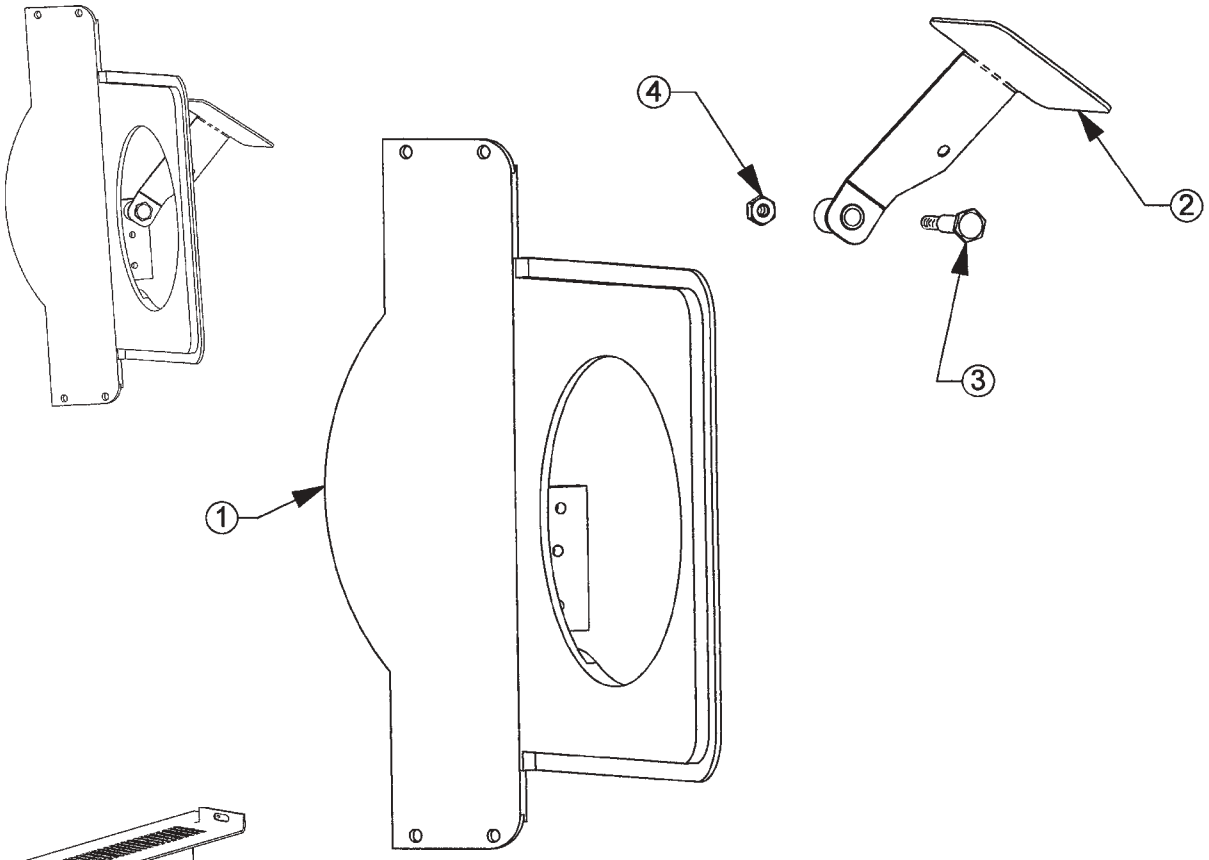


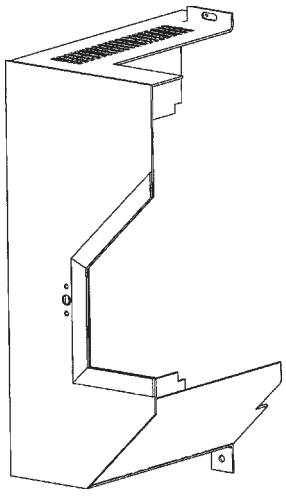
OIL PUMP ASSEMBLY

OIL PUMP ASSEMBLY
Parts List

Item	Part No.	Description
1	51-23022*	Oil Pump Driven Gear
2	52-00288	Pump Support Bracket
3	52-00001*	Oil Pump Housing
4	51-39019*	Oil Pump Gasket
5	51-98105*	Oil Pump Drive Shaft
6	51-98016*	Impellor Vane (2 req'd.)
7	51-58028*	Compression Spring
8	4040751*	Screw, 4-40 x 3/4" Socket Head
9	4040373*	Screw, 4-40 x 3/8" Socket Head (3 req'd.)
10	52-20114*	Pump Housing Cover
11	4110500	Screw, 10-32 x 1/2" Socket Head (2 req'd.)
12	51-07005	Compression Bushing (2 req'd.)
13	51-35007	Compression Nut (2 req'd.)
14	52-00360	Oil Intake Assembly, Apogee
15	52-00361	Oil Output Tube, Apogee
16	4110751	Mounting Screw, 10-24 x 3/4" Pan Head (2 req'd.)
-	51-48025	O-Ring, Oil Seal (2 req'd.)
*	52-60027	Pump Housing & Vane Assembly (G-1822)

SHUTTER HOUSING
Assembly No. 52-00365

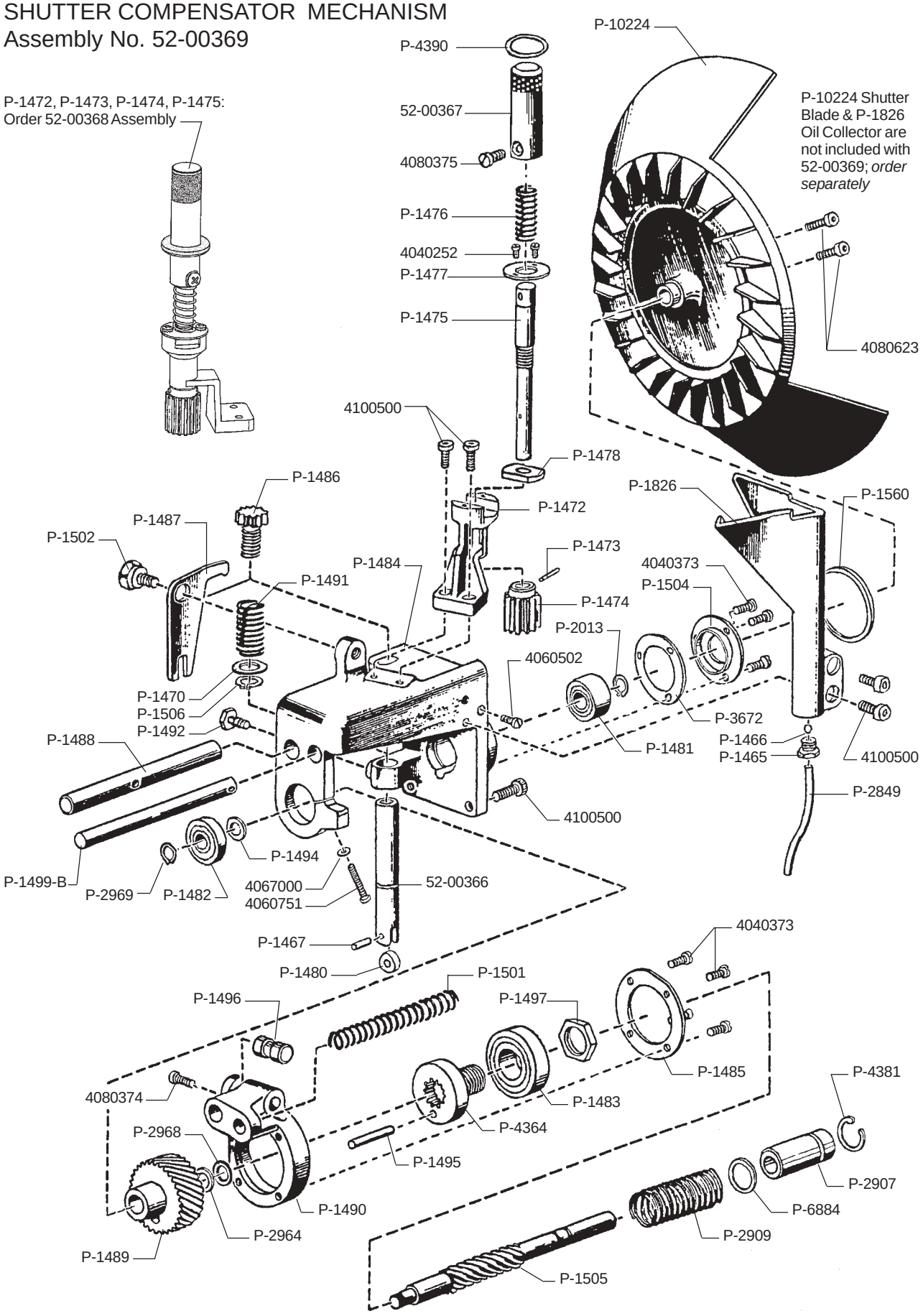




Item	Part No.	Description
1	52-20129	Shutter Housing Casting
2	52-00161	Douser Plate
3	51-51030	Shoulder Screw, Douser Pivot
-	52-00376	Douser Linkage Rod (not shown)
4	4108002	Hexnut, 10-32 NyLock

Shutter Cover 52-00374
Upper Mntg. Screw: 4080250
Lower Mntg. Screw: 4080375

SHUTTER COMPENSATOR MECHANISM
Assembly No. 52-00369

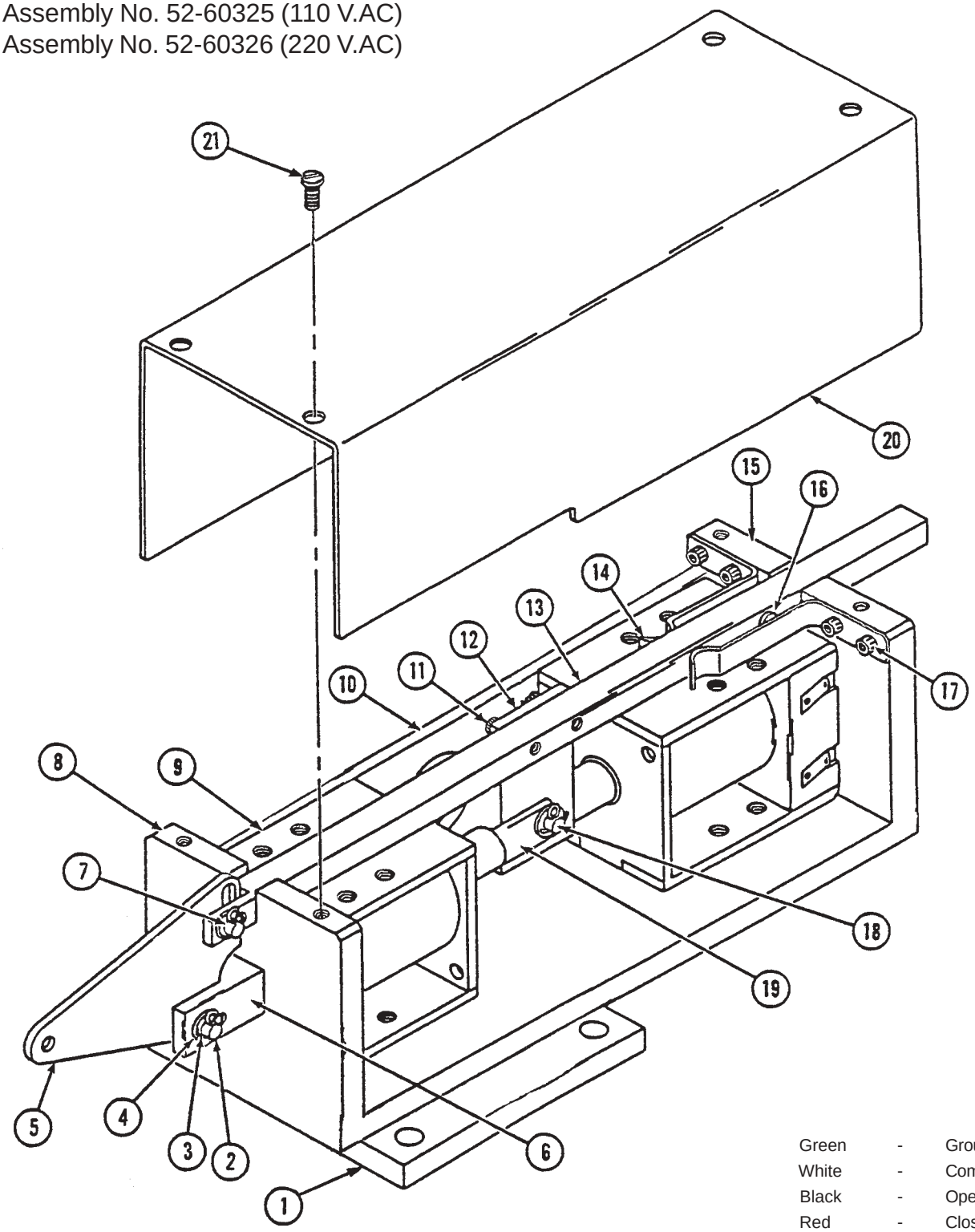


SHUTTER COMPENSATOR ASSEMBLY
Parts List

P-1465	Compression Nut (51-35007)
P-1466	Compression Bushing (51-07005)
P-1467	Roll Pin, Framing Rod (52-20105)
P-1470	Spring Retaining Washer (51-70027)
P-1472	Bracket Casting, Shutter Adjusting Shaft (52-20038)
P-1473	Pin, Shutter Adj. Gear (51-37002)
P-1474	Shutter Adjusting Gear (52-20107)
P-1475	Shutter Adjusting Shaft (52-20074)
P-1476	Shaft Compression Spring (51-58026)
P-1477	Retainer Plate, Stop Nut (52-40499)
P-1478	Stop Nut, Adjusting Shaft (52-20108)
P-1480	Framing Rod Roller (52-20106)
P-1481	Shaft Ball Bearing, Rear (51-04014)
P-1482	Shaft Ball Bearing, Front (51-04008)
P-1483	Spline Ball Bearing (51-04006)
P-1484	Shutter Shaft Mounting Bracket Casting (52-00078)
P-1485	Bearing Retaining Plate (52-00066)
P-1486	Framing Rod Screw Gear (52-20109)
P-1487	Adjusting Lever (52-00041)
P-1488	Slide Rod, Adjusting Spline Support Bracket (52-20110)
P-1489	Shutter Shaft Driven Gear (51-23020)
P-1490	Adjusting Spline Support (52-00029)
P-1491	Rod Compression Spring (51-58027)
P-1492	Framing Rod Guide Screw (52-02448)
P-1494	Shutter Shaft Spacer (51-98104)
P-1495	Pin, Driving Flange (52-20111)*
P-1496	Pin, Adjusting Lever 51-37010)
P-1497	Clamping Nut (52-20458; 2 req'd.)
P-1499-B	Guide Rod, Support Brkt. (52-20112)
P-1501	Compression Spring, Guide Rod (51-58003)
P-1502	Pivot Screw, Adjusting Lever (52-20470)
P-1504	Bearing Retainer Plate, Outer (52-20113)
P-1505	Shutter Shaft (52-20122)*
P-1506	Snap Ring, Washer Retaining (11-48016)
P-1560	Bracket Gasket (51-22012)
P-1826	Oil Collector Casting (52-20126)
P-2013	Retaining Ring, Rear Bearing (51-48012)
P-2849	Intermittent Oil Feed Tube (52-00042)
P-2907	Spring Retaining Collar (52-20127)
P-2909	Compression Spring (51-58019)
P-2964	Loading Spring, Shutter Shaft (51-58024)
P-2968	Spring Retaining Washer (51-70025)
P-2969	Retaining Ring, Front Bearing (51-48013)
P-3672	Oil Seal, Shaft Bracket (51-36003)
P-4364	Flanged Spline (52-20251)*
P-4381	Collar Retaining Ring (51-37012)
P-4390	O-Ring (51-48005)
P-6884	Washer, .625" I.D. x .75" O.D. (52-00390)
P-10224	Shutter Casting (52-20791, as shown) Three-Bladed Shutter: P-2885 (52-00140)
4040252	Fastening Screw, 4-40 x 1/4" (2 req'd.)
4040373	Fastening Screw, 4-40 x 3/8" (7 req'd.)
4060502	Guide Rod Retaining Screw, 6-32 x 1/2"
4060751	Clamping Screw, Bearing; 6-32 x 3/4"
4067000	Lockwasher, Clamping Screw
4080375	Knob Fastening Screw, 8-32 x 3/8
4080374	Slide Rod Fastening Screw, 8-32 x 3/8"
4080623	Clamping Screw, 8-32 x 5/8" (2 req'd.)
4100500	Fastening Screw, 10-32 x 1/2" (6 req'd.)
52-00366	Framing Rod
52-00367	Shutter Adjusting Knob

* Order G-4364 Spline & Shaft Assembly (51-52019)

G-9727 PICTURE CHANGEOVER DEVICE
Assembly No. 52-60325 (110 V.AC)
Assembly No. 52-60326 (220 V.AC)



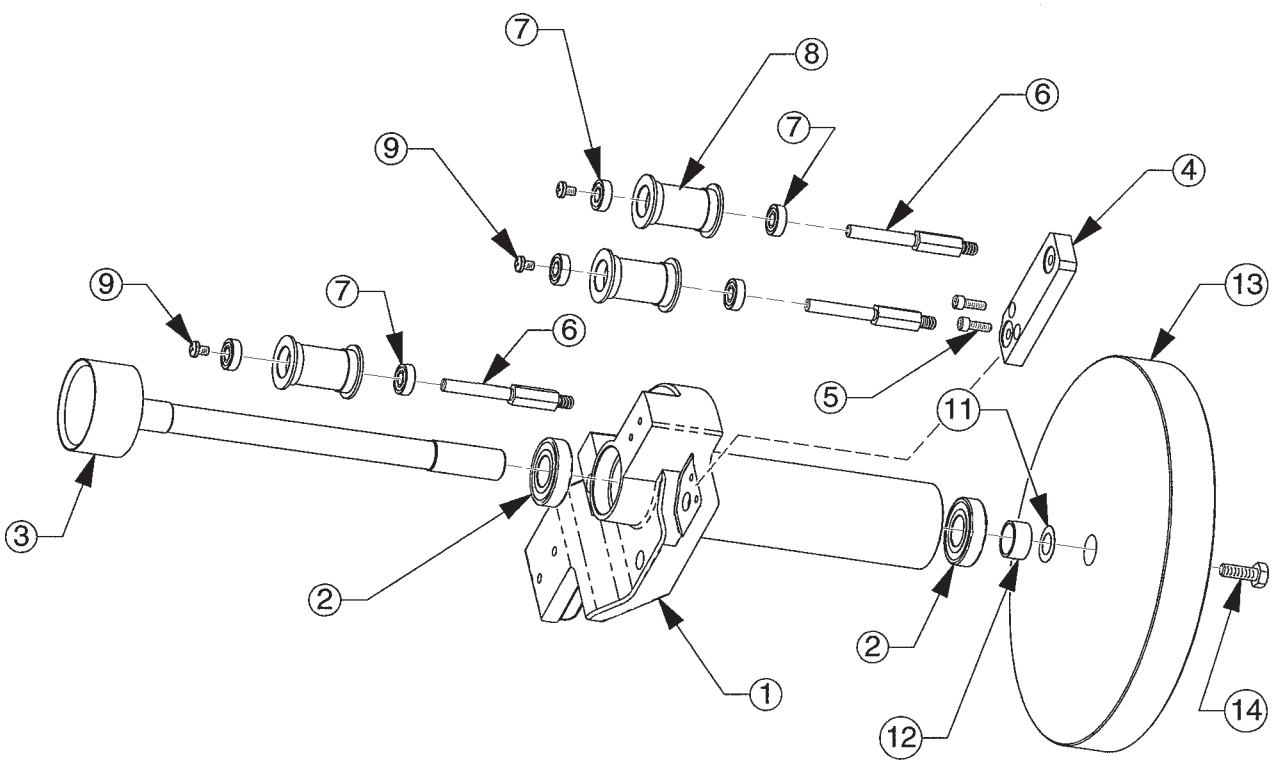
Green	-	Ground
White	-	Common
Black	-	Open
Red	-	Close

G-9727 PICTURE CHANGEOVER
Parts List

Item	Part No.	Description
1	52-40233	Base Plate (P-7926)
2	51-98254	Clevis Pin, 1/8" Diameter (P-7966)
3	01704000	Hitch Pin, 1/16" Diameter
4	4047101	Flatwasher, #4
5	51-98090	Bell Crank (P-7892)
6	52-20677	Pivot, Bell Crank (P-7923)
7	51-98254	Clevis Pin, 1/8" Diameter (P-7966)
8	52-40231	Bracket, Changeover Body (P-7919)
9	51-55005	Solenoid, 115 V.AC Coil (with 52-60325)
-	51-55006	Solenoid, 230 V.AC Coil (with 52-60326)
10	52-40231	Bracket, Changeover Body (P-7919)
11	4060372	Screw, 6-32 x 3/8" Socket Head
12	52-40232	Connector (P-7925)
13	52-20676	Push Rod (P-7922)
14	51-58058	Spring (P-7920)
15	52-40231	Bracket, Changeover Body (P-7919)
16	4040120	Screw, 4-40 x 1/8" Pan Head
17	4040250	Screw, 4-40 x 1/4" Pan Head
18	51-98254	Clevis Pin, 1/8" Diameter (P-7966)
19	51-55005	Solenoid, 110 V.AC Coil (with 52-60235)
--	51-55006	Solenoid, 220 V.AC Coil (with 52-60236)
20	52-40235	Cover (P-7924)
21	4060250	Screw, 6-32 x 1/4" Pan Head
	52-60235	Picture Changeover Assembly, Complete (115 V.AC)
	52-60236	Picture Changeover Assembly, Complete (230 V.AC)
		NOT SHOWN
	52-00376	Linkage Rod, Bell Crank to Douser Plate
	41-10030	Nylon Cable Clamp, 3/8"
	41-13008	Cable Connector, 90°
	51-71007	Cable, (4) Conductor, Type SO (2 feet required)

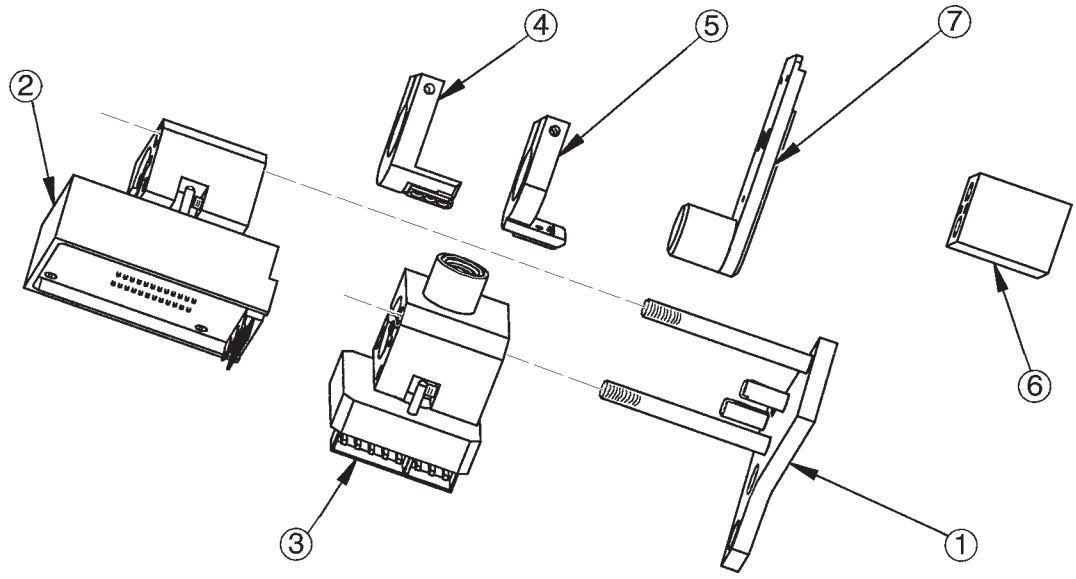
Douser Plate 52-00161 (see Page 51) *not included* with G-9727 Changeover and must be ordered separately.

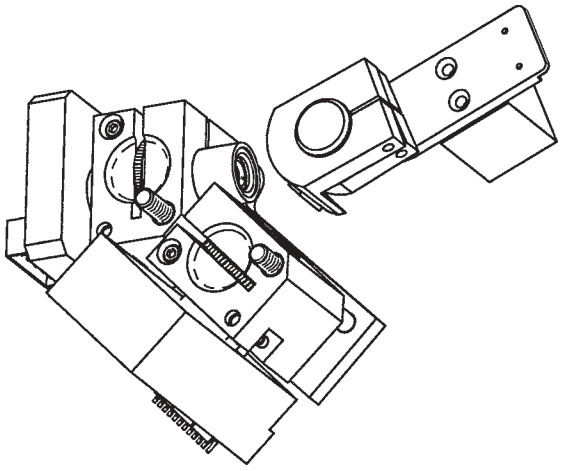
APOGEE SOUND READER
Assembly No. 52-00297



Item	Part No.	Description
1	52-00290	Sound Reader Base, Machined
-	4100870	Mounting Screw (to Main Frame), 10-32 x 7/8" Socket Head (3 req'd.)
2	51-04006	Ball Bearing (P-1483)
3	52-00289	Impedance Drum & Shaft
4	52-00276	Roller Mounting Bracket
5	4080502	Screw, 8-32 x 1/2" Socket Head
6	52-00280	Roller Shaft
7	21-04003	Ball Bearing
8	52-20428	Guide Roller (P-4672)
9	408025D	Screw, 8-32 x 1/4" Pan Head
10	410050A	Screw, 10-32 x 1/2" Flat Socket Head
11	51-58047*	Wave Spring Washer (P-1653)
12	52-00295*	Flywheel Spacer
13	52-00294*	Flywheel
14	51-51013*	Flywheel Mounting Screw, 1/4-20 x 3/4" Hex Head, Left-Hand Thread

* not included with 52-00297; order separately





Item	Part No.	Description
1	5198413-1	Reader Plate Assembly
2	5198413-2	Digital (Dolby®)Pick-Up Assembly
3	5198413-3	Analog Pick-Up Assembly
4	5198413-4	Outer L.E.D. Illuminator (Digital)
5	5198413-5	Inner L.E.D. Illuminator (Analog)
6	5198413-6	Standoff Block
7	5198413-7	Stud Plate, Illuminators

NOT SHOWN

4080502	Screw, 8-32 x 1/2" Socket Head
410050A	Screw, 10-32 x 1/2" Flat Socket Head
51-35003	FlexLock Hexnut, 1/4-28 (P-1471)
51-98415	L.E.D. Power Supply, LS-40