MARCH 1972 775107

Servicing the

KODAK PAGEANT SOUND PROJECTOR, Model AV-12M6

EASTMAN KODAK COMPANY • CUSTOMER EQUIPMENT SERVICES DIVISION
SERVICE ENGINEERING DEPARTMENT
800 LEE ROAD, ROCHESTER, NEW YORK 14650

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1. GENERAL INFORMATION

1.1 ELECTRICAL

Power service required:

105 to 125 volts, 60 Hz, 3-wire grounded outlet

Power Consumed: With 750-watt lamp - 950 watts

With 1000-watt lamp - 1200 watts

With 1250-watt lamp - 1400 watts

Projections Lamps: 750-watt, ANSI Code DDB

1000-watt, ANSI Code DFD

1250-watt, ANSI Code DHT

Dielectric Strength: Must withstand 900 volts RMS at 60 Hz applied between shorted prongs of the power cord and the frame for a period of one minute.

1.2 MECHANISM

Pull-down claw protrusion: 0.030-inch to 0.045-inch (Instruction 6.30.3)

Pull-through tension: 1 1/2 to 2 1/2 ounces (Instruction 6.1.6)

Side guide tension: 1 to 1 1/2 ounces (Instruction 6.1.2)

Flywheel slipping torque: 3 to 4 1/2 inch-ounces (Instruction 6.21.3)

Pressure roller tension: 12 to 18 ounces (Instruction 6.26.3)

Shutter shaft rpm, sound speed: 1440 $\pm$ 75 at 115 volts

Shutter shaft rpm, silent speed: 1020-1140 at 115 volts

1.3 AMPLIFIER RATING (IHFM SPECIFICATIONS A-200):

Music power: 12 watts

Sensitivity: 1 mv film channel

10 mv microphone channel

500 mv phono channel

Distortion: 2% maximum

Frequency response: 30 to 20,000 Hz (cycles per second) $\pm$ 3db

Hum and noises: -50db with open circuit input

1.4 SOUND SYSTEM

Transistors: 2-2N5232A, 1-2N5458, 2-2N3859, 1-D29E1, 1-D33D21, 2-D42C2

Exciter lamp: 6 volts, 1.0 ampere, ANSI Code BSK

Input impedances: Microphone, 5000 ohms
Phono, 0.5-megohm

Output impedances: 16 ohms

Speaker: 11 x 6-inch oval, PM, 6-ohm voice coil

1.5 MAGNETIC HEAD

Head gap: 0.0625

Nominal electrical characteristics:

dc resistance - 10 ohms

Inductance - 12 mh

Magnetic record/playback response: 70 Hz to 5 kHz $\pm$ 1db

2. SPECIAL TOOLS AND MATERIALS

2.1 SPECIAL TOOLS

Tool #TL815 - 64-ounce push-pull scale
Tool #TL962 - Azimuth alignment tool
Tool #TL1007 - Claw protrusion gauge
*Tool #TL1034 - Amplifier power supply
Tool #TL1079 - 8-ounce push-pull scale
Tool #TL1513 - Dielectric checker
Tool #TL1765 - Spanner wrench, head selector switch retaining nut

*Use a source of dc voltage (current capacity about 750 ma) that will supply a negative 25 to 30 volts measured across the amplifier filter capacitor C13.

2.2 TEST FILMS

#760079 - 135-foot roll, SMPTE Jiffy Test Film

#760382 - 6-foot loop, SMPTE 5,000 Hz Sound Focusing Test Film

#760383 - 6-foot loop, SMPTE Buzz Track Test Film

#760386 - 6-foot loop, SMPTE 400 Hz Signal Level Test Film

#760947 - 8-foot loop, Magnetic Sensitivity Test Film

#760948 - 8-foot loop, Magnetic Multi-frequency Test Film

#760949 - 8-foot loop, Unrecorded Magnetic Test Film

#760950 - 100-foot roll, Magnetic Listening Test Film

#760951 - 100-foot roll, Unrecorded Magnetic Test Film

#760952 - 6-foot loop, Azimuth Alignment Test Film

#761715 - 25-foot roll, SMPTE Registration Test Film

3. LUBRICATION

Part Number	KAD Number	Description
763001	61-3686	SAE #20 Oil
763002	61-3655	Plastilube #1 Grease
763003	10-592	Special Formula
763017	63-5306	Special Formula
763029	61-3664	Beacon #325 Grease
*110882	61-3616	*DOW CORNING* DC 200 Fluid, 100,000 Centistokes

*Supplied in two-ounce container; all others supplied in one-ounce containers. Order by part number.

	GENERAL AREA	LUBRICATION POINT	LUBRICANT
3.1	Case	Elevating rack teeth, pinion teeth, and both sides of elevating bracket	763002
3.2	Exciter lamp cover	Film guide roller shafts	763001
3.3	Flywheel	Full length of flywheel shaft, drive chain, tension adjusting stud, and drive pawl and ratchet Flywheel shaft at flywheel	763001 763002
3.4	Pull-down claw	Claw pivot balls and ball area In-and-out cam and spring Claw pivot pads, framing shaft threads, and up-and-down cam	763002 763002 763001
3.5	Supply arm	Supply arm bearing balls	763002
3.6	Take-up arm	Spindle pawl pivot, inside diameter of pulley ratchet, spindle, pivot, and release lever pivot	763001
3.7	Sprocket and belt drive mechanism	All nylon gear teeth, reverse take-up clutch bushing, groove for reverse take-up clutch actuator, upper sprocket drive shaft, upper sprocket shaft, and outside diameter of sprocket drive collar Speed shifting roller shaft Rewind shift lever detent spring at detent and rewind shift plate pivot Tension clutch groove on reverse drive spider	763001 763017 763002 763003
3.8	Master control switch and bracket	Teeth and cam of cam and pinion assembly, pivot area of control lever and switch, cam yoke, shifting arm stud, and contact points of interlock lever	763002

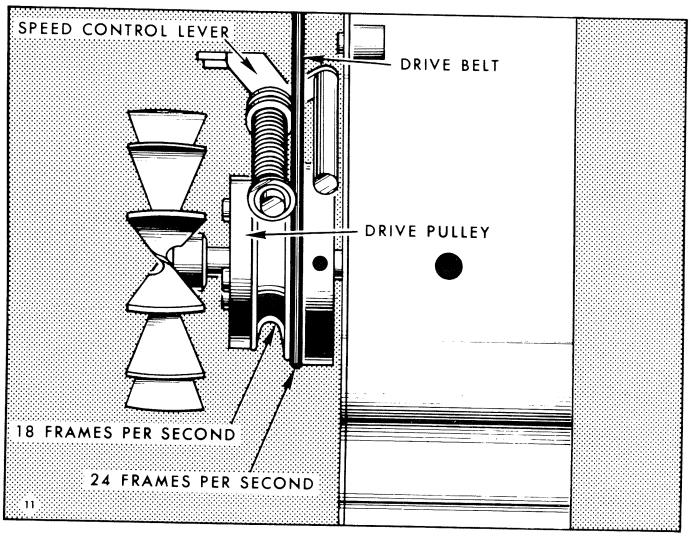
	GENERAL AREA	LUBRICATION POINT	LUBRICANT
3.9	Pressure roller	Shaft, loop restorer shaft, and pressure roller pivot	763029
3.10	Upper and lower sprocket plates	Sprocket guard stop pin balls, idler roller shaft, damper roller, and bearing shafts	763001
		Sprocket roller shafts and idler arm pivot pin	763029
3.11	Damper bearing	Damper bearing cup	110882

4. OPERATING SEQUENCE

4.1 SEQUENCE OF OPERATION (MECHANICAL)

With the projector plugged in and the control lever in either the motor or lamp position (forward or reverse), the projector drive motor turns at a constant speed. The motor reverses direction as the control lever is moved from forward to reverse.

On the motor shaft is the drive pulley and fan. The drive pulley is in two sections and drives the drive belt from either section, depending on the position of the speed control lever. This speed control lever is cammed and interlocked to prevent movement of the lever with the projector control lever in the OFF position. Thus the film speed can be changed only while the drive motor is in operation.



Drive from the motor and pulley is transmitted via the drive belt to the *KODAK SUPER-40* Shutter.

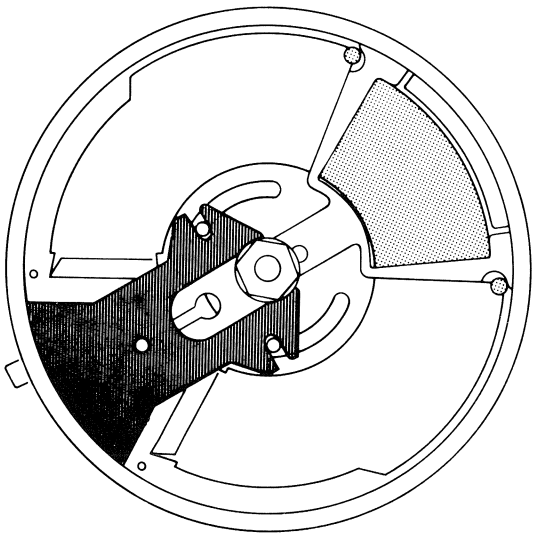
At the three-blade position (for silent speed), there are a minimum of forty-eight light interruptions per second. This position is maintained by spring tension. The tension counteracts the centrifugal force exerted by a weight that is linked to the two movable blades.

When the speed selector is moved to SOUND, the additional centrifugal force that results from the faster speed of the shutter overcomes the spring tension. The movable blades rotate on their axis and overlap in a position opposite the fixed blade. Now the shutter will operate in the two-blade position, giving the same light interruptions per second, but with 40 percent more screen illumination.

SOUND SPEED

If the *KODAK SUPER-40* Shutter in the two-blade position provides too much illumination, it can be locked in the three-blade position. When the projector is operated at sound speed, the shutter will automatically shift (if not locked) from the three-blade position to the two-blade position.

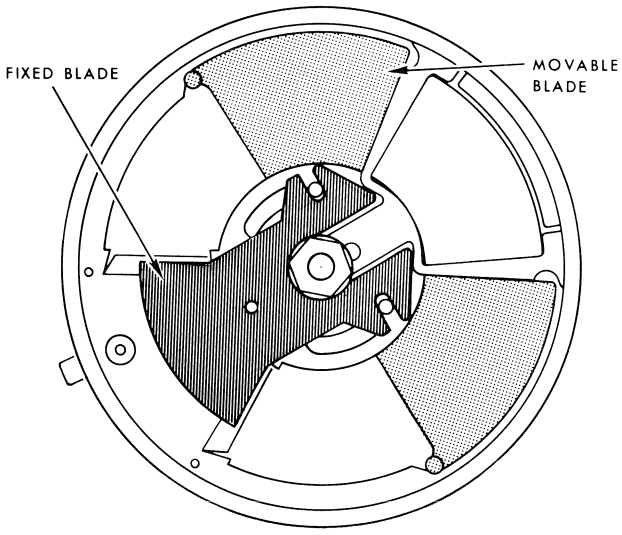
SUPER-40 SHUTTER IN 2-BLADE POSITION (SOUND)



SILENT SPEED

The *KODAK SUPER-40* Shutter will remain in the three-blade position if the projector is started in silent speed. If the projector is started in sound speed and then shifted to silent speed, the shutter cannot return to the three-blade position unless the motor is stopped momentarily.

SUPER-40 SHUTTER IN 3-BLADE POSITION (SILENT)



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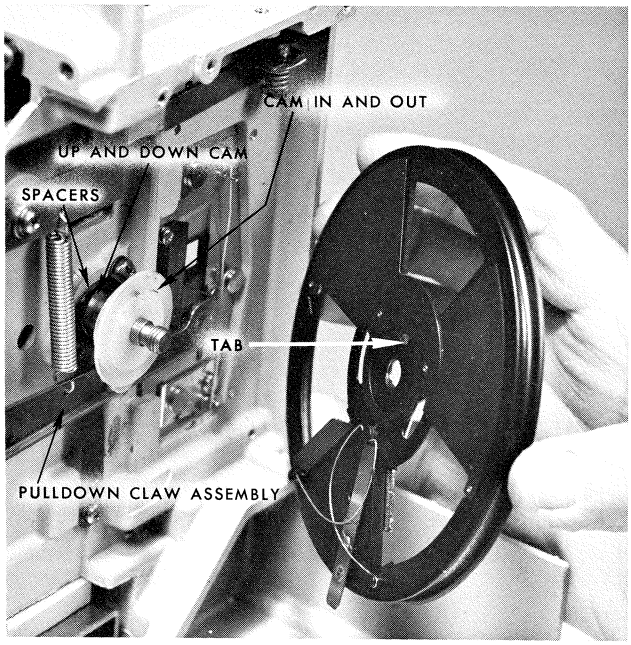
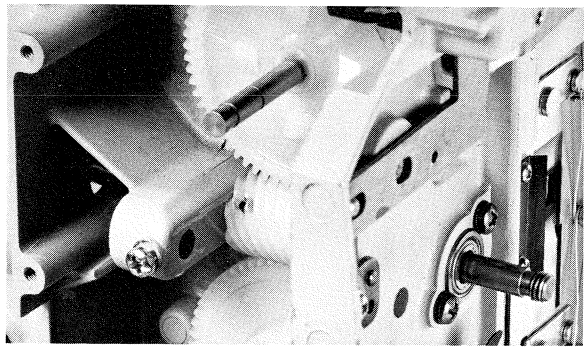
The shutter is secured to the shutter shaft by a left-handed thread nut. The shutter also has a tab which extends inward through two cams (one nylon and one steel). These cams determine the up and down (steel cam) motion and the in and out (nylon cam) motion of the pull-down claw assembly. This claw assembly is held in operating position against the cams by two springs (one coil and one flat), and it rotates on a swivel of three bearings.



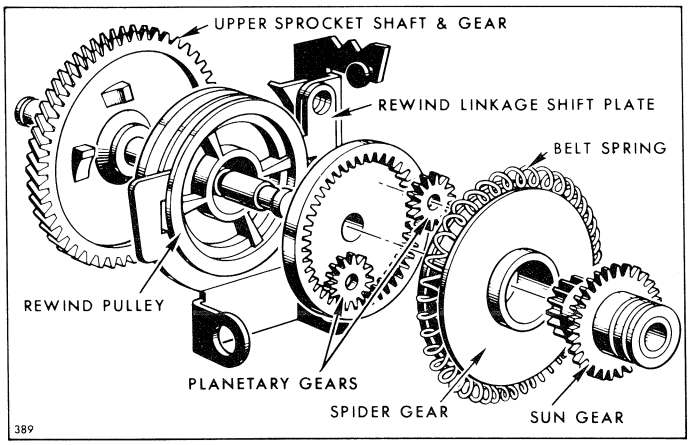
On the shutter shaft between the steel cam and ball bearing in the housing, is a series of spacers. These spacers establish the amount of protrusion of the pull-down claw into the aperture plate opening during the down stroke of the claw assembly. The number of spacers must be varied as necessary to achieve the .035-inch $\pm$ .005-inch of protrusion required for proper film transport through the aperture area.

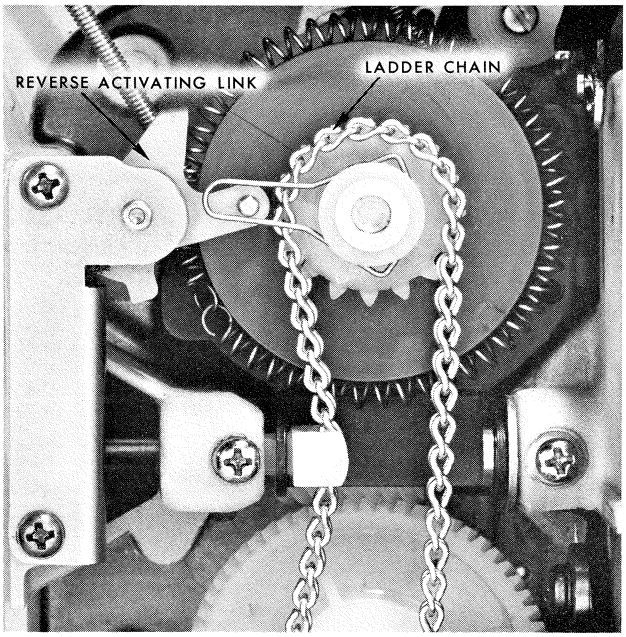
The speed of rotation of the shutter shaft determines the film speed. At silent speed [18 frames per second (fps)], the shutter shaft should rotate 1130 $\pm$ 10 rpm; and at sound speed, it should rotate 1440 $\pm$ 75 rpm. This can be easily checked by using a Strobotac on the threading knob which is pressed-fitted onto the shutter shaft.

The shutter shaft has a worm gear set-screwed to it. This worm gear drives the upper and lower sprocket shaft and gear assemblies in opposite directions. The upper sprocket shaft and gear assembly drives a gear/pulley combination which is part of the upper sprocket plate assembly and to which is set-screwed the upper sprocket assembly. The upper sprocket is spring-loaded to prevent perforation damage when shifting from forward to reverse. This whole plate assembly is mounted on the front of the projector with two screws and a spacer. The pulley part of the gear/pulley is used to drive the fabric take-up belt which drives the take-up arm, pin, and bearing assembly.



Also on the upper sprocket shaft and gear assembly, is the rewind pulley which is positioned on the shaft by the rewind plate and guide assembly. A mechanical linkage from the rewind lever on the front of the projector to the rewind plate and guide assembly accomplishes the engagement or disengagement of the rewind pulley and the upper sprocket shaft gear (and the driving lugs which are a molded part of the gear). A spring belt from the pulley to the supply spindle assembly drives the supply spindle assembly counterclockwise when the rewind lever is in the rewind position (pulley forward).





In addition to the rewind pulley on the upper sprocket shaft, there is a combination of gears, pulley, and actuator which provides reverse operation. When in forward operation, this series of gears and pulleys is allowed to "free-wheel" and provides no drive to the supply spindle pulley or belt. However, when the mechanism is shifted to reverse, the upper sprocket shaft changes direction of rotation. This change of direction is transmitted through the shaft to a sun gear and actuator at the end of the shaft. This actuator now moves a linkage of the reverse take-up clutch into engagement with the spring belt around the spider gear. This effectively stops the "free-wheeling" motion of this assembly, and drive is now transmitted through the planetary gears to the pulley on which the supply belt rides, driving the supply spindle in reverse.

A ladder chain runs from the sun gear to a sprocket and gear assembly on the flywheel shaft and sound drum assembly. This sprocket and gear assembly is ratcheted to permit drive to the flywheel shaft and sound drum assembly only in the reverse mode of operation, where sound stabilization is not required.

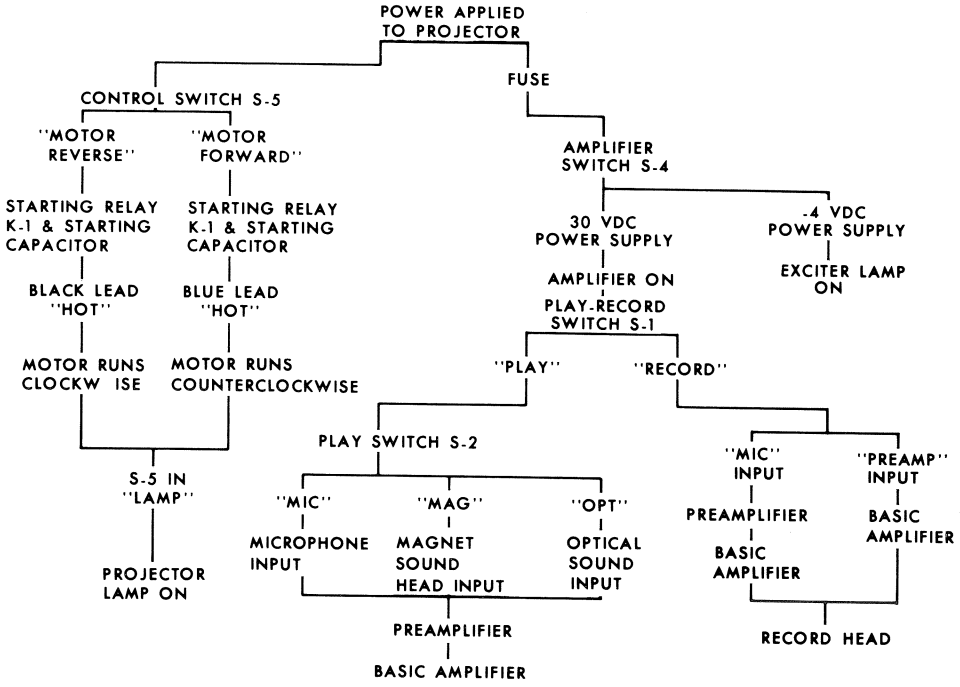
The lower sprocket shaft and gear assembly drives the lower sprocket assembly which is setscrewed to it.

There is a flywheel mounted on the sound drum shaft with a left-hand threaded nut. This should be adjusted to allow the flywheel to slip. Since the sound drum and shaft is driven in forward projection, by the film motion, it is necessary that the flywheel slips during the period of time it takes the projector to get to operating speed. This flywheel also tends to assist in keeping the sound drum and film speed constant through the sound optics sensing area to reduce distortion in sound output.

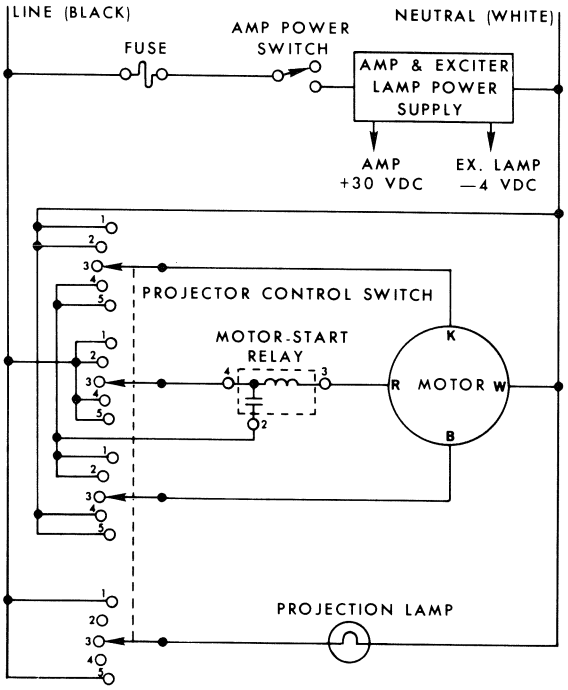
Several mechanical functions are also built in to make sure film speed is constant. They include the spring tension in the aperture plate assembly and the pressure pad assembly, a spring-loaded loop-forming roller, a spring-loaded sound drum pressure roller, a damping roller assembly which uses a fluid in the assembly as a damper, and finally, a spring-loaded snubber roller. These will be described in more detail in other sections of the manual.

4.2 SEQUENCE OF OPERATION (ELECTRICAL)

4.2.1 SIMPLIFIED POWER DISTRIBUTION BLOCK DIAGRAM



4.2.2 SIMPLIFIED PROJECTOR CONTROL SCHEMATIC



NOTE: 1. ONLY BASIC FUNCTIONAL ELEMENTS ARE SHOWN. CAPACITORS USED FOR ARC SUPRESSION, AND OTHER ELEMENTS OF A SECONDARY FUNCTIONAL NATURE, ARE EXCLUDED.

2. PROJECTOR CONTROL SWITCH POSITIONS- 1, FWRD. RUN/LAMP; 2, FWRD. RUN; 3, STOP 4, REV. RUN; 5, REV, RUN/LAMP.

4.3 SEQUENCE OF OPERATION (AMPLIFIER - FUNCTIONAL DESCRIPTION)

4.3.1 OPERATIONAL MODES

In the PLAY mode, the amplifier accepts one or two selected input signals (out of a total of four possible inputs) and provides a high-level audio output, for use with a 6- to 8-ohm speaker. It also provides a low-level output (PREAMP output) intended primarily for headphone monitoring. The inputs, and associated signal sources, are:

1. PHONO - driven by a preamp output from a tuner, phonograph, tape deck, etc.
2. MIC - driven by a 200-ohm dynamic microphone supplied with the projector.
3. MAG (Magnetic) - driven by the magnetic head in the projector.
4. OPT (Optical) - driven by the photo transducer in the projector.

The input and operational mode selections are MIC or MAG or OPT. However, the PHONO input may be used simultaneously with any of the three modes. See the Functional Block Diagram (4.3.3) which illustrates how these are interconnected.

NOTE: In the magnetic RECORD mode, the amplifier accepts the MIC and/or PHONO input(s) only and provides low-level (PREAMP) output only.

4.3.2 EQUALIZATION (FREQUENCY COMPENSATION)

The following summarizes equalization (frequency compensation) in the amplifier. No equalization implies an essentially flat frequency response throughout the audio frequency range of interest.

Operational Mode	Functional Block Where Equalization Is Accomplished
PLAY	
PHONO Input	No Equalization
MIC Input	No Equalization
MAG Input	Basic Preamp
OPT Input	Opt Equalization
RECORD	Mixing and Control
	Power Amp
	Record Equalization

4.3.3 FUNCTIONAL BLOCK DESCRIPTIONS

LEVEL CONTROL (PHONO and MIC) - allows adjustment of signal level into the amplifier.

OPTICAL EQUALIZATION - provides required equalization for optical track film/photo transducer.

BASIC PREAMP - performs initial voltage amplification of the input signal and, in the case of the MAG/PLAY mode, provides required equalization.

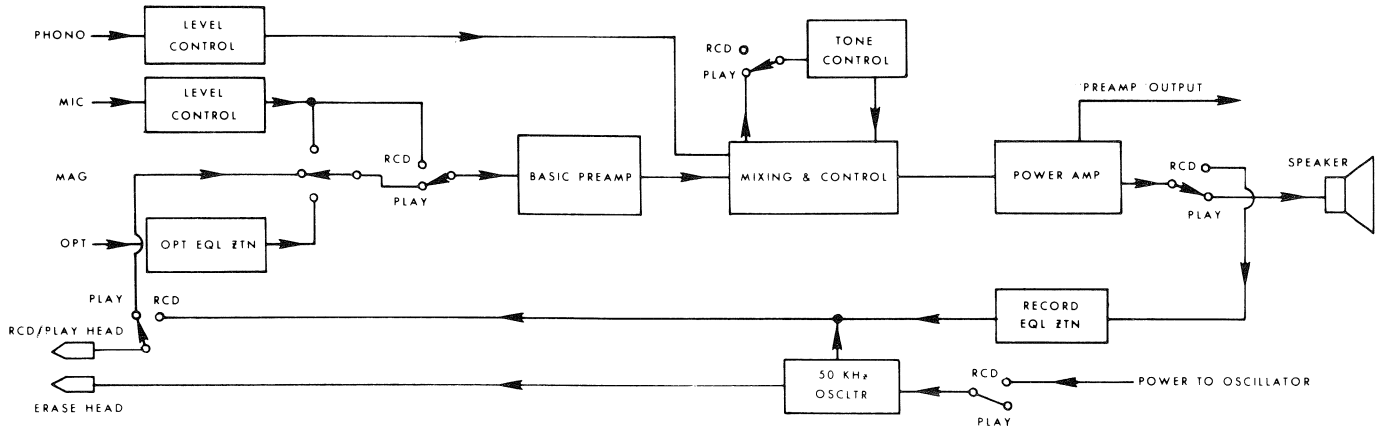
MIXING and CONTROL (including Tone Control) - performs the following functions:

1. Mixing of the PHONO signal with the basic PREAMP output signal.
2. Volume level control.
3. Tone (or Frequency Response) - alteration in the PLAY mode.
4. Voltage amplification.
5. Impedance matching to the power amplifier.
6. Part of high-frequency boost required for equalization in the RECORD mode.

POWER AMPLIFIER - performs voltage amplification and current drive for low impedance load. Also, in RECORD mode, provides low-frequency boost required for RECORD mode equalization.

RECORD EQUALIZATION - provides the majority of high-frequency boost required for RECORD mode equalization.

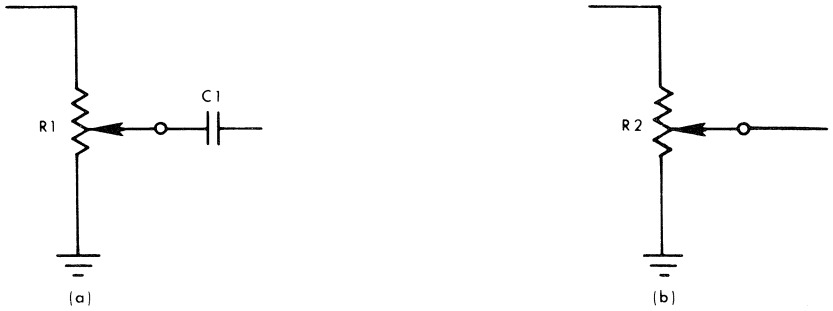
50 kHz OSCILLATOR - in the RECORD mode, provides ac bias current to the record head and supplies erase current to the erase head.



AV-12M6 AMPLIFIER FUNCTIONAL BLOCK DIAGRAM

4.4 SEQUENCE OF OPERATION (AMPLIFIER - CIRCUIT DESCRIPTION)

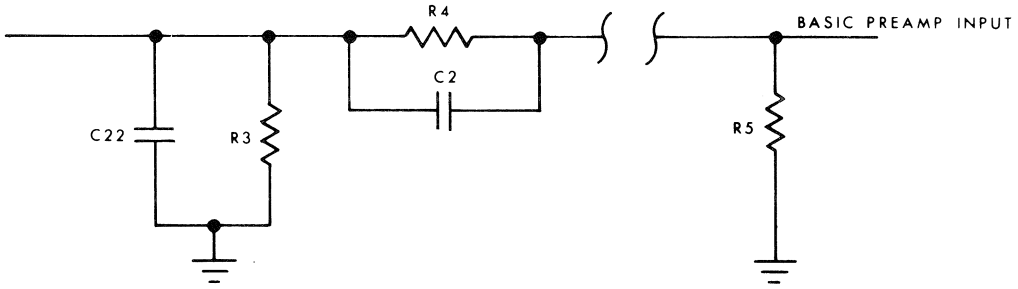
4.4.1 LEVEL CONTROL (PHONO and MIC)



LEVEL CONTROL: (a) PHONO (b) MIC

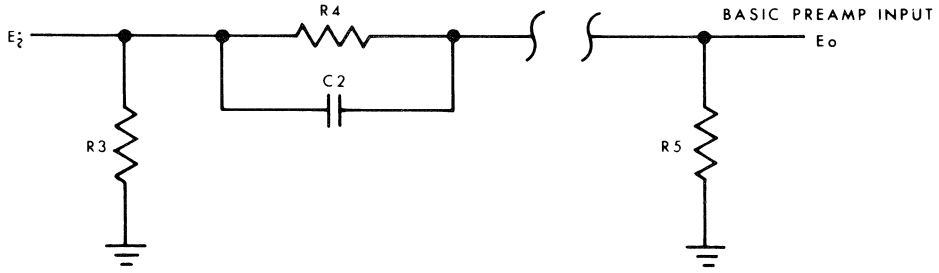
The level control is simply an audio-taper potentiometer which can be used to attenuate the input signal.

4.4.2 OPTICAL EQUALIZATION



OPTICAL EQUALIZATION

The purpose of C22 is to reduce high-frequency noise (hiss) and possible oscillation in the OPT/PLAY mode. Actually, it is not a part of the equalization and has no effect on the frequency range with which we are working.



OPTICAL EQUALIZATION, EFFECTIVE NETWORK

Essentially then, the equalization circuit is reduced to that shown in the figure. At higher audio frequencies, the shunting effect of C-2 on R4 becomes significant, i.e., C2 begins to "short" R4, with the result that Eo increases and approaches E. This provides the high-frequency boost required for equalization.

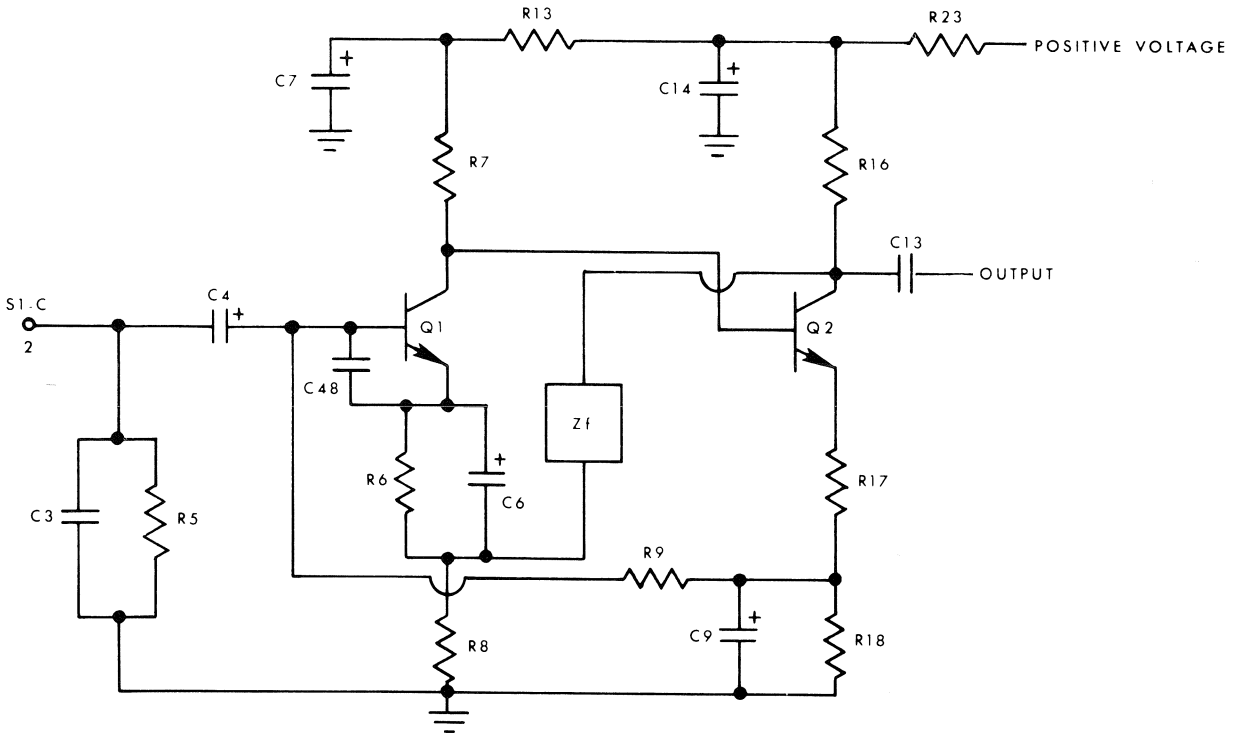
4.4.3 BASIC PREAMP

The BASIC PREAMP is shown in the figure below. The dc bias current to the base of Q1 is supplied through R9, which is in a dc negative feedback path from the second stage. Because a dc feedback scheme is used for biasing and since Q1 and Q2 are direct-coupled, the result is a stabilized bias for both stages. Also, the relatively large amount of dc impedance in the emitter circuit of Q1 (R6 + R8) promotes the stability by providing a large amount of local feedback at Q1. The quiescent voltage at the collector of Q2 provides for the best possible symmetrical clipping. This makes the input overload capability of the preamp maximum.

Capacitor C48 in this network serves to suppress radio reception at the amplifier input. This causes high-frequency radio carriers to be bypassed across the base-emitter junction of Q1 without affecting audio performance.

R23, C14, R13, and C7 form successive filters for the supply voltages at the two stages. These filters filter ripple and other time-varying voltage variations occurring in the amplifier power supply.

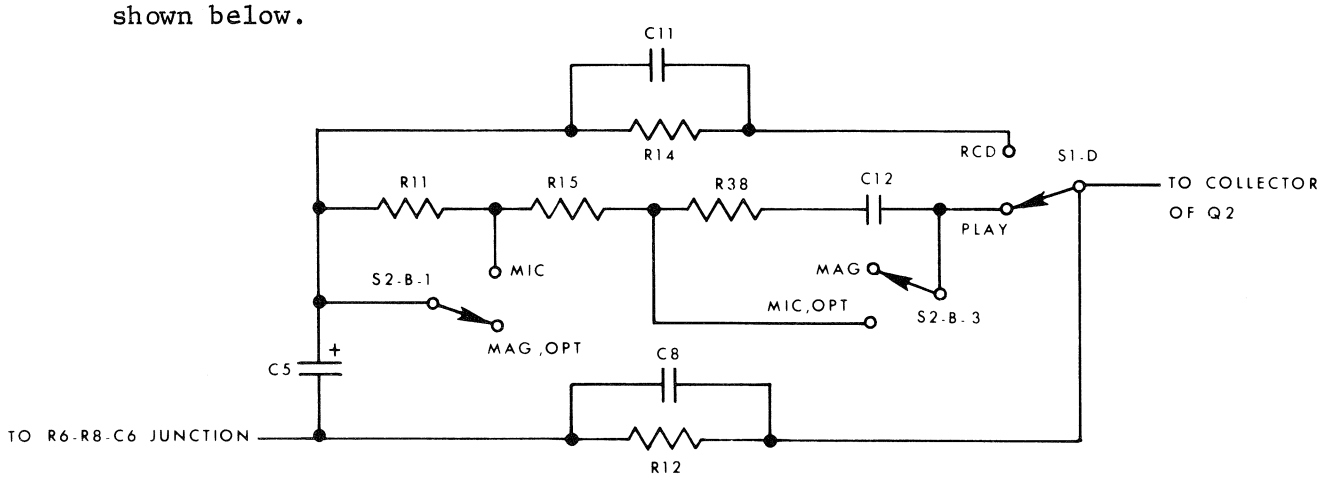
In dynamic operation, C4 couples the input signal to the base of Q1. C6 essentially "shorts" R6 so that R8 alone becomes the dynamic impedance in the emitter circuit of Q1. Also, C9 acts as an ac "short", causing the junction of R9-C9-R17-R18 to be grounded insofar as the ac signal is concerned.



BASIC PREAMP

The dynamic voltage gain of the circuit is determined primarily by Zf (the series impedance in the negative feedback loop) and by R8. In this particular case, Zf is always much greater than R8 throughout the frequency range with which we are working.

Zf is actually made up of several elements in a switched network and is shown below.



COMPLETE SCHEMATIC OF FEEDBACK NETWORK, Z_f

Effective feedback impedances for the different modes of operation are shown below.

EFFECTIVE FEEDBACK IMPEDANCE:

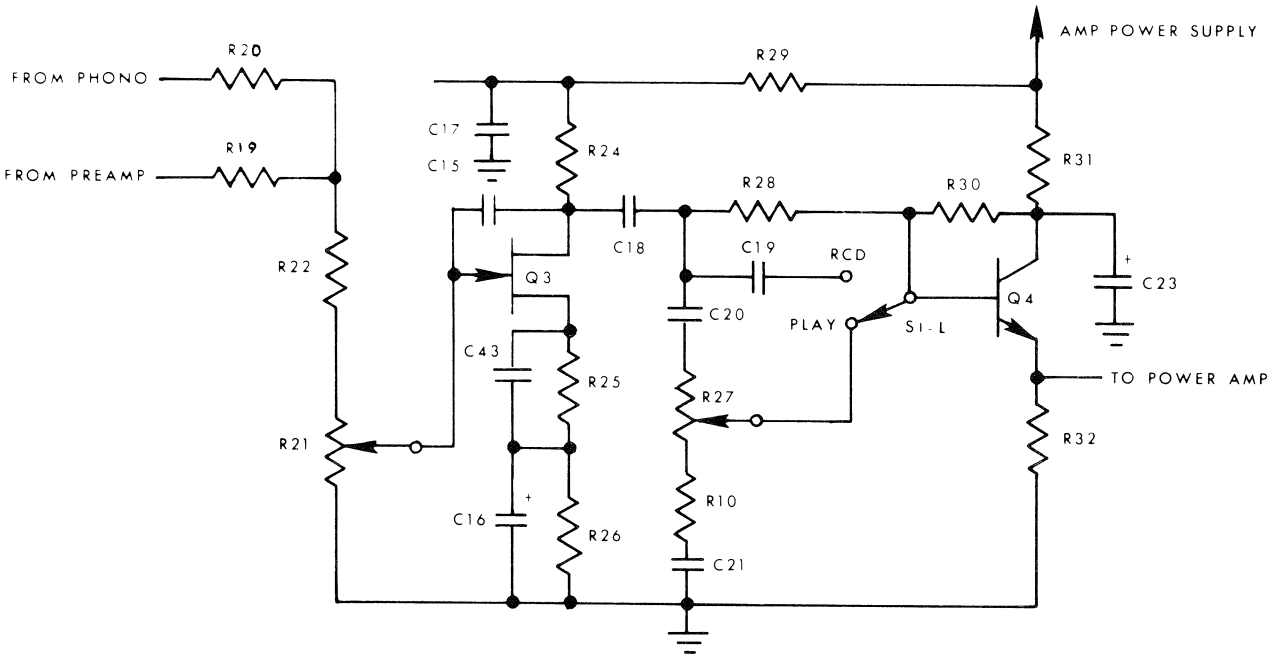
(a) MIC/PLAY (b) MAG/PLAY
(c) OPT/PLAY (d) MIC/RECORD

NOTE: In the MIC/PLAY, OPT/PLAY, and MIC/RECORD, the feedback elements are resistive, and the gain, therefore, is not a function of frequency -- the frequency response is flat. C11, which parallels R14 in the MIC/RECORD, serves only to roll off the gain at a high audio frequency. In MAG/PLAY, however, C12 establishes the necessary equalization for this mode of operation. At the very low frequencies, the only feedback is via R12. However, as frequency increases, C12 begins to conduct significantly; and at the mid-high frequencies, the feedback impedance is essentially the parallel combination of R12 and R11 + R15 + R38, resulting in much lower feedback impedance than R12 alone. The ultimate effect is that the voltage gain initially decreases as frequency increases, and then reaches a plateau, which is significantly less than the low-frequency gain. C8 causes further roll-off of the gain at a very high audio frequency.

4.4.4 MIXING AND CONTROL (Including Tone Control)

The mixing and control circuit is shown in the figure below. The output signals of the PHONO LEVEL CONTROL and the BASIC PREAMP are mixed at the R19-R20-R22 junction through resistors R20 and R19.

R21, an audio-taper potentiometer, is the MASTER VOLUME control and operates by regulating the signal voltage level at the gate of Q3.



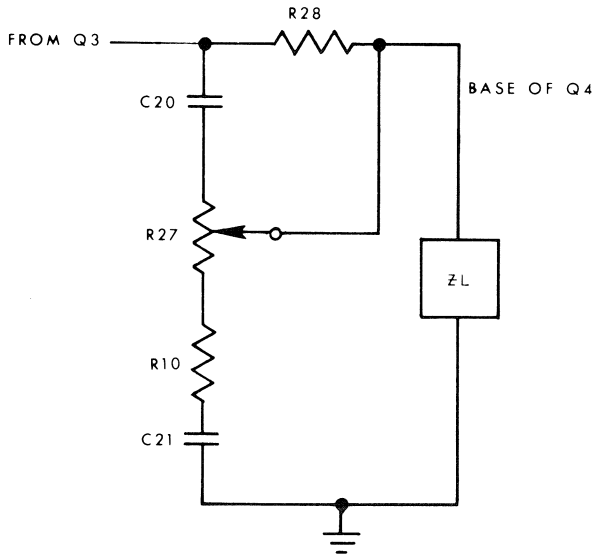
MIXING & CONTROL

Transistor Q3 is an N-channel FET (Field-Effect Transistor) and is used in this circuit because of its high-input impedance characteristics. This high-input impedance is necessary to prevent Q3 from "loading-down" the high impedance source driving it. The dc quiescent current flowing through R25 and R26 causes a positive voltage at the source of Q3.

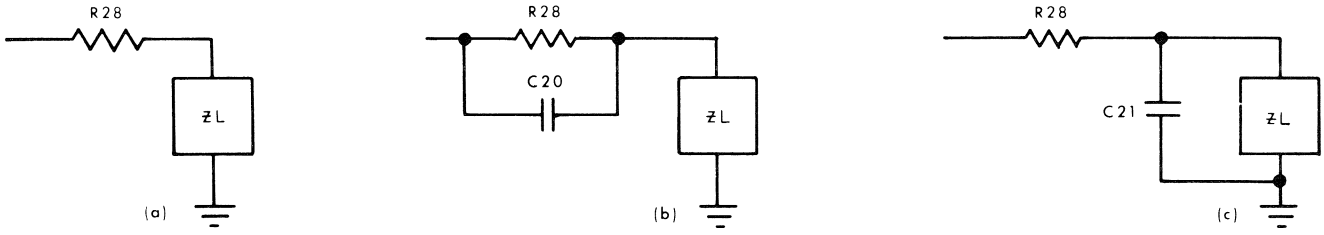
NOTE: The gate is nearly at ground potential. This results in the gate-source junction of Q3 to be reverse-biased, allowing Q3 to operate in the linear, active region required. In dynamic operation, C16 (a large value bypass capacitor) causes the lower junction of C43 and R25 to be essentially an ac ground. Dynamic voltage gain is provided at this stage. Resistor R29 and capacitor C17 form a filter for the supply voltage applied to this stage.

The tone control circuit (operative only in the PLAY mode) and the tone control equivalent circuits are shown in the accompanying sketches.

The signal from Q3 is coupled, via C18, to the input of the tone control. The output of the tone control goes to the base of Q4. The equivalent load impedance seen looking toward the base of Q4 has been lumped and designated ZL for clarity of illustration. Since R10 is a small value resistor (200 ohms), and has no effect at all on the frequency characteristics of the control, it will not be considered in the following circuit description.



TONE CONTROL, (PLAY MODE)



TONE CONTROL, Approximate Equivalent Circuit:

(a) Flat

(b) Treble Boost

(c) Treble Attenuate

When the wiper of R27 is in the midposition, corresponding to FLAT on the physical control, the frequency response of the control is flat. The approximate equivalent circuit is shown. This circuit results due to the fact that the relatively large resistance value of R27 (1 megohm) causes R27, C20 and C21 to be essentially isolated from the circuit when the control is centered. Since the coupling is strictly resistive, no frequency alteration occurs.

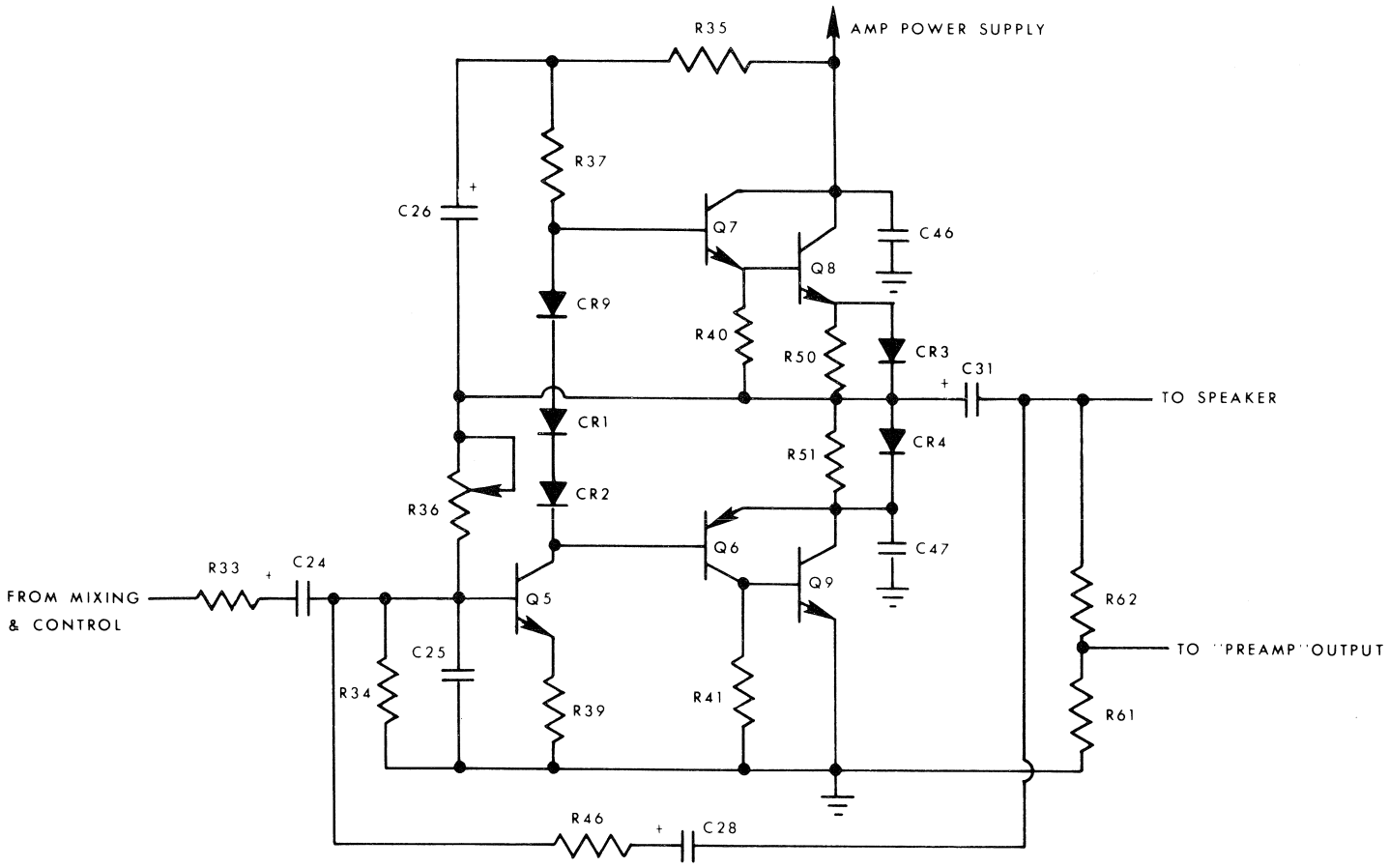
When the wiper is all the way toward C20, corresponding to the clockwise position of the control, a maximum amount of high-frequency boost occurs, giving rise to a "treble" response. The approximate equivalent circuit is shown in (b). The circuit now behaves as a high-pass filter, i.e., C20 bypasses the higher frequencies. When the wiper is all the way toward C21, corresponding to the counterclockwise position of the control, the maximum amount of treble attenutation occurs, resulting in a "bass" response and shown in (c). In this case the circuit is a low-pass network, which results in attenuation of the higher frequencies.

NOTE: In the RECORD mode, the TONE CONTROL is essentially switched out of the MIXING and CONTROL circuitry, and thus becomes inoperative. However, C19 is now in parallel to R28, providing a portion of high-frequency boost required for RECORD mode equalization. The R28-C19 combination behaves in the same manner as the circuit shown in (b).

Q4 is an emitter-follower providing the low-output impedance required to drive the POWER AMPLIFIER. The quiescent base current is supplied via R30, a collector-to-base negative feedback path. This particular configuration results in stable and predictable quiescent levels and, at the same time, exhibits a rather high dynamic input impedance. C23, a large value capacitor, serves to clamp the collector voltage to its quiescent value. Therefore, in dynamic operation, this capacitor prevents signal feedback via R30, which would be undesirable in this case.

4.4.5 POWER AMPLIFIER

The circuitry of the POWER AMPLIFIER differs slightly in the PLAY and RECORD modes and is controlled by the RECORD/PLAY switch. We will consider the PLAY mode first as it appears in the following sketch.



POWER AMPLIFIER, PLAY MODE

Transistor Q5 is the voltage amplifier and Q6, Q7, Q8, and Q9 are current drivers, or current amplifiers. This circuit gives us a "quasi-complimentary" push-pull arrangement.

Transistors Q7 and Q8 are connected in an NPN-NPN arrangement and "push" current to the load during the positive half-cycle. Q6 and Q9 are connected in a PNP-NPN "inverted" arrangement and "pull" load current during the negative half-cycle.

Quiescent current to the base of Q5 is supplied from the voltage divider formed by R36 and R34. R36 is a negative feedback path from the dc output of the amplifier. This scheme, in conjunction with the local feedback provided by R39 in the emitter circuit of Q5, assures sufficiently stable quiescent conditions. Trimpot (R36) allows the quiescent voltage of the amplifier to be used to the best advantage to provide symmetrical sine-wave clipping.

In order to prevent crossover distortion in the dynamic operation, Q6, Q7, Q8, and Q9 must be turned on as the output passes through the quiescent point. Three diodes (CR1, CR2, and CR9) are used to set up a prebias voltage across the base-emitter junctions of Q6, Q7, and Q8 (the base-emitter voltage of a turned-on transistor is roughly equal to the forward voltage drop of a diode). Only a small amount of voltage drop exists across the 1-ohm resistors, R50 and R51, when the amplifier is at the quiescent level. This drop is small enough that CR3 and CR4 are essentially turned off. Transistor Q9 is prebiased by the voltage drop across R41, and because this circuit is basically symmetrical, resistors R40, R41, R50, and R51 provide an additional means of control over prebias levels, stabilizing the circuit.

C24 is the input coupling capacitor; C31, the output coupling capacitor; C28, the coupling capacitor for the ac feedback loop.

C26 is a bootstrap capacitor, applying positive feedback from the output to the R35-R37 junction. The bootstrap serves two basic purposes:

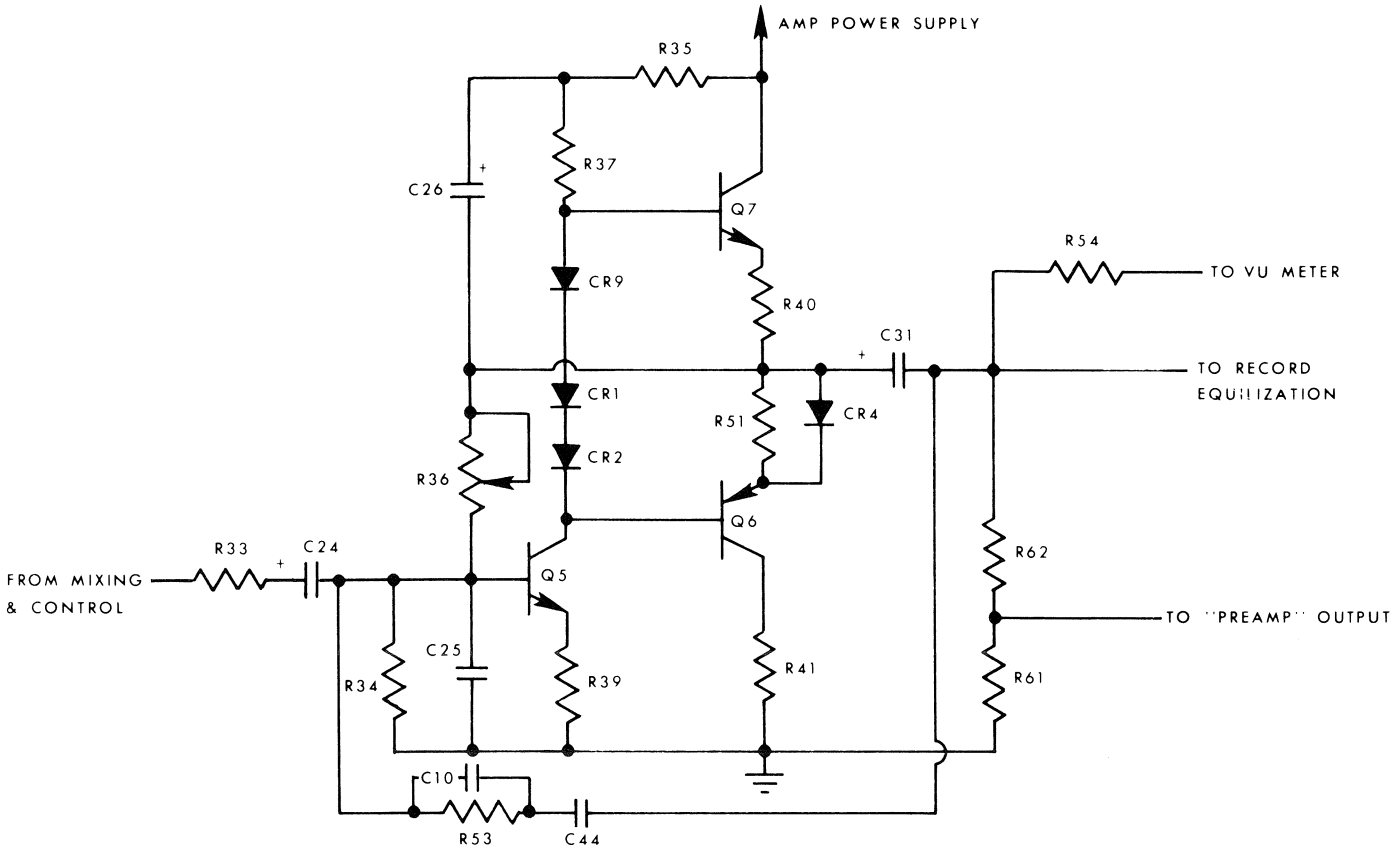
1. It extends, slightly, the maximum unclipped output available from the amplifier by raising the voltage at the R35-R37 junction during the positive half-cycle. Thus, saturation of Q7, as opposed to cutoff of Q5, becomes the limiting factor for clipping, effectively increasing the maximum unclipped output.
2. It increases the effective input impedance of Q5, resulting in greater linearity. This is accomplished by C26 clamping the voltage across (and current through) R37, resulting in reduced collector and base currents in Q5.

Diodes CR3 and CR4 extend the maximum unclipped output available from the amplifier. The voltage drop across R50 and R51, resulting from load current, is a voltage <u>loss</u> in the circuit. CR3 and CR4 clamp this voltage loss to about 1 volt or so.

The PREAMP output is supplied from the POWER AMPLIFIER output through the voltage divider formed by R61 and R62.

Since the circuitry and operating principles of the POWER AMPLIFIER in the RECORD mode are basically the same as those already described in the PLAY mode, we will only look at the differences.

The simplified circuit sketch shows the RECORD mode of operation.



POWER AMPLIFIER, RECORD MODE

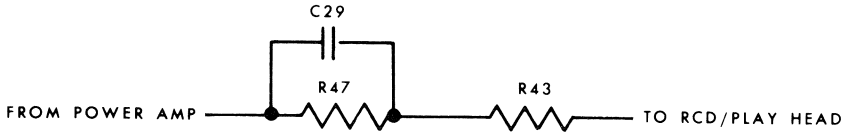
In the RECORD mode, the output of the amplifier is now switched to the RECORD EQUALIZATION network and through R54 to the VU Meter, which is a record level monitor.

Q8, Q9, C46, and C47 have been switched out of the amplifier circuit, and into the oscillator circuit, leaving the output configuration as shown. Although the loss of Q8 and Q9 means that the amplifier has less current drive capability, the amount of drive is adequate since the current loading in the RECORD mode is considerably less than in the PLAY mode.

A different set of feedback elements has been switched into the circuit. C44, a small value capacitor, provides low-frequency boost, required for RECORD mode equalization (as frequency is decreased, the impedance of the negative feedback path is increased, causing an increased amount of voltage gain). C10 causes roll-off of the amplifier at a higher audio frequency.

4.4.6 RECORD EQUALIZATION

In the RECORD mode, the input of the RECORD EQUALIZATION network is driven by the POWER AMPLIFIER output. The output of the network drives the magnetic head.

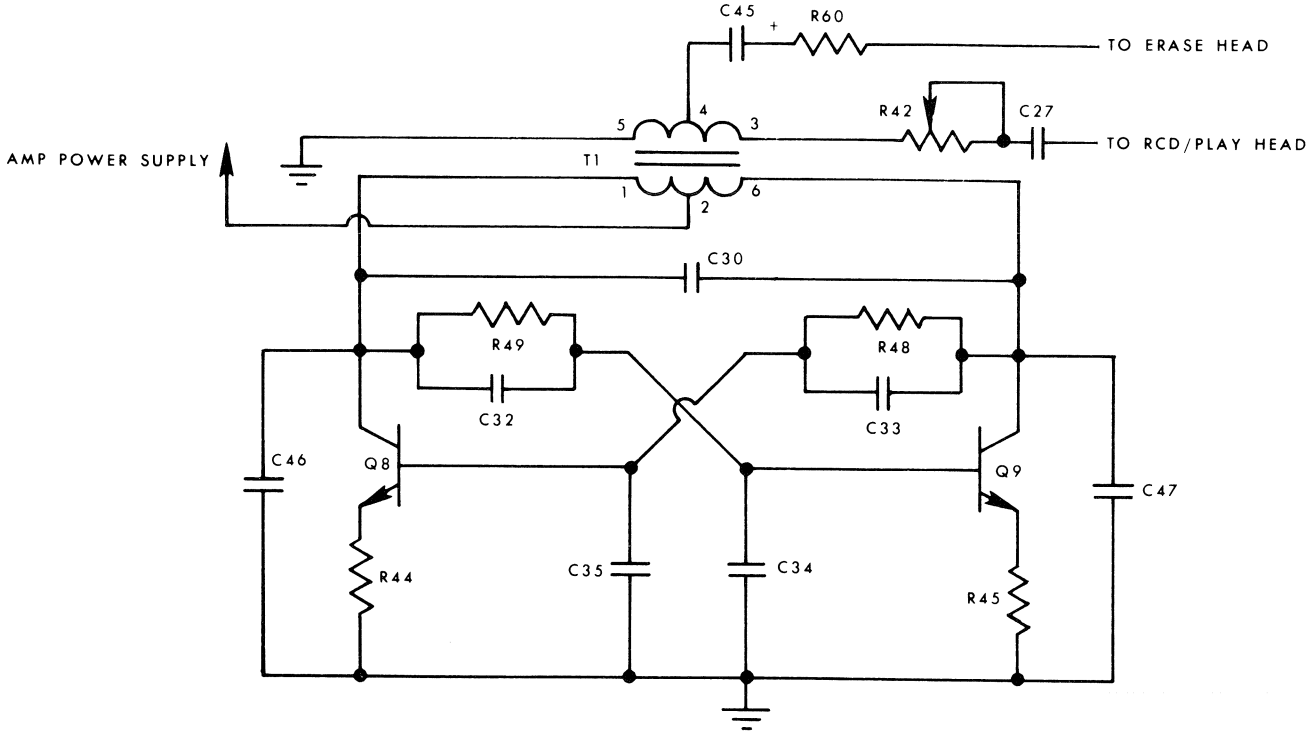


RECORD EQUALIZATION

Basically, the network varies the series impedance to the head as a function of frequency. Since the impedance of the network is directly related to the impedance of the head, the current to the head must be a function of frequency. At the middle and lower frequencies, the network impedance is essentially R43 plus R47. At higher frequencies, C29 begins to shunt R47, and the network impedance approaches the value of R43. The resultant current boost at the higher frequencies provides most of the high-frequency equalization required for magnetic recording.

4.4.7 50 kHz OSCILLATOR

The oscillator is operative only in the RECORD mode. Q8 and Q9, normally in the POWER AMPLIFIER circuit, are switched into the oscillator circuit, along with C46 and C47. Also, the amplifier power supply is applied to the oscillator. The resultant circuit, as it exists in the RECORD mode, is shown below.



50KHz OSCILLATOR

The circuit can be compared to a free-running oscillator with a tuned load. However, the output is a sine wave instead of the square wave one would normally expect to see. The inductance of the T1 primary coil and the capacitance of C30 establish parallel resonance at 50k Hz. The two contact factors establish oscillator frequency, and the secondary load current, power supply voltage, etc, have only small effects on frequency.

The branch containing R48 and C33 and the branch containing R49 and C32 are the regeneration (positive feedback) paths to Q8 and Q9, respectively. The majority of regeneration current flows through the capacitors, R48 and R49, in conjunction with the resistors (R44 and R45) and, the emitter circuits of the transistors establish the quiescent currents in the transistors.

Capacitors C46 and C47 reduce the level of the 50k Hz signal coupled/radiated into the amplifier circuit.

R/P head bias current and erase current both are supplied from the secondary of T1. C27 and C45 serve as coupling capacitors for bias current and erase current, respectively. Trimpot R42 provides a means of accurately controlling the level of bias current, which has a significant bearing on frequency response, recording sensitivity, and recorded signal linearity. R60 limits, and thus provides a degree of control over, erase current level.

5. SERVICE HINTS WITH SUGGESTED CHECKPOINTS

In the following, it is assumed that wiring has been checked against appropriate wiring diagrams and is good.

5.1 MECHANISM

5.1.1 Projector Mechanism Will Not Run (Motor OK)
- a. Motor drive pulley or belt slippage caused by oil.
- b. Shutter drive belt slippage.
- c. Motor control lever not functioning (loose or binding switch cam and pinion assembly).

5.1.2 Speed Shifting Operates Improperly
- a. Adjustment (Instruction 6.24.3 and 6.24.4).
- b. Shutter drive belt slippage.

5.1.3 Picture Cannot Be Framed Properly
- a. Stripped threads on framing shaft.
- b. Framing shaft retaining ring missing.
- c. Pull-down claw worn.

5.1.4 Unsteady Projection
- a. Pull-down claw clearance insufficient (Instruction 6.1.5).
- b. Pull-through tension insufficient or excessive (Instruction 6.1.6).
- c. Movable side-guide pressure insufficient or excessive (Instruction 6.1.2).
- d. Poor pressure pad and aperture plate rail alignment (Instruction 6.1.3).
- e. Pull-down claw protrusion insufficient or excessive (Instruction 6.30.3).
- f. Pull-down cam follower worn.
- g. Shutter shaft ball bearing worn.

5.1.5 Projector Loses Lower Loop and/or Tears Film Perforation
- a. See Instruction 5.1.4.
- b. In-and-out cam worn.
- c. Sound drum pressure roller tension (Instruction 6.26.3).

5.1.6 Breaks Splices
- a. Splice condition.
- b. Excessive pull-through tension (Instruction 6.1.6).
- c. Improper sprocket clamp adjustment (Instructions 6.3.2 and 6.19.3).

5.1.7 Does Not Take Up Film
- a. Take-up pulley pawl binds.
- b. Take-up belt defective.

5.1.8 *KODAK SUPER-40* Shutter Fails to Shift or Shifts Slowly
- a. Locking lever action binding.
- b. Blades bind (Instruction 6.29).
- c. Shutter weight return spring tension insufficient.

5.1.9 Take-up (Rear) Reel Spills Film While Projector Is Running in Reverse
- a. Take-up pulley assembly binds.
- b. Pulley pawl dry or dirty.

5.1.10 Film Does Not Stay On Sound Drum when Projector Is Running in Reverse
Improper damper roller arm adjustment (Instruction 6.19.3).

5.1.11 Rewind Does Not Function
a. Rewind belt broken.
b. Rewind mechanism linkage loose or binding (Instruction 6.22).
c. Take-up and rewind spindles bind.

5.1.12 Scratches Film
a. Damper roller or sound drum pressure roller binds.
b. Rough or worn rails on pressure pad.
c. Poor alignment of pressure pad rails with aperture plate rails (Instruction 6.1.3).
d. Burrs, nicks or abrasions on any surface over which film passes.

5.1.13 Supply (Front) Spindle Rotates While Projector Is Running Forward
Insufficient clearance between the sun gear and sprocket and the reversing mechanism internal gear (Instruction 6.22.3).

5.1.14 Film Noise in Gate
a. Excessive amount of pull-through tension (Instruction 6.1.6).
b. Insufficient clearance of claw in aperture plate slot (Instruction 6.1.5).

5.1.15 Mechanism Noisy -- No Film in Projector
a. Pull-down claw maladjusted (Instruction 6.1.5 and 6.30.3b).
b. Claw return spring or retaining spring defective.
c. Pull-down cam loose or worn.
d. In-and-out spring loose or burred.
e. Shutter shaft bearings defective or ball bearing retaining screws loose.
f. Worm not secure on shutter shaft.
g. Fan housing-to-mechanism mounting screws loose.
h. Motor bearings worn.

5.1.16 Pinging Sound in Mechanism, Especially at Silent Speed
a. Poor drive belt operation.
b. Improper speed shifting adjustment (Instruction 6.24.3 and 6.24.4).

5.1.17 Projector Speed Incorrect
a. Motor drive pulley belt and rubber drive slippage caused by oil on belt and/or rubber drive.
b. Shutter drive belt slippage.

5.2 SOUND SYSTEM - OPTICAL

5.2.1 No Film Sound (Exciter Lamp Not Lighted)
a. Exciter lamp defective.
b. Defective component in exciter lamp filament circuit.

5.2.2 No Film Sound (Exciter Lamp Lighted)
Plug in microphone, and:
a. If no sound through microphone, check amplifier circuitry.
b. If sound satisfactory through microphone, check the following:

Threading of projector
Speaker cable continuity
Sound optics adjustment (Instruction 7.1.3)
Speaker plug contact
Solar cell cable and connection

5.2.3 Excessive Hum
Solar cell cable plug connection.

5.2.4 Noise in Speaker
a. Sound drum reverse drive chain too loose (Instruction 6.20.3).
b. Projector electrical connections.
c. Electrical leakage between motor frame and projector or between amplifier and projector.
d. Insufficient fan clearance.
e. Motor grounding connection loose or missing.

5.2.5 Microphonics
a. Improper seating of exciter lamp in socket.
b. Sound optics adjustments (Instruction 7.1.3).

5.2.6 Microphonics (Microphone Plugged In)
a. Microphone defective.
b. Microphone connection poor.

5.2.7 Weak or Distorted Sound
a. Fidelity control adjustment misaligned (see projector instruction book).
b. Poor seating of exciter lamp in socket.
c. Sound optics assembly and sound optics adjustment misaligned (Instruction 7.1).
d. Defect in amplifier.

5.2.8 Speaker Rattles at High Sound Volume
a. Speaker coil bottoming.
b. Speaker cone damaged.

5.2.9 Sound Unsteady
a. Improper threading of projector.
b. Poor damper roller action (Instructions 6.19.3 and 6.19.4).
c. Sound drum binds.
d. Sound drum reverse drive chain too tight (Instruction 6.20.3).
e. Improper pressure roller action or tension.
f. Damper roller spring tension insufficient or excessive (Instruction 6.19.3).
g. Insufficient damper fluid in damping bearing cup (Instruction 6.19).

5.2.10 Sound Still Unsteady After Above Checks
a. Sound drum ball bearings rough.
b. Binds in sound drum sprocket and pawl assembly.

5.2.11 Fidelity Control Does Not Peak
a. Positioning and adjustment of sound optics assembly (Instruction 7.1.3).
b. Sound optics (Instruction 7.1).

5.3 SOUND SYSTEM - MAGNETIC

NOTE: It is assumed that the projector and amplifier have been checked in the optic mode and are good.

5.3.1 High Noise Level
Magnetic head assembly magnetized.

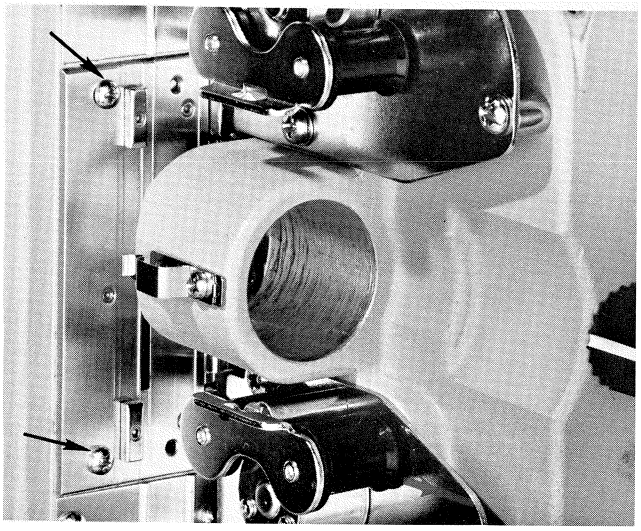
5.3.2 Poor Sensitivity
- a. Magnetic head assembly misaligned (Instruction 8.1.4).
- b. Magnetic head assembly worn (Instruction 8.1).

5.3.3 Poor Frequency Repsonse
- a. Magnetic head assembly azimuth misaligned (Instruction 8.1.4).
- b. Magnetic head assembly worn (Instruction 8.1).

5.3.4 Partial or No Erase
- a. Misalignment of erase head assembly (Instruction 8.1.4).
- b. Defective erase head assembly (Instruction 8.1).

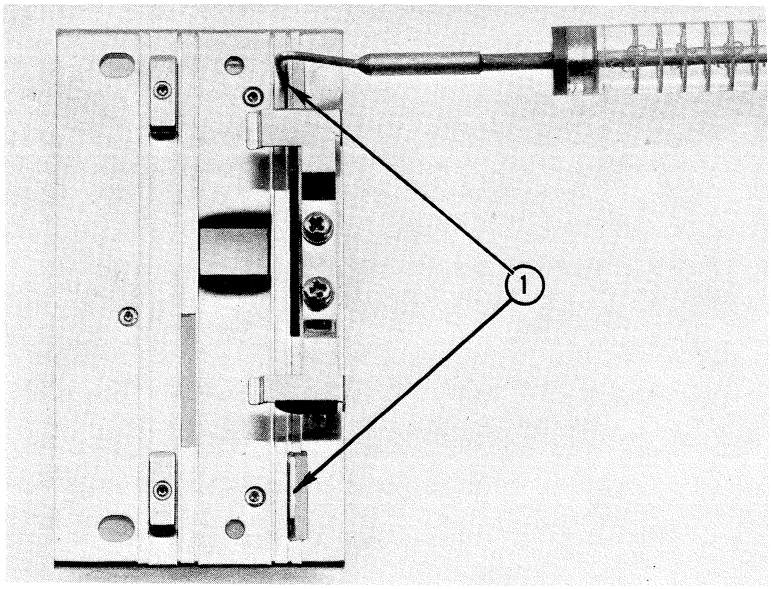
6. MECHANISM DISASSEMBLY, REASSEMBLY, AND ADJUSTMENTS

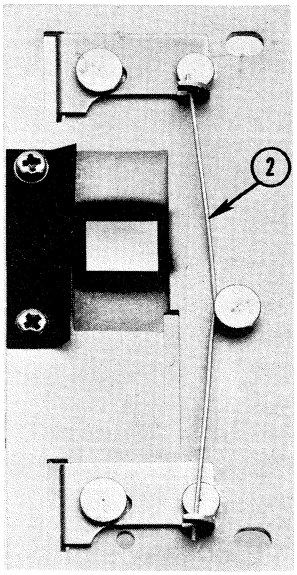
6.1 APERTURE PLATE AND PRESSURE PAD ASSEMBLY



6.1.1 DISASSEMBLY

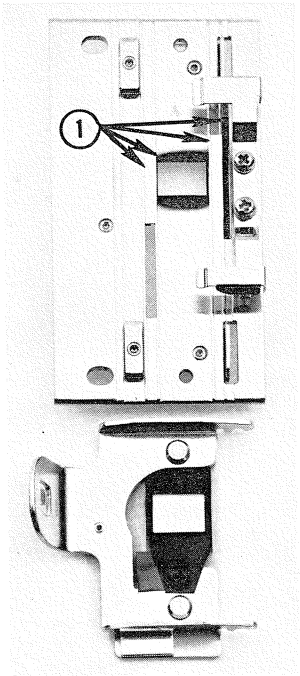
a. Remove projection lens.
b. Turn threading knob so that white line is toward you to retract claw.
c. Open pressure pad and insert a card or piece of paper to protect the plate and withdraw the pressure pad.
d. Remove the aperture plate (two screws -- arrows).

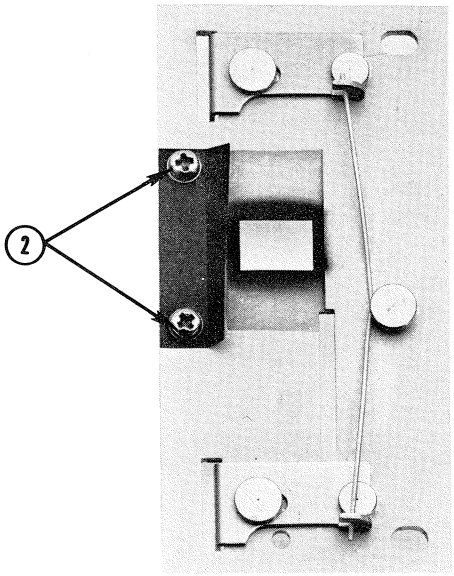




6.1.2 ADJUST

Adjust pressure of movable side guides (1) between 1 and 1/2 ounces by re-forming spring (2) as shown above.





6.1.3 ALIGNMENT

Align pressure pad and aperture plate rails (1); if necessary, loosen screws (2) and reposition pressure pad as shown above.

6.1.4 REASSEMBLY

Reassemble the reverse of disassembly and make necessary adjustments for pull-down claw clearance (Instruction 6.1.5) and pull-through tension (Instruction 6.1.6).

6.1.5 ADJUST

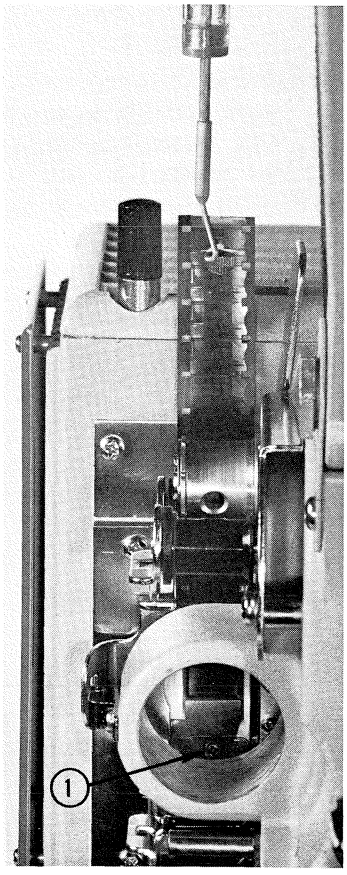
Adjust clearance of pull-down claw in aperture plate slot as follows:

a. Place a strip of film in the gate.
b. Turn threading knob and observe claw action with framing knob turned to extreme clockwise position and then to extreme counterclockwise position.
c. Claw points should be fairly well centered in the film perforations and should not strike perforations or claw slot.
d. Loosen the two aperture plate screws and reposition the plate to adjust.

6.1.6 ADJUST

Adjust pull-through tension between 1 1/2 and 2 1/2 ounces as follows:

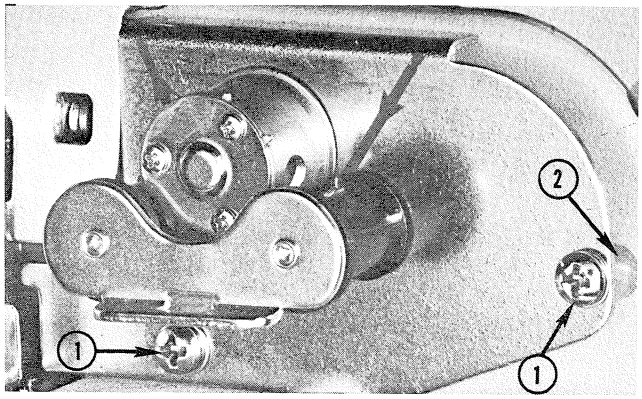
a. Place a strip of processed film in the gate and measure the tension required to pull it through.
b. Turn screw (1) clockwise to increase and counterclockwise to decrease spring tension.
c. Apply a small amount of air-drying cement or shellac to the screw when adjusted.



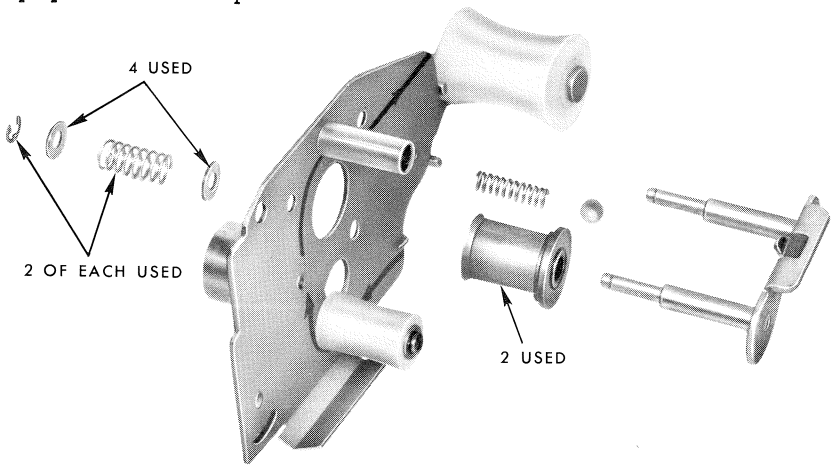
6.2 UPPER SPROCKET CLAMP AND PLATE

6.2.1 DISASSEMBLY

a. Remove the two retaining screws (1) and spacer (2); then lift off the assembly.

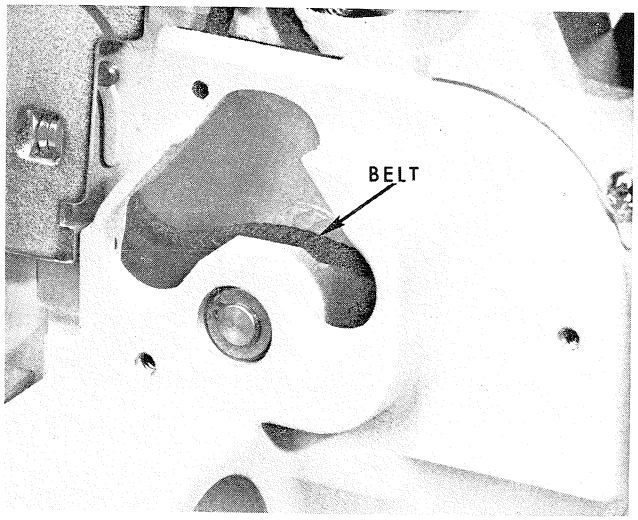


b. Disassemble sprocket clamp parts as required.



6.2.2 REASSEMBLY

a. Hold take-up belt in groove next to sprocket drive gear.
b. Fit clamp and plate assembly in position and press down to make sure gear is engaged properly.
c. Assemble the two retaining screws (lockwashers under head) and spacer.
d. Lubricate stop pin balls, idler roller shaft, and bearing shafts with a light coat of SAE #20 Oil (part No. 763001). Use Beacon No. 325 Grease (part No. 763029) as required on sprocket roller shafts and idler arm pivot pin.



6.2.3 ADJUST

Adjust sprocket clamp as follows:

a. Close clamp over two thicknesses of film. Rollers should turn freely.
b. Repeat with three thicknesses of film. Rollers should be snug.
c. Carefully bend post on plate to adjust.

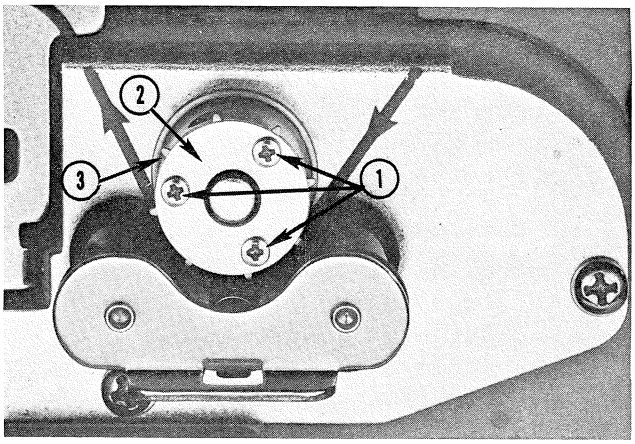
6.3 TAKE-UP BELT

6.3.1 DISASSEMBLY
- a. Remove the upper sprocket clamp and plate (Instruction 6.2.1).
- b. Remove belt.

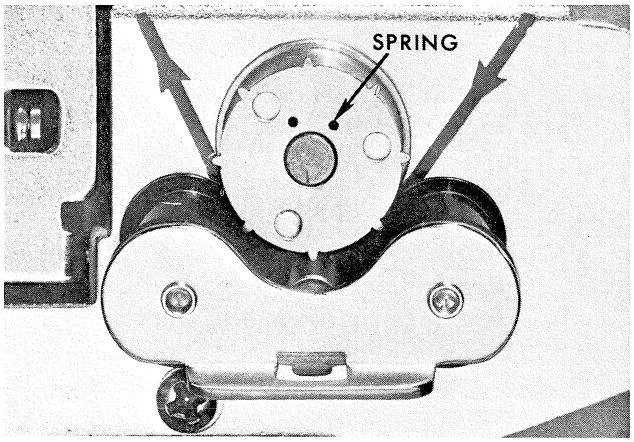
6.3.2 REASSEMBLY
Reassemble the reverse of disassembly. Position belt as shown being sure stud is inside loop of belt.

6.4 UPPER SPROCKET

6.4.1 DISASSEMBLY
- a. Open clamp.
- b. Remove end plate screws (1), end plate (2), and sprocket (3).
- c. Note spring behind sprocket.



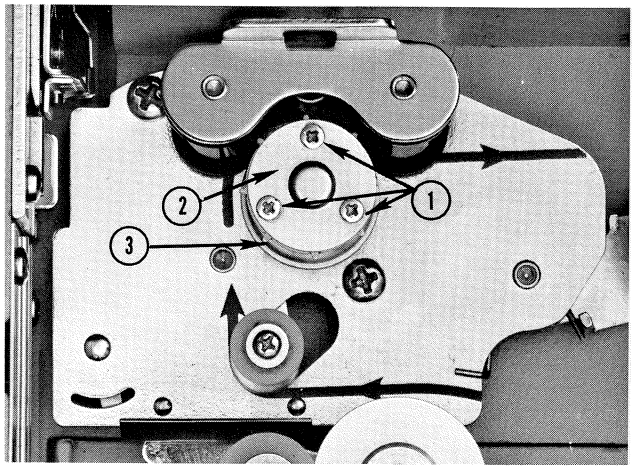
6.4.2 REASSEMBLY
- a. Install spring in the hub with point of spring in hole of collar.
- b. Rotate hub clockwise to the stop and hold in this position.
- c. Fit sprocket on hub with end of spring in hole of sprocket as shown.
- d. Still holding hub in clockwise position, rotate sprocket counter-clockwise to align screw holes.
- e. Assemble end plate to avoid appearance of "wobble" while running.



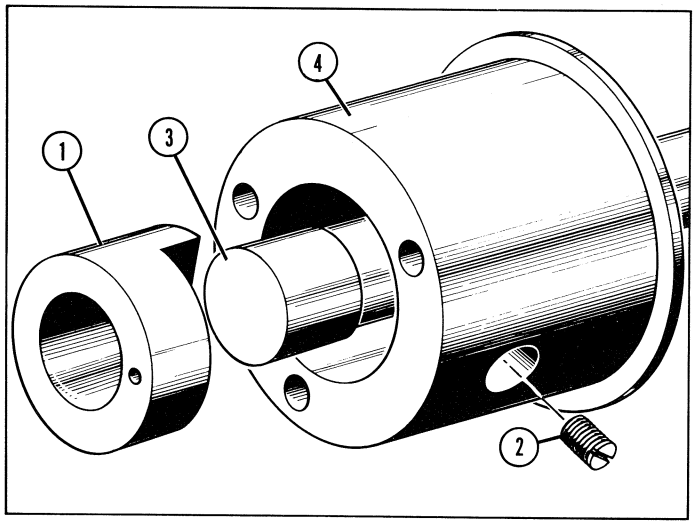
6.5 LOWER SPROCKET

6.5.1 DISASSEMBLY
- a. Open clamp.
- b. Remove end plate screws (1), end plate (2), and sprocket (3).

6.5.2 REASSEMBLY
Reassemble reverse of disassembly.
Center end plate to avoid appearance of "wobble" while running.



6.6 UPPER SPROCKET HUB



6.6.1 DISASSEMBLY

a. Remove upper sprocket and spring (Instruction 6.4.1).
b. Remove upper sprocket clamp and plate (Instruction 6.2.1).
c. Remove collar (1) by removing setscrew (2) through hub; then remove stud (3) and hub (4). It may be necessary to drive out the shaft in order to remove the collar (1) and hub (4).

6.6.2 REASSEMBLY

a. Fit hub on the shaft, then the stud and collar in the hub with cutout of collar over stud.
b. Assemble setscrew in the collar through the hole in the hub.
c. Tighten setscrew on cutout of shaft; no end play.
d. Assemble upper sprocket clamp and plate to projector (Instruction 6.2.2).
e. Assemble sprocket and spring to hub (Instruction 6.4.2).

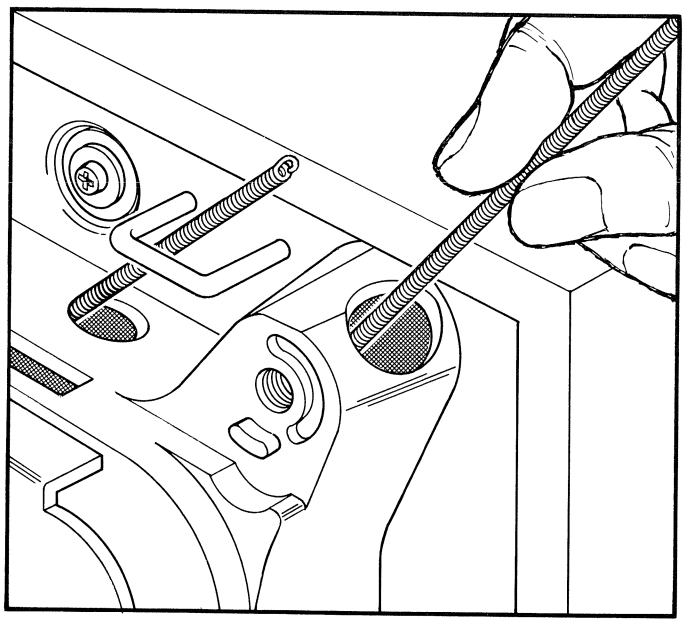
6.7 SUPPLY BELT

6.7.1 DISASSEMBLY

Do not remove old belt; follow steps in Instruction 6.7.2.

6.7.2 REASSEMBLY

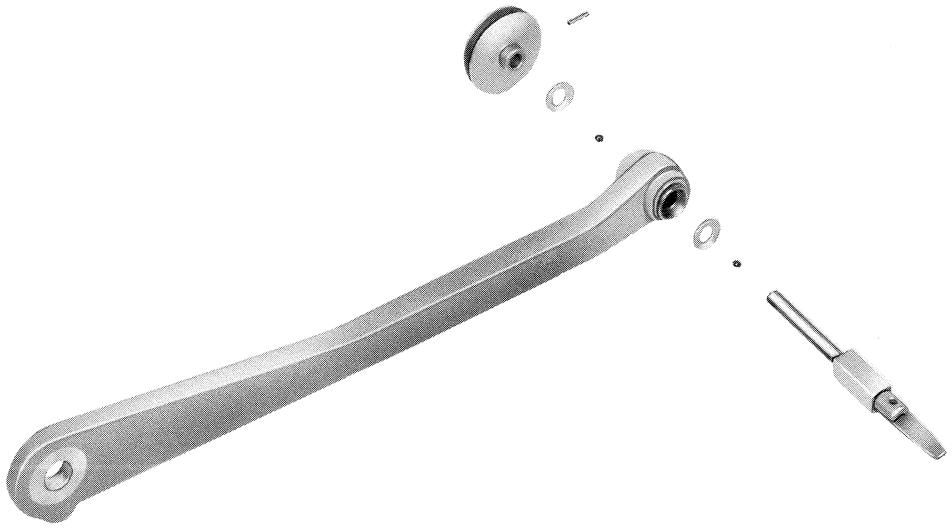
a. If old belt is still on the projector, disconnect it; hook the new belt on one end of the old and pull the old belt out. New belt will automatically position itself properly.
b. If old belt has been removed, feed new belt in the front opening around the rewind drive pulley until it comes out the rear hole. Arm shown removed for clarity.
c. Fasten the loops of the belt together.



6.8 SUPPLY SPINDLE ASSEMBLY

6.8.1 DISASSEMBLY

a. Remove belt from pulley.
b. Drive out pin holding pulley to spindle.
c. There are 10 loose bearing balls on each side of the arm bushing.
d. Carefully withdraw spindle from the arm.

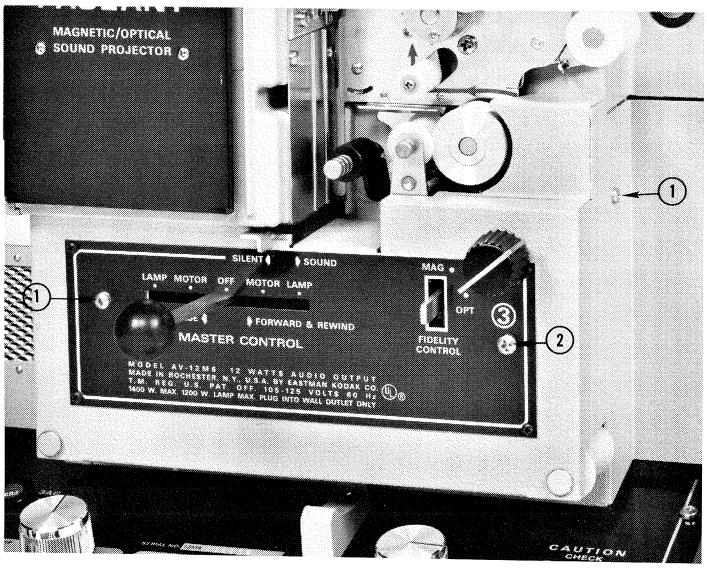


6.8.2 REASSEMBLY

a. Clamp the spindle assembly vertically in a vise with the shaft up; then fit one of the washers over the shaft.
b. Apply a light coat of Plastilube #1 lubricant (part No. 763002) to the upper surface of the washer and place 10 bearing balls around the shaft on the washer; the lubricant will retain the balls in position.
c. Fit the longer, bushed end of the arm over the end of the shaft and carefully lower the arm so the bearing balls go into the bushing recess.
d. Apply a small amount of Plastilube #1 lubricant (part No. 763002) in the upper recess and place the other 10 bearing balls in the recess.
e. Add the other washer over the spindle shaft and fit the pulley on the shaft, hub toward the washer.
f. Insert a .005-inch feeler gauge between the washer and pulley hub.
g. Clamp the pulley and spindle together, remove the assembly from the vise, and drill a 1/16-inch diameter hole through the shaft and pulley, using the hole in the pulley hub as a guide.
h. Fasten pulley on the shaft with the pin; then remove feeler gauge.

6.9 EXCITER LAMP COVER

WARNING: DISCONNECT POWER CORDS.



6.9.1 DISASSEMBLY

a. Remove the two screws (1) and screw (2) and spacer behind the screw.

b. Remove control knob (setscrew in underside); then take off exciter lamp cover.

6.9.2 REASSEMBLY

Reassemble the reverse of disassembly. Lubricate roller shafts with a light coat of SAE #20 Oil (part No. 763001).

6.10 MASTER CONTROL SWITCH

WARNING: DISCONNECT POWER CORDS.

6.10.1 DISASSEMBLY

a. Remove exciter lamp cover (Instruction 6.9.1).

b. Remove insulator from switch and disconnect all switch leads.

c. With switch control lever in center position, loosen cam setscrew and slide cam up, out of mesh.

d. Loosen switch retaining nut and slide switch down and out. Leave cam and nut in position.

6.10.2 REASSEMBLY

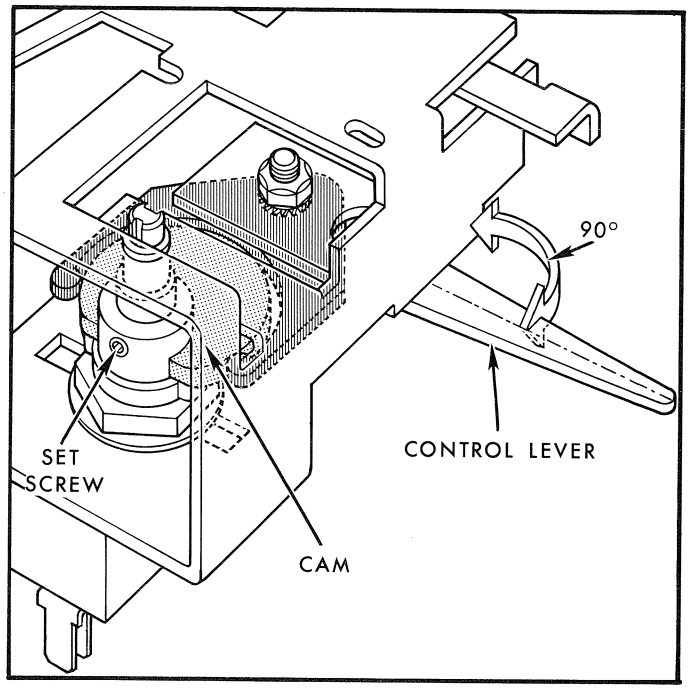
a. Slide switch in bracket with nut and cam over shaft; then tighten nut.

b. Fit cam in mesh with control lever so that conditions in illustration are met; then tighten setscrew.

c. Connect terminals to switch (refer to wiring diagram).

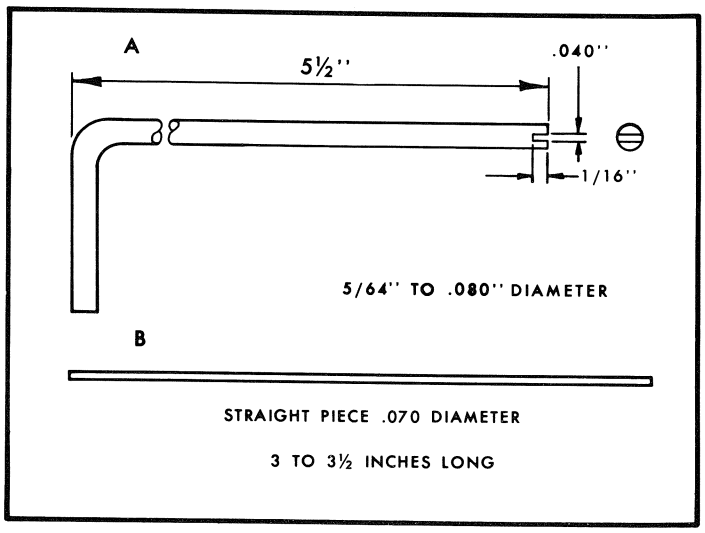
d. Lubricate teeth and cam of the cam and pinion assembly, the pivot area of the control lever, the cam yoke, shifting arm stud, and contact points of the interlock lever with Plastilube #1 lubricant (part No. 763002).

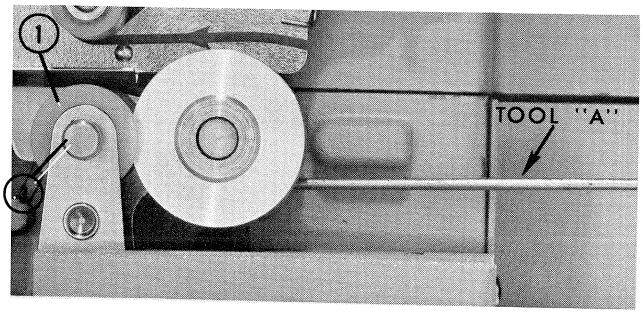
e. Reassemble exciter lamp cover the reverse of disassembly.



6.11 PRESSURE ROLLER

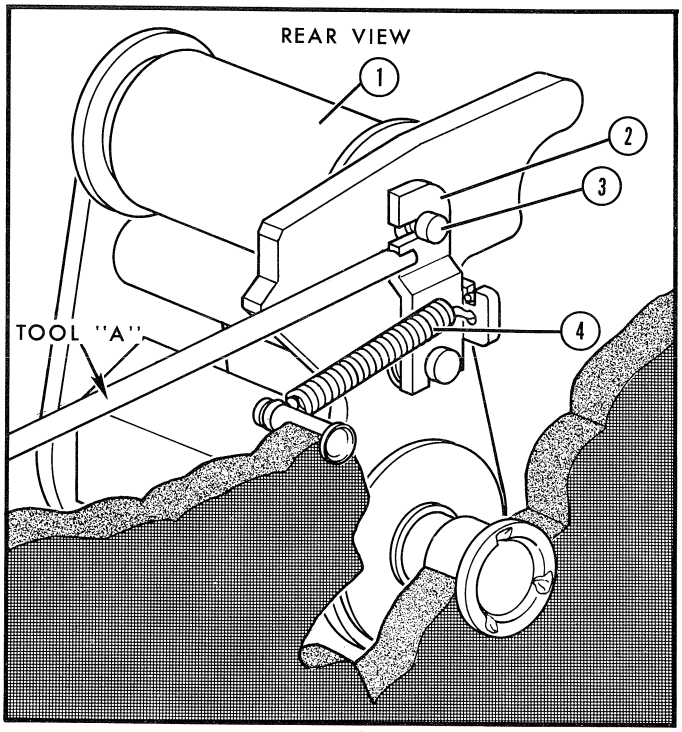
The pressure roller can be removed and replaced with a minimum amount of disassembly by carefully using the two tools shown in the illustration. Although you will be working blindly, a considerable amount of time will be saved by using these tools. If the equalizing link (2) slips off its pivot post, or the spring (4) is disconnected, it will be necessary to completely remove the pressure roller assembly (Instruction 6.26.1).





6.11.1 DISASSEMBLY

a. Fit tool "A" under the sound drum shaft.
b. Carefully hold the tool against the equalizing link (2) and push against the link to disengage it from the shaft (3).
c. While the link is in this position, withdraw the shaft (3) and remove pressure roller (1). Note position of thick flange on roller.
d. Insert tool "B" in place of the shaft and slowly release the pressure on tool "A" so that the link (2) hooks on tool "B".
e. Remove tool "A".



6.11.2 REASSEMBLY

Reassemble the reverse of disassembly with thick flange of roller positioned as previously noted. Lubricate shaft, hub restorer shaft, and pressure roller pivot with Beacon No. 325 grease (part No. 763029).

6.11.3 Check and adjust the sound optics (Instruction 7.1.3).

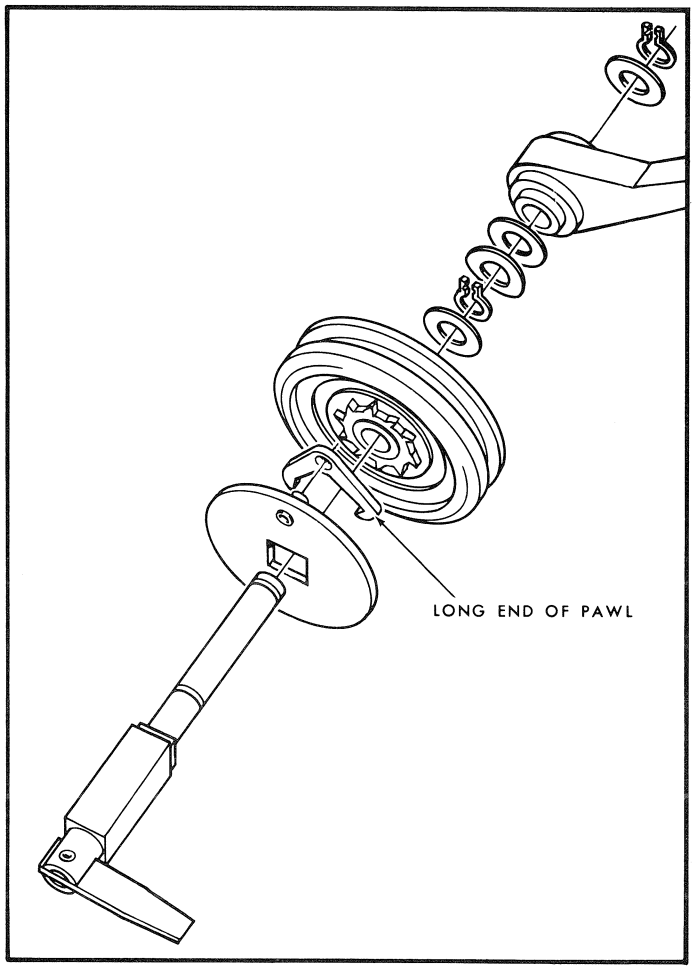
6.12 TAKE-UP SPINDLE

6.12.1 DISSASSEMBLY

Refer to breakdown illustration.

6.12.2 REASSEMBLY

Reassemble the reverse of disassembly and lubricate spindle pawl pivot, inside diameter of pulley ratchet, spindle, pivot, and release lever pivot with light coat of SAE #20 Oil (part No. 763001).

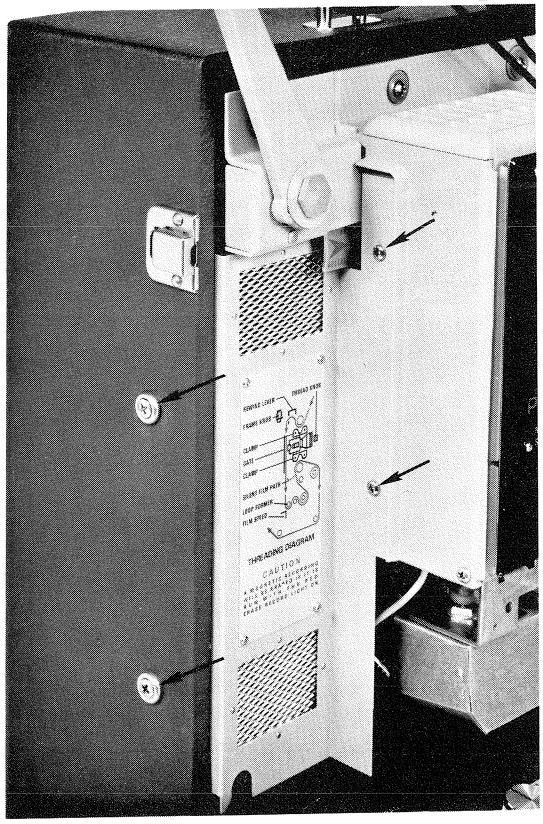


6.13 MECHANISM FROM CASE

WARNING: DISCONNECT POWER CORDS.

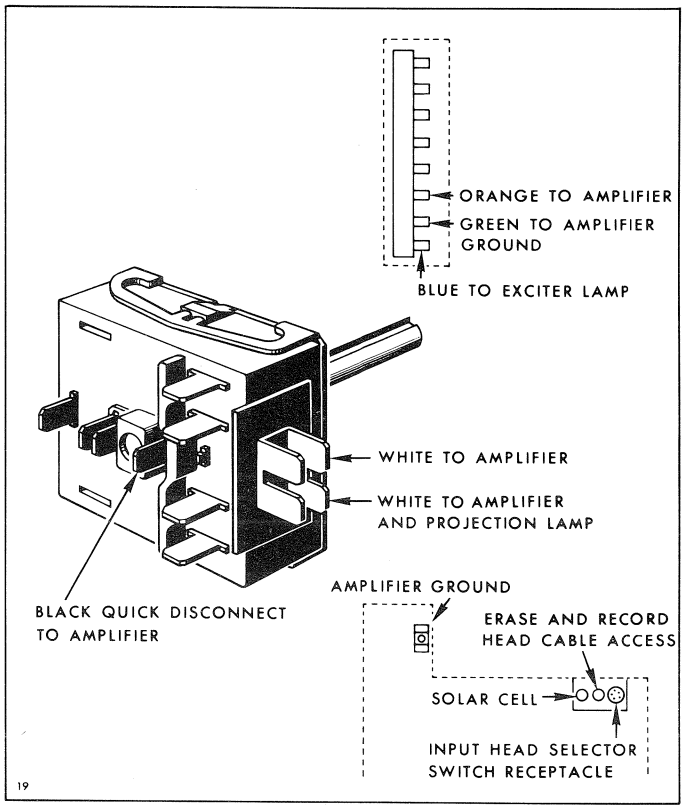
6.13.1 DISASSEMBLY

a. Remove exciter lamp cover (Instruction 6.9.1).
b. Remove drive cover assembly (four screws, arrows).
c. Remove power cord cable clamp (one screw and washer).
d. Remove one screw in rear of projector case (screw nearest edge of projector case).



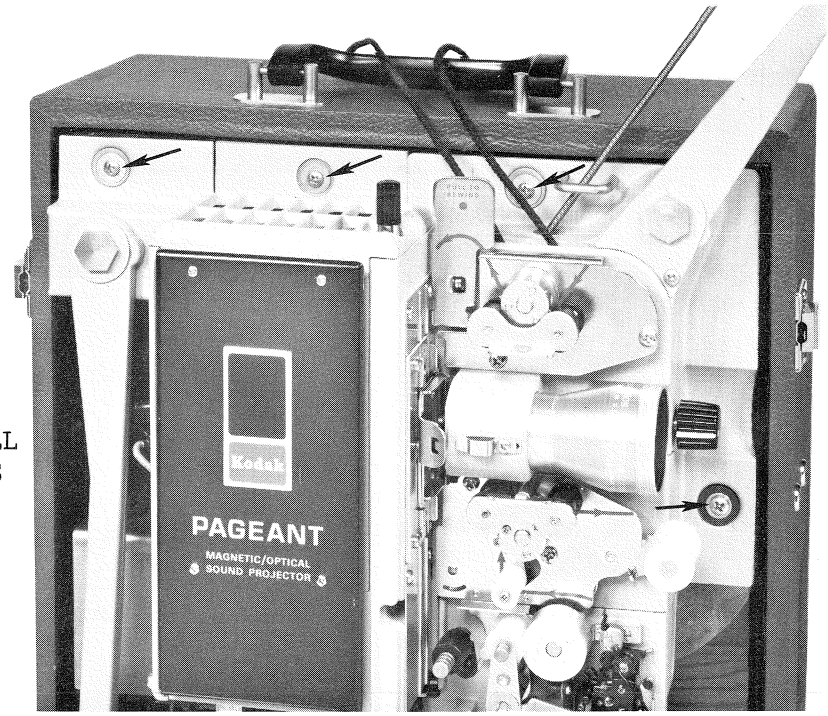
e. Remove switch shield and disconnect leads shown in illustration.

In addition, the quick-disconnect connection between the black lead (transformer) and red and white lead (amplifier) must be disconnected.



f. Lay projector on its back and remove four screws (arrows) and one screw in bottom of projector.

g. Lift mechanism out of case and remove support post (right-hand thread) to stand mechanism upright.



h. Mechanism can be operated at this point by connecting line voltage to the power cord.

WARNING: TERMINAL STRIP AND SWITCH CONNECTION WILL BE "HOT" -- DANGEROUS VOLTAGE.

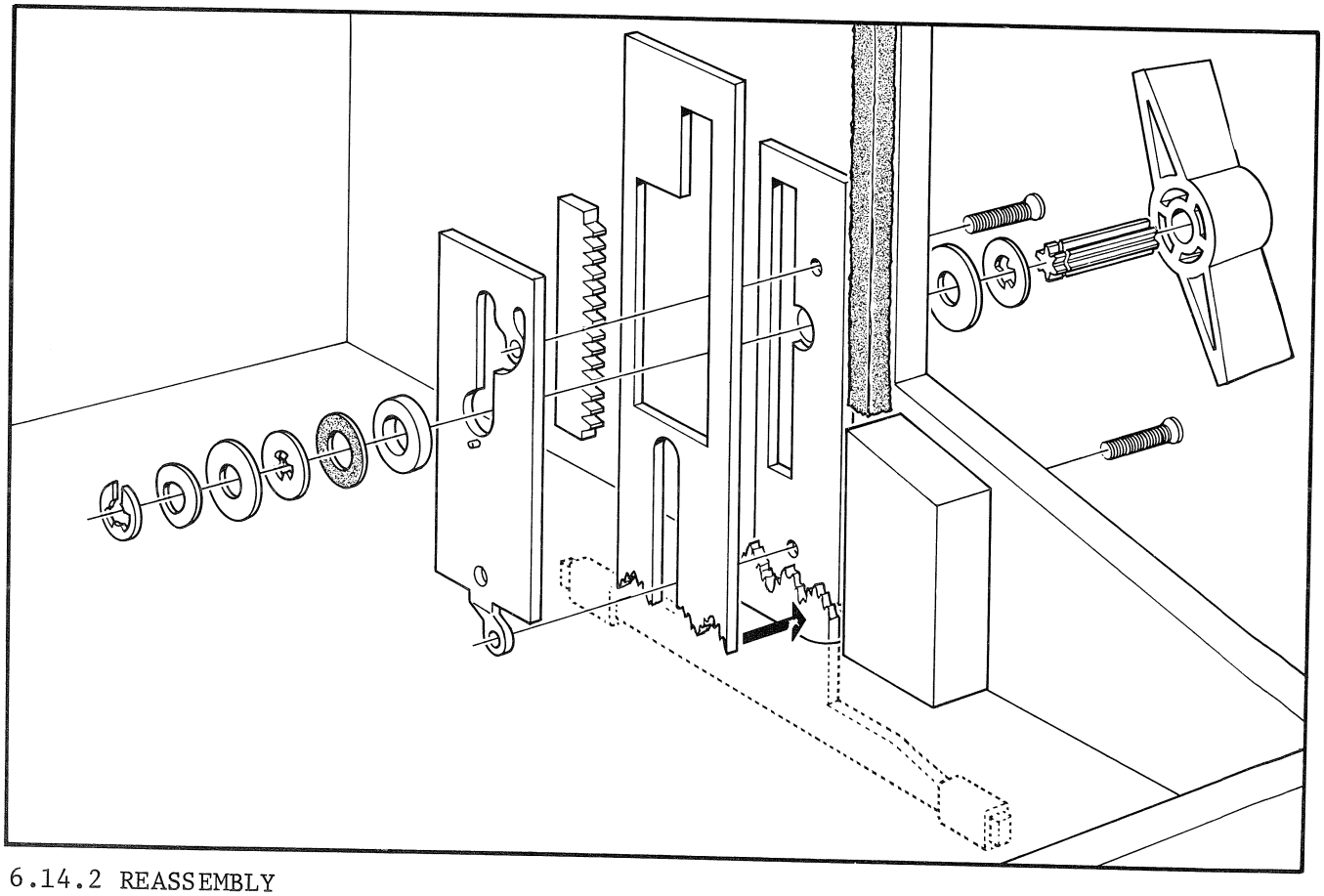
6.13.2 REASSEMBLY

Reassemble the reverse order of disassembly.

6.14 ELEVATING MECHANISM

6.14.1 DISASSEMBLY

a. Remove mechanism from case (Instruction 6.13.1).
b. Disassemble elevating mechanism as required, and as shown below.



6.14.2 REASSEMBLY

Reassemble the reverse of disassembly so that knob is vertical when elevation is fully retracted. Lubricate contact points with Plastilube #1 lubricant (part No. 763002).

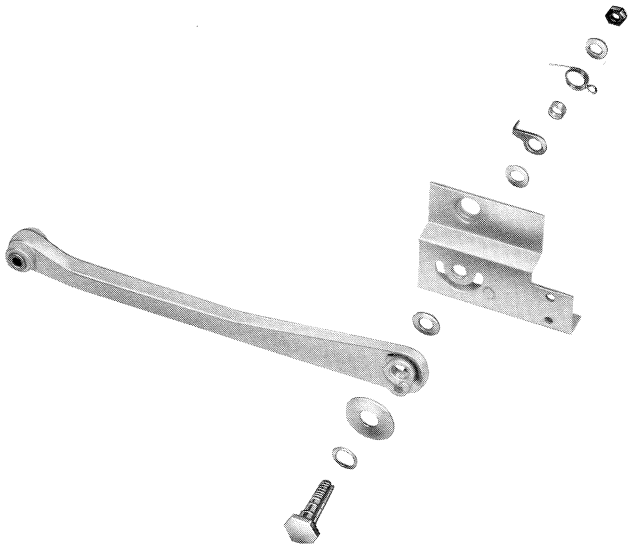
6.15 TAKE-UP ARM

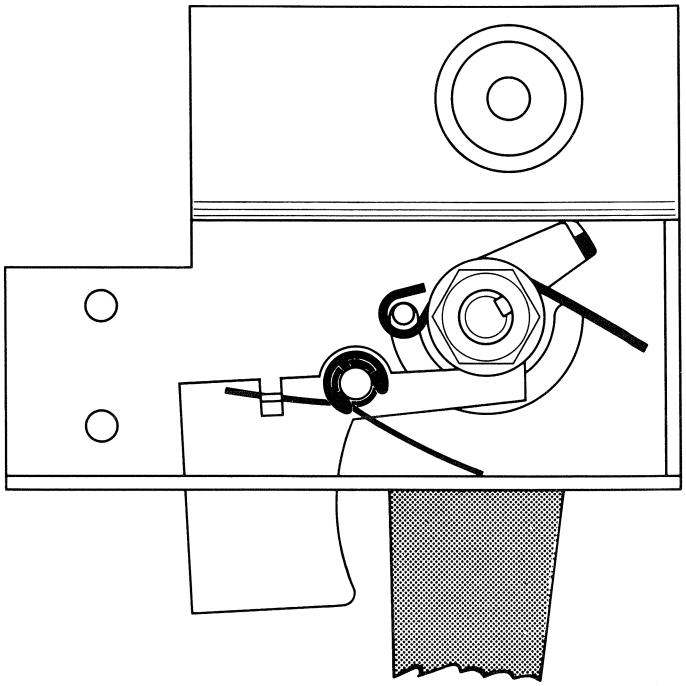
6.15.1 DISASSEMBLY

a. Remove mechanism from case (Instruction 6.13.1).
b. Remove two screws holding arm assembly to casting.
c. Disassemble further as required. (See breakdown 6.15.2).

6.15.2 REASSEMBLY

Reassemble the reverse of disassembly. Lubricate bearing surfaces as required with a light coat of SAE #20 Oil (part No. 763001).

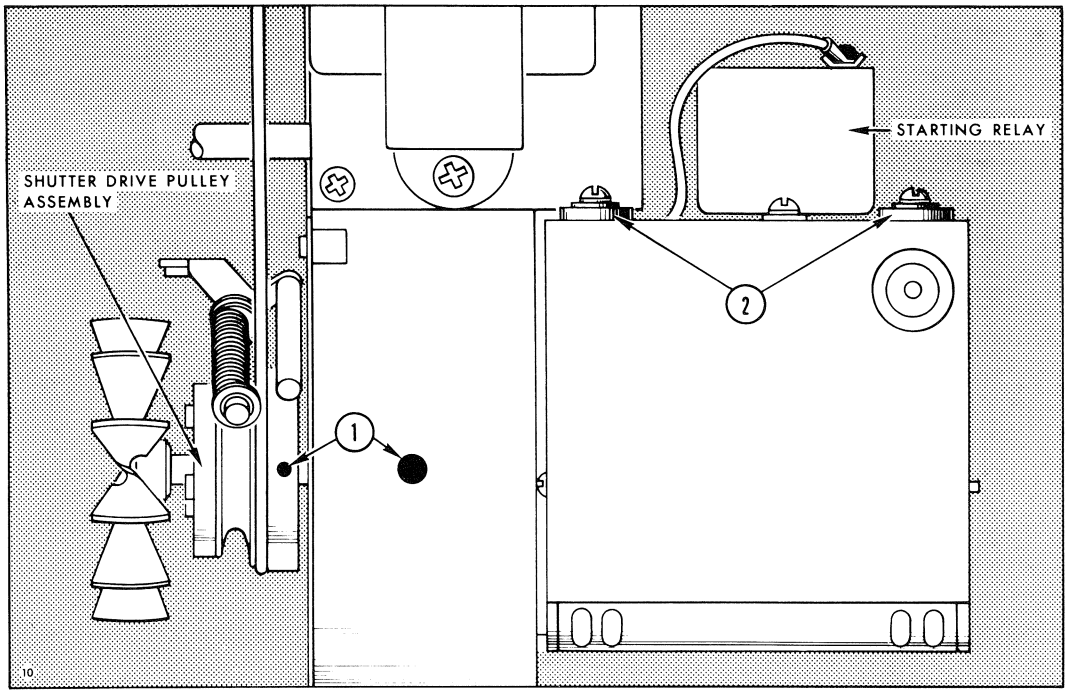




6.16 MECHANISM DRIVE MOTOR

6.16.1 DISASSEMBLY

a. Remove mechanism from case (Instruction 6.13.1).
b. Disconnect all motor leads from control switch and one motor lead (red) from starting relay.
c. Loosen setscrews (one each, arrow No. 1) holding the shutter drive pulley and the lamp-cooling blower to the motor shaft.
d. Remove four motor mounting screws (arrow No. 2) and remove motor. Note position of washers.



6.16.2 REASSEMBLY

Reassemble the reverse of disassembly. Center the drive pulley, and tighten setscrew on flat of motor shaft. Center the lamp cooling blower in its housing so that it does not rub and tighten the setscrew on the flat of the motor shaft.

6.17 LOWER SPROCKET HUB

6.17.1 DISASSEMBLY

a. Remove lower sprocket (Instruction 6.5.1) and remove mechanism from case (Instruction 6.13.1).
b. Loosen hub setscrew and slide lower sprocket shaft out far enough to remove hub.

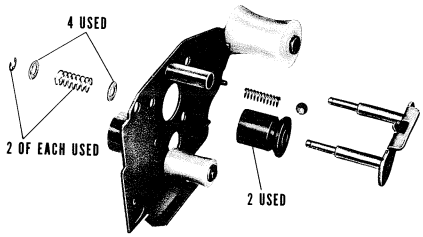
6.17.2 REASSEMBLY

a. Set hub on shaft and tighten setscrew on cutout of shaft; no end play.
b. Assemble lower sprocket to hub (Instruction 6.5.2).
c. Fit mechanism in case (Instruction 6.13.2).

6.18 LOWER SPROCKET CLAMP

6.18.1 DISASSEMBLY

a. Remove lower sprocket hub (Instruction 6.17.1).
b. Remove lower sprocket plate assembly (two screws).
c. Disassemble sprocket clamp parts as required.



6.18.2 REASSEMBLY

a. Reassemble the reverse of disassembly. Lubricate sprocket guard stop pin balls, idler roller shaft, damper roller, and bearing shafts with a light coat of SAE #20 Oil (part No. 763001).
b. Lubricate sprocket roller shafts and idler arm pivot with Beacon No. 325 grease (part No. 763029).

6.18.3 ADJUST

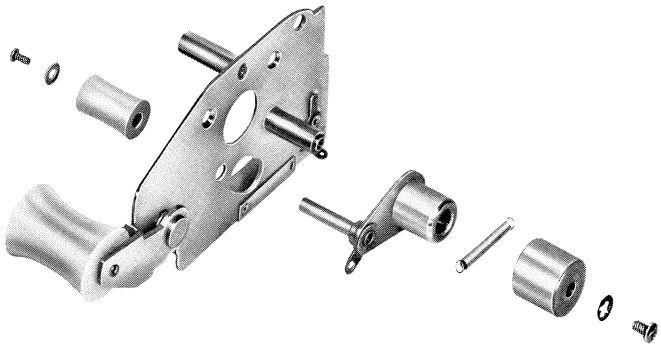
Adjust sprocket clamp as follows:

a. Close clamp over two thicknesses of film. Rollers should turn freely.
b. Repeat with three thicknesses of film. Rollers should be snug.
c. Loosen mounting screws and reposition plate to adjust.

6.19 DAMPER ROLLER ARM AND SPRING

6.19.1 DISASSEMBLY

a. Remove lower sprocket clamp (Instruction 6.18.1).
b. Disassemble damper roller parts as required.



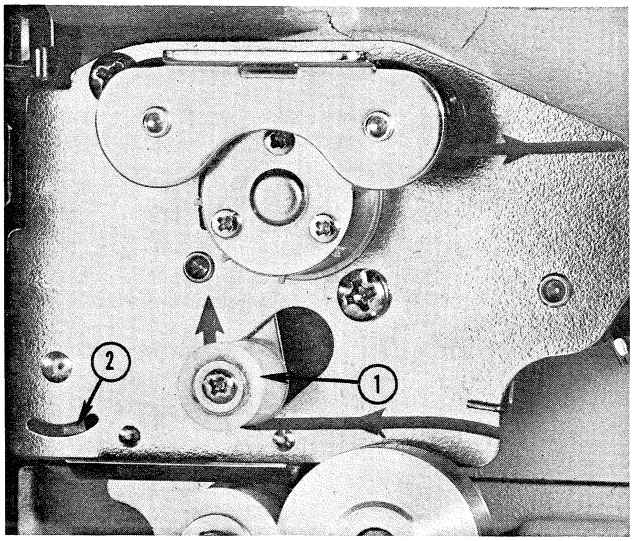
6.19.2 REASSEMBLY

a. Reassemble the damper roller parts, as required in reverse order of disassembly. Lubricate damper bearing cup with *DOW CORNING* DC 200 Fluid, 100,000 Centistokes (part No. 110882).
b. Adjustment in Instruction 6.19.3 can be made at this time.

c. Assemble lower sprocket clamp on projector (Instruction 6.18.2) and adjust clamp (Instruction 6.18.3).
d. Reassemble balance of projector.

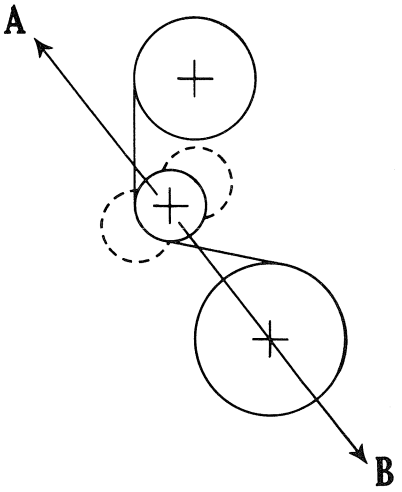
6.19.3 ADJUST
Adjust tension on damper roller arm as follows:

a. When the damper roller (1) is in the fully relaxed position, there should be no tension on the damping roller spring but the spring should have no slack.
b. Insert a small tool through slot (2) and move spring lever to adjust tension.



6.19.4 ADJUST
Adjust damper roller arm as follows:

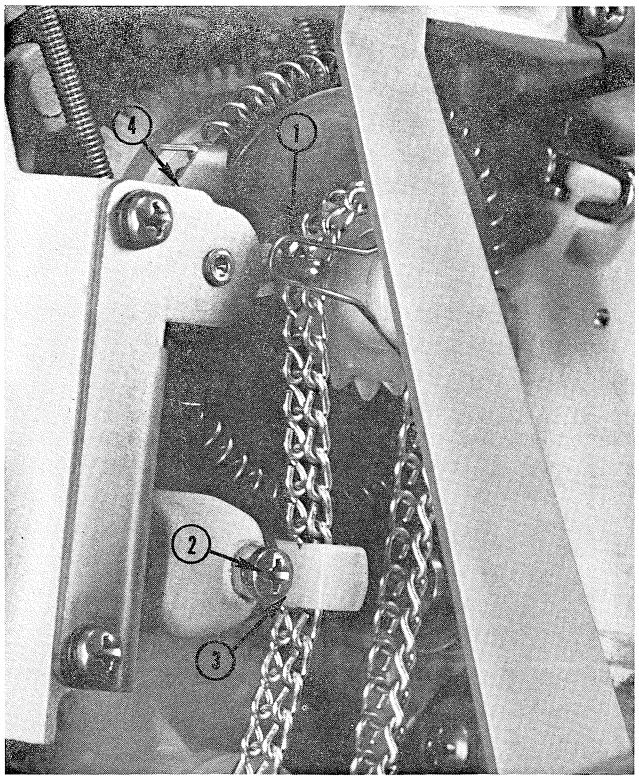
a. Remove the damper roller retaining screw.
b. Thread the projector for sound, using processed film; turn on the motor and observe the action of the damper roller.
c. A correctly adjusted roller arm will cause the damper roller to slowly work its way off the shaft when the projector is running forward and cause it to work its way on the shaft slowly (toward the sprocket plate) when the projector is running in reverse.
d. If the roller motion is rapid in either direction, it indicates that the roller arm is bent too much and should be straightened until the in and out movement of the roller is slow.
e. Bend arm as indicated by "A-B".
f. Replace the damper roller retaining screw.



6.20 REVERSE FLYWHEEL DRIVE CHAIN

6.20.1 DISASSEMBLY

a. Remove mechanism from case (Instruction 6.13).
b. Remove reverse take-up clutch actuator (1).
c. Loosen screw (2) and move tension adjusting stud (3) in as far as it will go.
d. Slip chain over sprocket teeth.
e. To completely remove the chain, open one of the links.



6.20.2 REASSEMBLY

Reassemble the reverse of disassembly. To install a new chain, carefully open a link; fit the chain on the sprockets; then close the link. Lubricate the chain, tension and adjusting stud, and reverse take-up clutch bushing (4) with a light coat of SAE #20 Oil (part No. 763001).

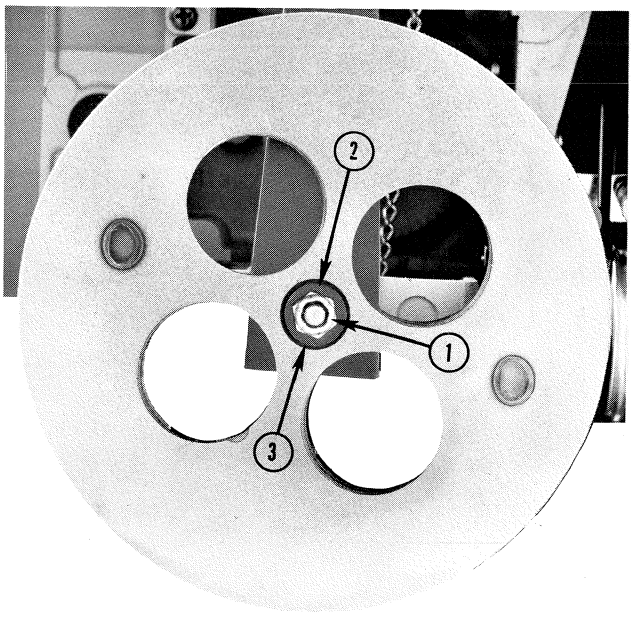
6.20.3 ADJUST

Adjust the tension adjustment stud (3) so that there is a slight amount of slack in the chain. Too tight an adjustment will result in "wows" in the sound; too loose a chain will allow it to strike the pivot shaft when the projector is elevated, causing static in the sound.

6.21 FLYWHEEL

6.21.1 DISASSEMBLY

a. Remove mechanism from case (Instruction 6.13).
b. Remove flywheel nut (1) (left-hand thread) and spring washer (3).
c. Remove flywheel and spacer behind flywheel.



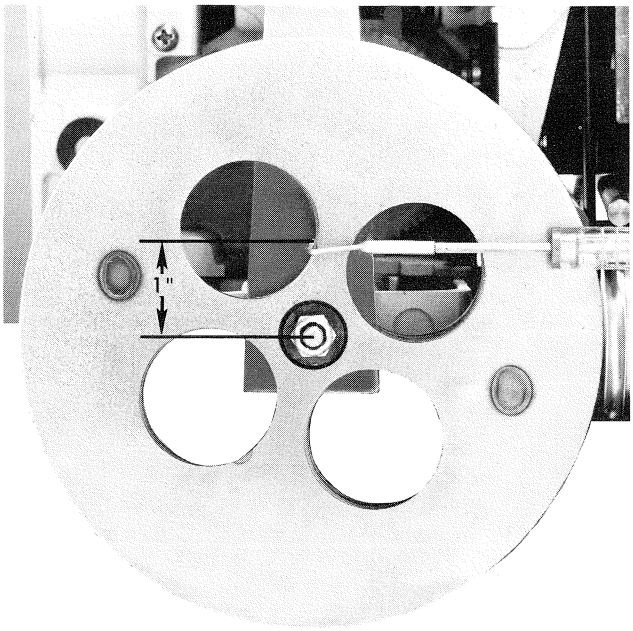
6.21.2 REASSEMBLY

Reassemble the reverse of disassembly. Lubricate bearings of flywheel shaft with SAE #20 Oil (part No. 763001) and the flywheel shaft at the flywheel with Plastilube #1 lubricant (part No. 763002).

6.21.3 ADJUST

Adjust flywheel slippage torque between 3 and 4 1/2 inch-ounces:

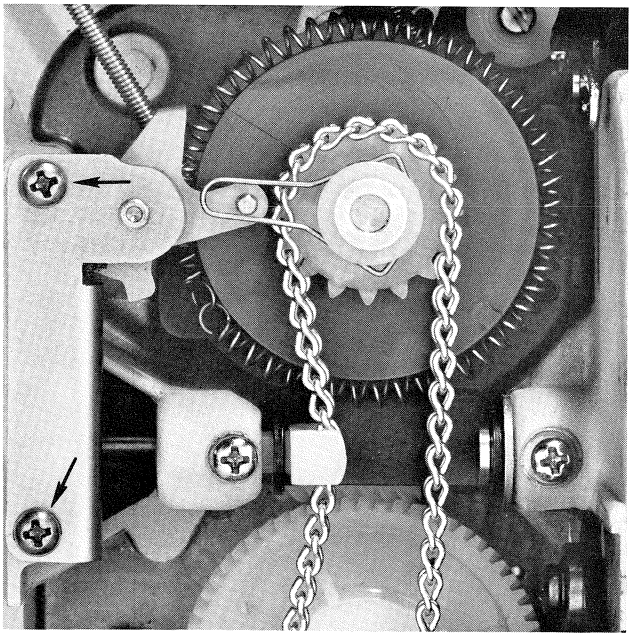
a. Hook a pull-type spring scale (Tool #TL1079 can be used) in one of the holes in the flywheel. Axis of scale must be at a right angle to a radial line from center of flywheel to contact point of scale.
b. Hold sound drum firmly and note tension required to start flywheel rotating: Should be between 3 and 4 1/2 ounces.
c. Tighten or loosen nut to adjust.



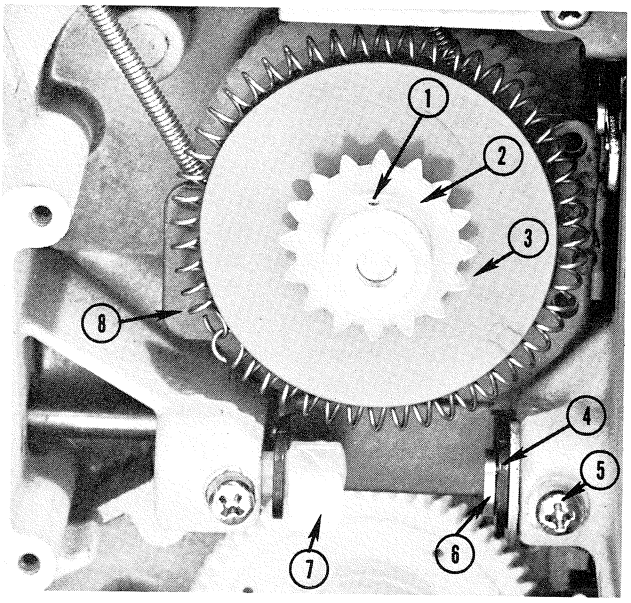
6.22 PLANETARY GEAR ASSEMBLY AND REWIND MECHANISM

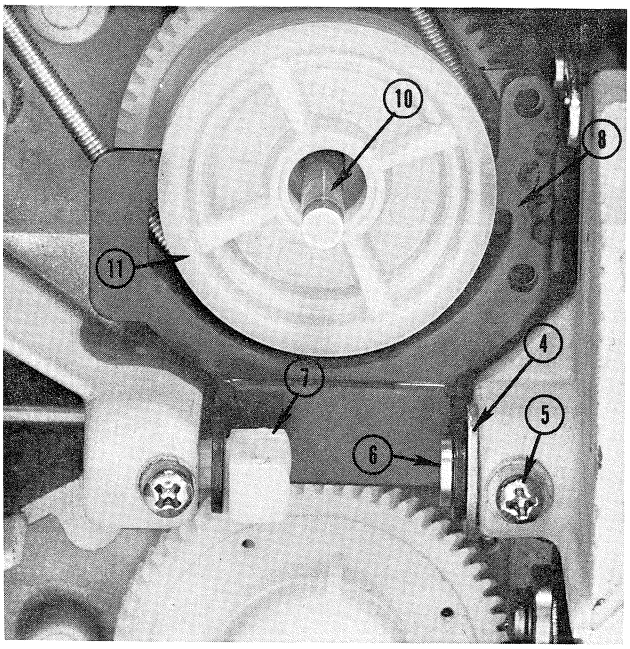
6.22.1 DISASSEMBLY

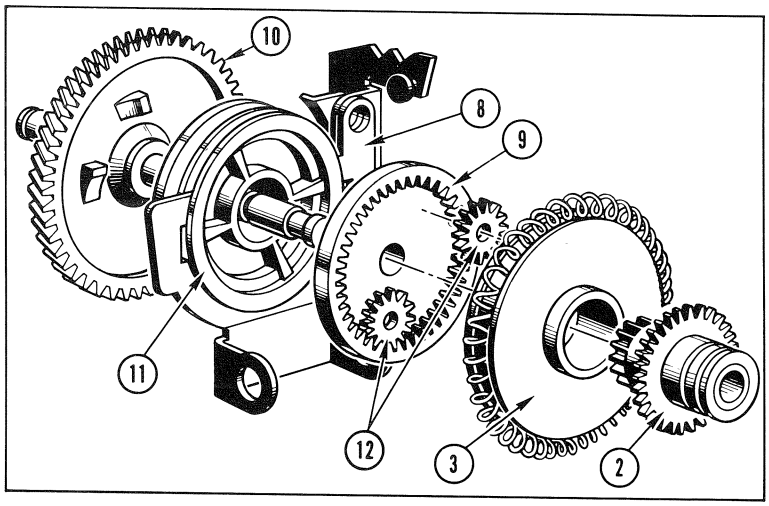
a. Remove the flywheel (6.21.1), then the flywheel support (three screws).
b. Remove the reverse take-up clutch assembly (two screws -- arrows).
c. Remove the chain (Instruction 6.20.1); not necessary to completely remove it.



d. Loosen setscrew (1) and remove sun gear (2); then lift off spider (3), planetary gears (12), and reverse mechanism gear (9).
e. Remove adjustment stud (7).
f. Loosen screw (5); then remove the shift plate shaft (6), and spacing washer (4).







g. Remove shift plate (8) and pulley (11).
h. Remove sprocket shaft and gear assembly (10), if necessary, by removing sprocket plate (Instruction 6.2.1) and retainer beneath plate holding shaft.

6.22.2 REASSEMBLY

Reassemble the reverse of disassembly. Lubricate all nylon gear teeth, reverse take-up clutch bushing, groove for reverse take-up assembly, upper sprocket shaft and drive shaft, shift lever detent spring at detent, and the rewind shift plate pivot with Plastilube #1 lubricant (part No. 763002).

6.22.3 ADJUST

Adjust clearance between sun gear (2) and reversing mechanism internal gear (9) as follows:
Set the sun gear tightly against the internal gear and back the gear off the shaft .015-inch to .020-inch; then tighten the setscrew (1).

6.23 LOWER SPROCKET GEAR

6.23.1 DISASSEMBLY

a. Remove chain (Instruction 6.20.1). It is not necessary to completely remove the chain.
b. Remove lower sprocket hub (Instruction 6.17.1).
c. Remove lower sprocket gear and shaft.

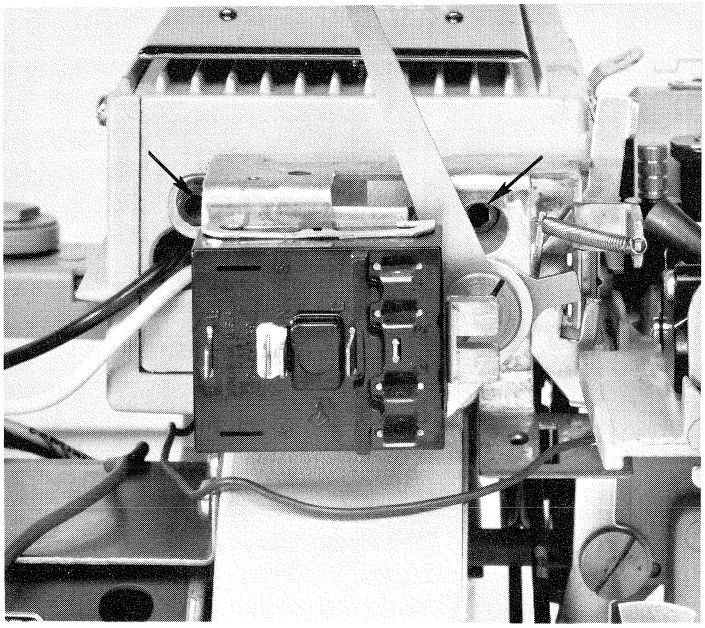
6.23.2 REASSEMBLY

Reassemble the reverse of disassembly. Lubricate gear teeth with a light coat of SAE #20 Oil (part No. 763001).

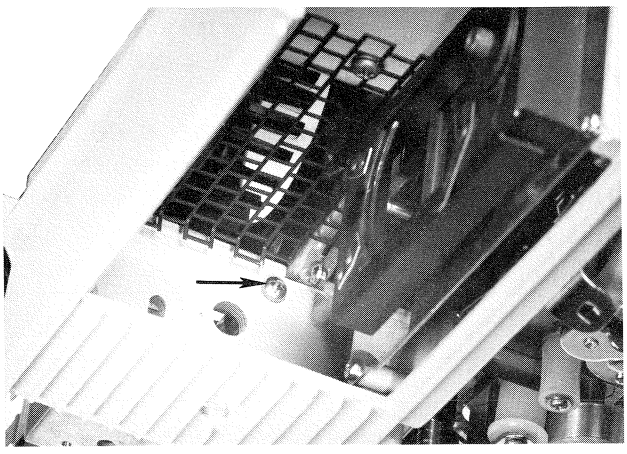
6.24 SPEED AND DIRECTION CONTROL MECHANISM

6.24.1 DISASSEMBLY

a. Remove the flywheel (Instruction 6.21.1), then the flywheel support (three screws).
b. Remove mechanism drive motor (Instruction 6.16.1).
c. Disconnect all switch leads.
d. Disconnect shutter drive belt and remove fan and pulley assembly.
e. Remove two hex socket head cap screws (arrows) holding switch bracket to casting as shown.

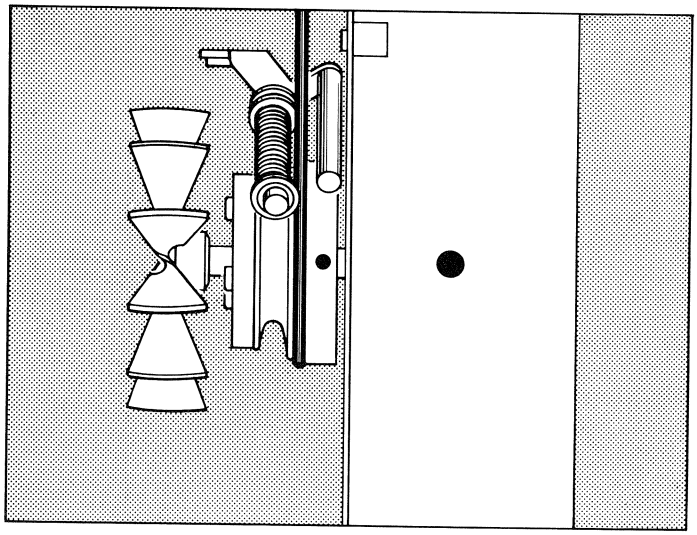


f. Loosen screw (arrow) and remove complete control bracket assembly. Some manipulation will be required.
g. Disassemble parts from assembly as required.



6.24.2 REASSEMBLY

Reassemble the reverse of disassembly.

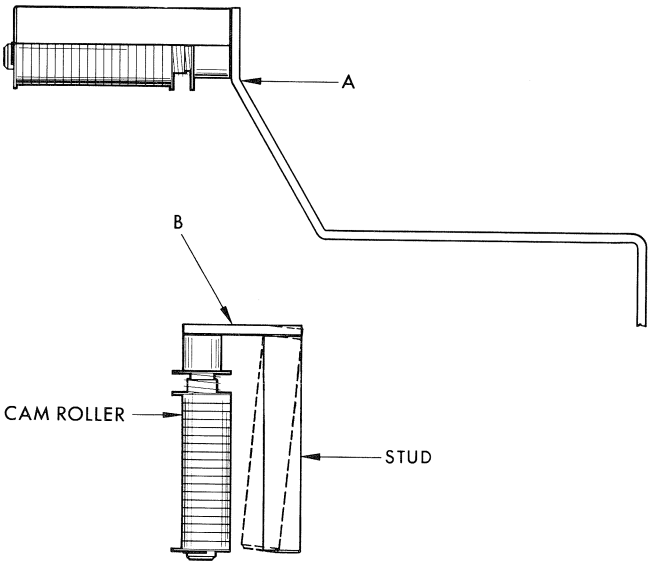


6.24.3 ADJUST

Adjust speed shifting by positioning the assembly (tighten bracket screws when adjusted) to meet the following conditions:

a. Shifting can be accomplished only in the forward position of the control lever. Position entire switch bracket as required to properly position interlock and function.
b. Drive belt does not touch shifting roller or stud in sound or silent speed.
c. Shifting roller or stud in sound or silent speed.
d. Shifting roller or stud does not touch pulley.
e. Speed shifting can be accomplished while rotating mechanism by hand.

NOTE: If further speed shifting adjustment is required, it can be accomplished as follows:



f. Bend bracket down at "A" so that roller and stud just clear pulley.
g. With control lever in sound speed and belt on high side of pulley, bend bracket at "B" so that stud just clears the belt.
h. With control lever in silent position and belt on low side of pulley, bend bracket at "B" so that eccentric roller clears belt by .010-inch to .020-inch when side of eccentric is away from belt.
i. When adjusted correctly, conditions in 6.24.3 will be met.

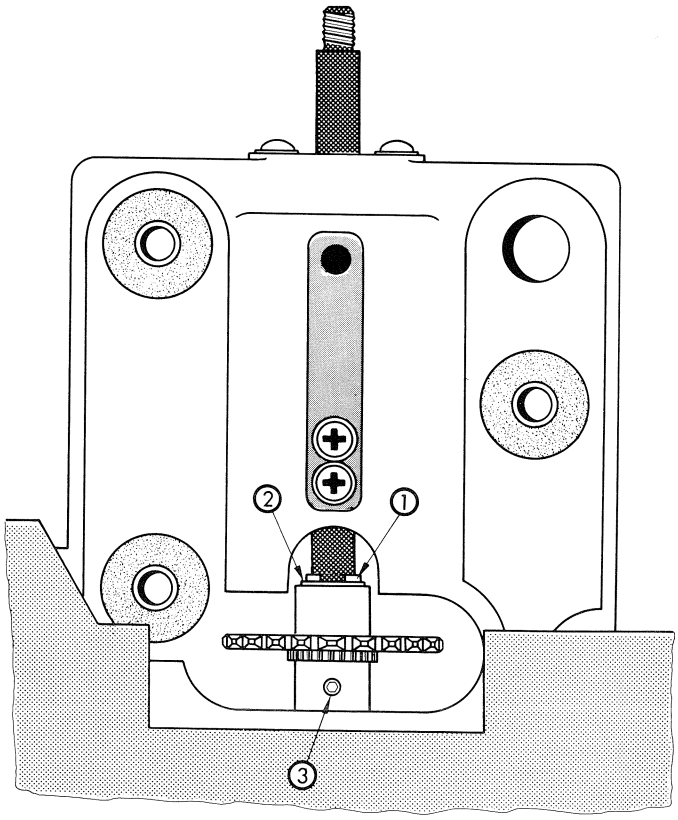
6.24.4 Lubricate as follows:

a. Speed shifting roller shaft with special formula lubricant (part No. 763017).
b. Pivot area of control lever and switch and shifting arm stud at contact points of interlock lever with Plastilube #1 lubricant (part No. 763002).

6.25 SOUND DRUM AND SPROCKET AND PAWL ASSEMBLY

6.25.1 DISASSEMBLY

a. Remove the flywheel and spacer (Instruction 6.21.1).
b. Remove retaining ring (1); note washer (2) between the ring and sprocket.
c. Loosen setscrew (3) in ratchet.
d. Hold pressure roller back and withdraw shaft to second retaining ring; then remove the ring.
e. Remove sound drum and shaft assembly.



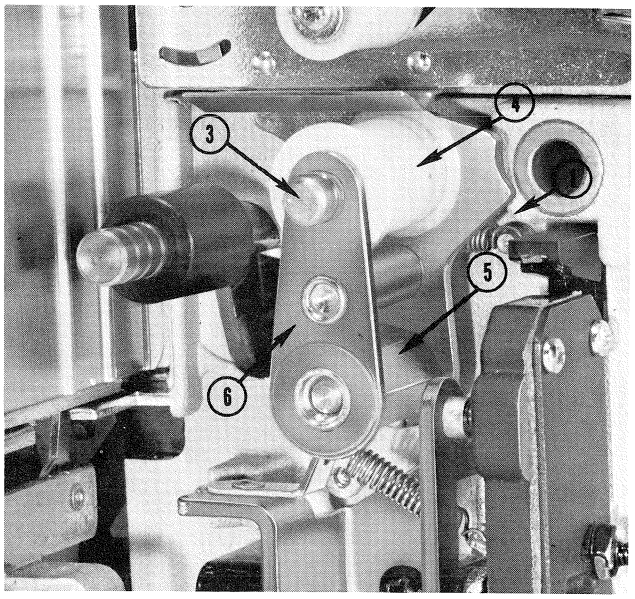
6.25.2 REASSEMBLY

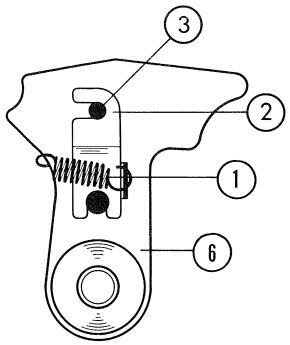
a. Reassemble the reverse of disassembly.
b. Lubricate the shaft pawl and ratchet with a light coat of SAE #20 Oil (part No. 763001).
c. Make necessary adjustments to chain (Instruction 6.20.3) and flywheel (Instruction 6.21.3).

6.26 PRESSURE ROLLER AND ARM ASSEMBLY

6.26.1 DISASSEMBLY

a. Remove sound drum (Instruction 6.25.1).





REAR VIEW

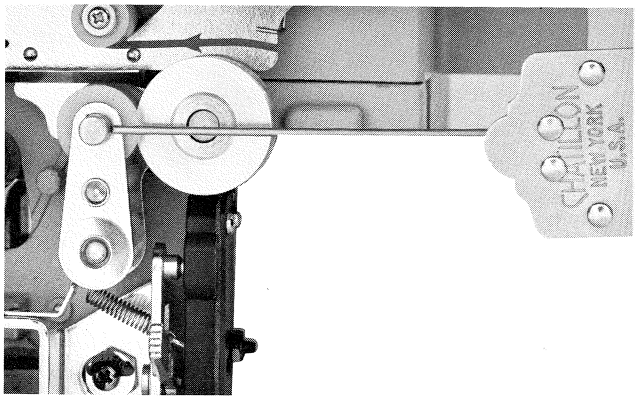
b. Disconnect the spring (1), unhook the equalizing link (2), withdraw shaft (3), and then remove roller (4). Note position of thick flange on pressure roller.

c. Turn hex spacer (5) counterclockwise to remove arm assembly (6).

6.26.2 REASSEMBLY

Reassemble the reverse of disassembly with pressure roller thick flange positioned as previously noted.

6.26.3 ADJUST

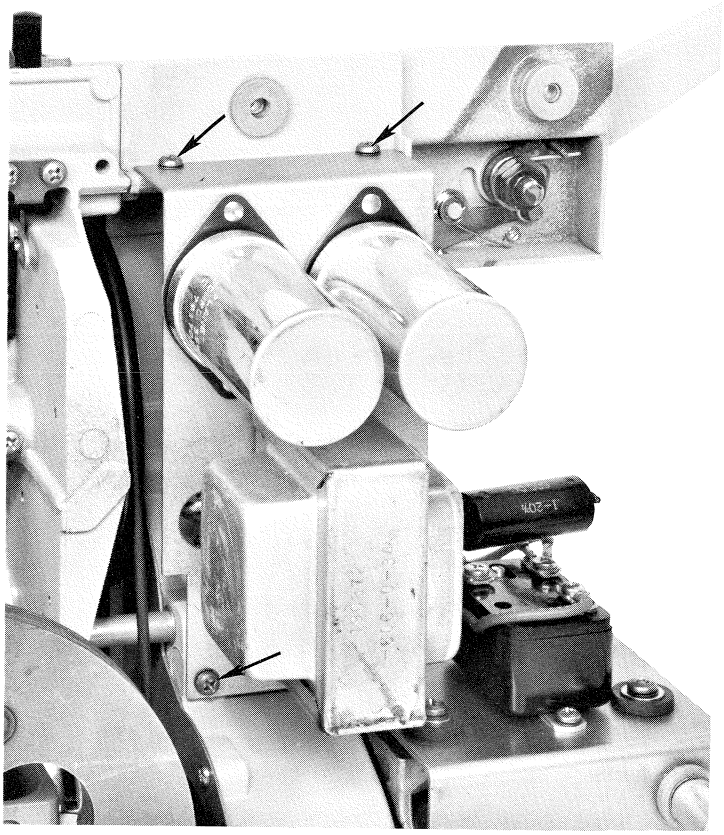


Adjust pressure of the pressure roller between 12 and 18 ounces:

a. Push against the shaft with a push-type spring scale (Tool #TL815 can be used).
b. Measure the force when the inner end of the roller loses contact with the sound drum. Should be between 12 and 18 ounces.
c. Adjust by re-forming or replacing the equalizing link spring.
d. Adjust position of pressure roller using buzz track test film (part No. 760383) (Instruction 7.1.3).

6.27 FAN HOUSING ASSEMBLY

6.27.1 DISASSEMBLY



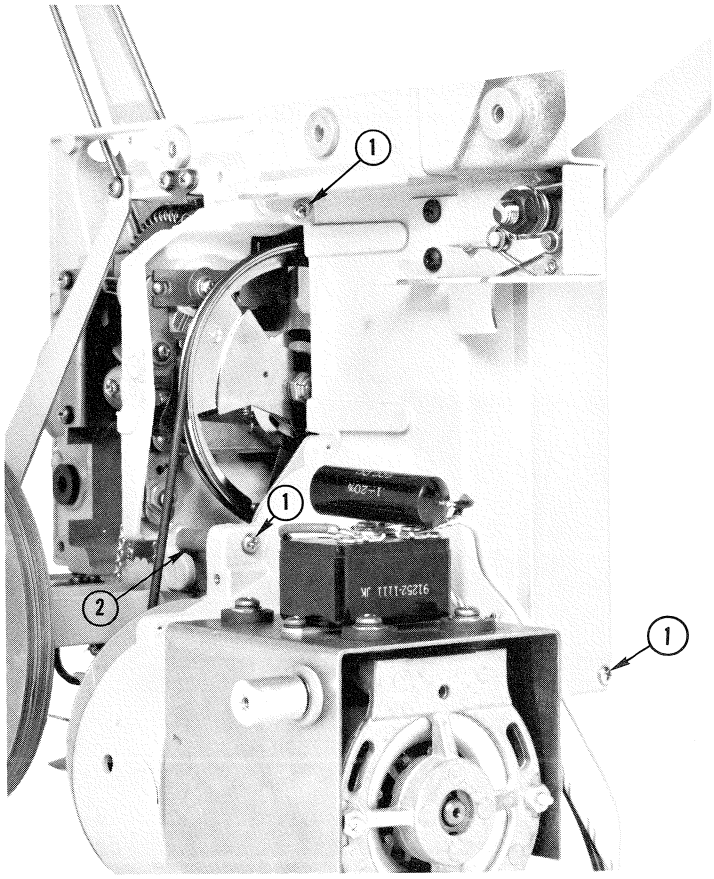
a. Remove mechanism from case (Instruction 6.13.1).
b. Remove lamphouse cover and lamp.
c. Disconnect exciter lamp leads (blue) from amplifier power supply.
d. Remove three screws (arrows) holding amplifier power supply and drop the power supply out of the way.
e. Remove motor and starting relay leads from master control switch (refer to wiring diagram).

f. Remove shutter drive belt from around drive pulley.

g. Remove three fan housing screws (1), the spacer (2), and lock-washer.

NOTE: A small brass washer may be behind spacer (2). If it is, it must be used when reassembling the projector.

h. Remove fan housing and motor assembly.



6.27.2 Reassemble the reverse of disassembly. Refer to wiring diagram as necessary.

6.28 SHUTTER DRIVE BELT

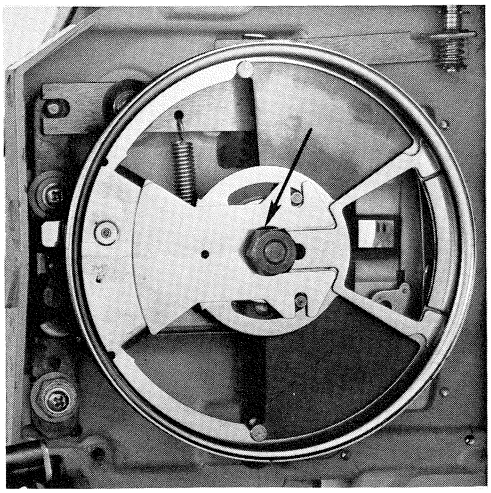
6.28.1 DISASSEMBLY

a. Remove mechanism from case (Instruction 6.13.1).
b. Remove lamphouse cover and lamp.
c. Remove fan housing assembly (Instruction 6.27.1).
d. Remove drive belt. Note that it may be necessary to remove the condenser lens assembly from the lamp chimney.

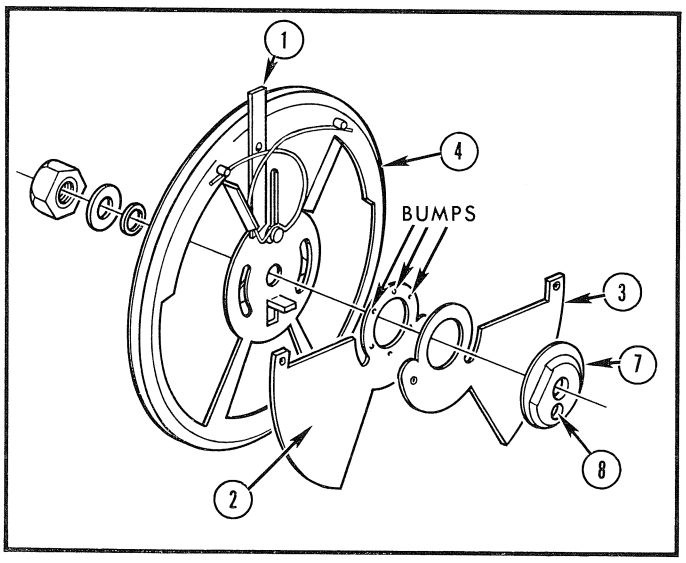
6.29 *KODAK SUPER-40* SHUTTER

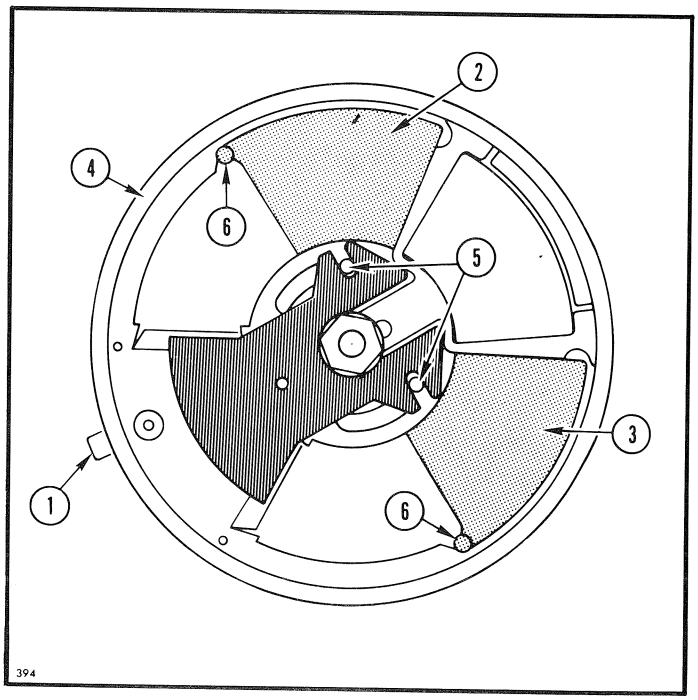
6.29.1 DISASSEMBLY

a. Remove drive belt (Instruction 6.28.1).
b. Remove shutter shaft nut (arrow) (left-hand thread). This nut is a self-locking type and it may be necessary to pull the nut while turning, in order to remove it.
c. Disassemble shutter as required.

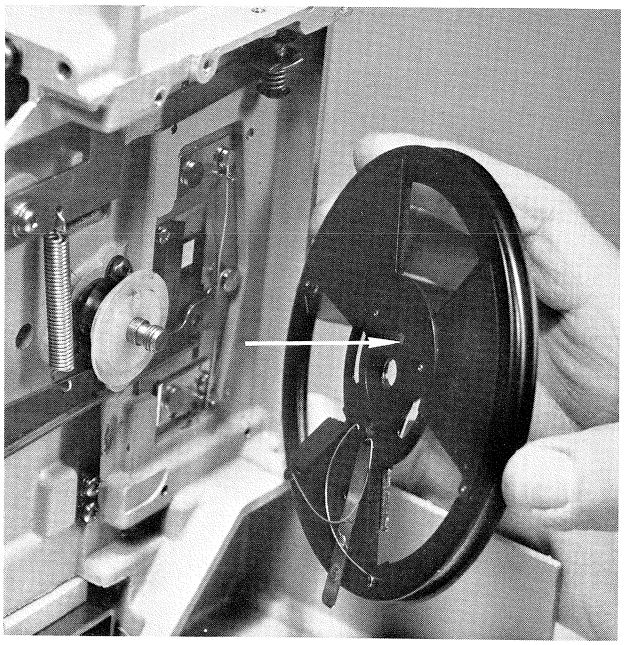


6.29.2 REASSEMBLY

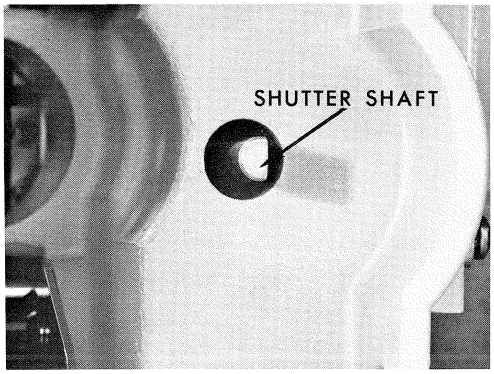


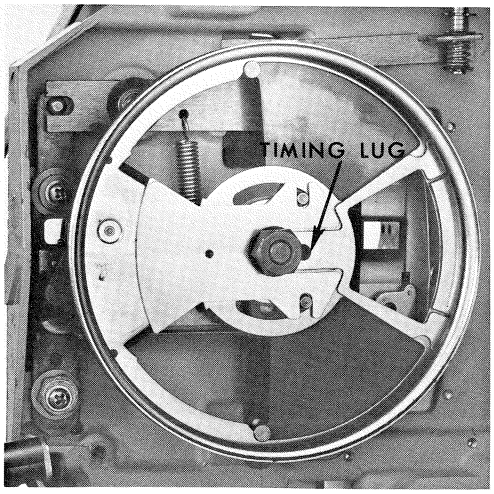


a. Place locking lever (1) in lock position and assemble the inner blades (2) and outer blades (3) to the shutter frame (4). Inner blade can be identified by small bumps around center.
b. Position actuating studs (5) and stop studs (6) as shown.
c. Assemble in-and-out cam (7) on the shutter shaft with timing hole (8) aligned with timing hole of up-and-down cam. Rotate cams to position timing holes at the top.
d. Tilt mechanism slightly back and fit the shutter in position with the timing lug (arrow) of the shutter in the timing holes of the two cams.
e. Fit the two washers on the end of the shaft and hand-tighten the shutter nut (left-hand thread).
f. Move locking lever (1) to unlock position and manually check the shutter blades for freedom of movement. If there is any binding, check for proper assembly of the various parts.



g. Remove threading knob and turn shutter shaft so that flat on shaft is toward the mechanism housing, as shown below, and hold it in this position.
h. Rotate shutter so that timing lug is toward the aperture, as shown below; then tighten the shutter shaft nut. This orientation of the shutter will make sure that the pull-down claw is retracted when the threading knob line is toward the operator.
i. Recheck the shutter blades for freedom of movement and then attach the threading knob.
j. Reassemble the balance of the projector.

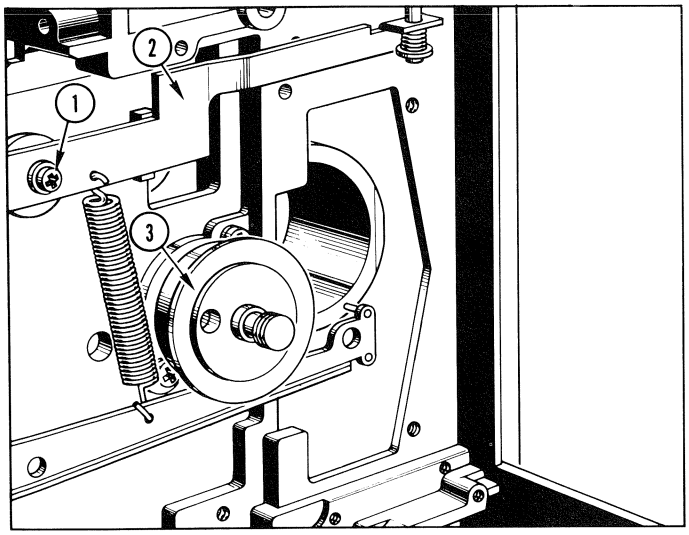


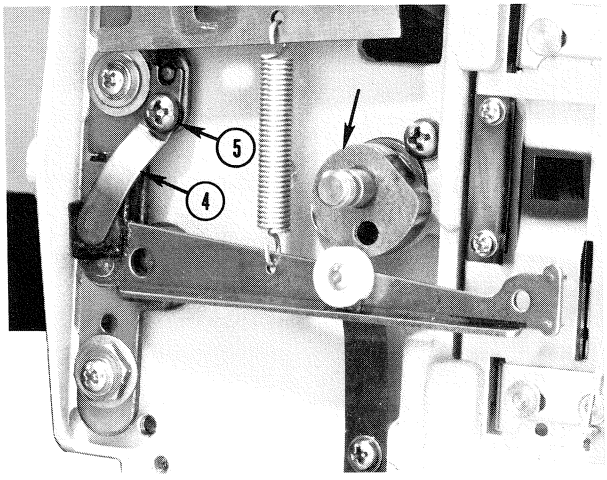


6.30 PULL-DOWN MECHANISM

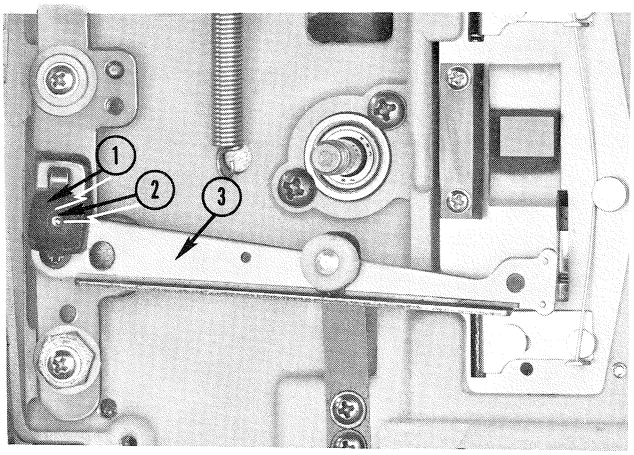
6.30.1 DISASSEMBLY (See illustration below.)

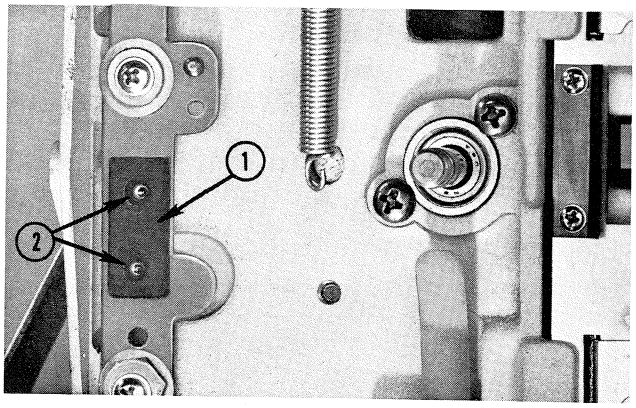
a. Remove *KODAK SUPER-40* Shutter (Instruction 6.29.1).
b. Remove framing lever pivot and screw (1), then disconnect framing lever (2) to relieve claw spring tension. Then remove in-and-out cam (3).
c. Remove up-and-down cam (arrow). Note shim washers behind up-and-down cam which control claw protrusion.
d. Remove retaining spring screw (5) and spring (4), and disconnect claw spring.





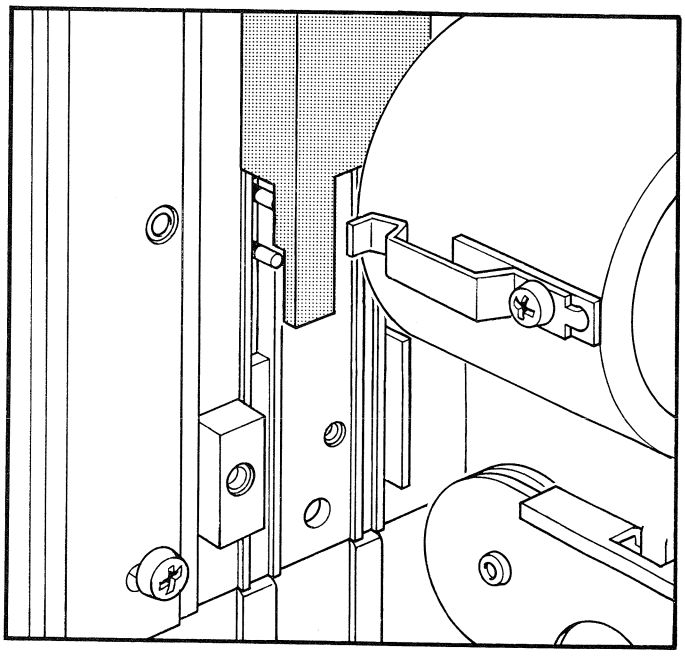
e. Remove pad (1), ball (2), and pull-down claw (3).
f. Remove pad (1) and ball (2).





6.30.2 REASSEMBLY
a. Fit pull-down parts in place the reverse of disassembly.
b. Lubricate claw pivot balls and recesses with Plastilube #1 lubricant (part No. 763002). Lubricate claw pivot parts and framing shaft thread with light coat of SAE #20 Oil (part No. 763001).
c. Reassemble *KODAK SUPER-40* Shutter to projector (Instruction 5.29.2).

6.30.3 ADJUST
a. Pull-down claw clearance (Instruction 6.1.5).
b. Pull-down claw protrusion. Top claw tooth should extend through the film perforations, but not so far that it strikes the pressure pad on the pull-down stroke or touches film on return stroke. Factory adjustment is .030-inch to .045-inch beyond aperture plate rails; use Tool #TL1007 as shown. Claw should clear first step and touch second. Correct, if necessary, by changing total thicknesses of claw shim washer located behind up-and-down cam.

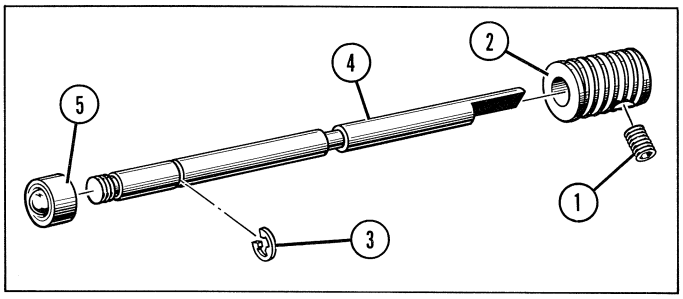


6.30.4 Reassemble balance of projector the reverse of disassembly.

6.31 SHUTTER SHAFT AND BEARING

6.31.1 DISASSEMBLY
a. Remove planetary gear assembly (Instruction 6.22.1 a. through g.).

b. Remove pull-down parts (Instruction 6.30.1).



c. Remove ball bearing (5) retaining screws and lockwashers.
d. Remove retaining ring (3).
e. Loosen two setscrews (2), 180 degrees apart, in worm (3).
f. Pull shaft (4) and bearing out from pull-down side.

6.31.2 REASSEMBLY

Reassemble the reverse of disassembly with worm teeth centered in gear teeth. Make necessary adjustments to planetary gear assembly (Instruction 6.22.3), chain (Instruction 6.20.3), and pull-down claw (Instruction 6.30.3).

7. SOUND OPTICS AND RELATED AREAS; DISASSEMBLY, REASSEMBLY, AND ADJUSTMENTS

7.1 SOUND OPTICS

7.1.1 DISASSEMBLY

a. Remove exciter lamp cover (Instruction 6.9.1).

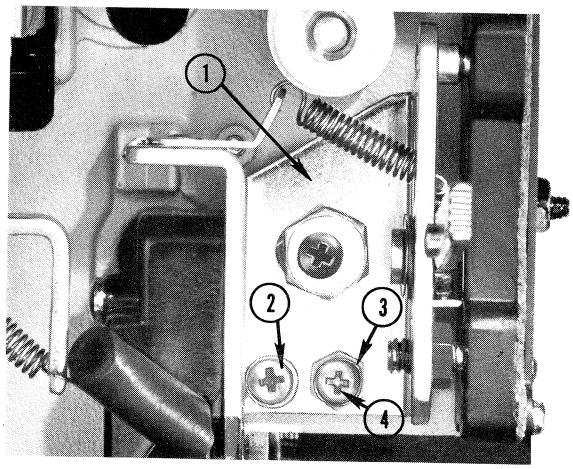
b. Unhook mount spring from exciter lamp bracket and remove sound optics.

7.1.2 REASSEMBLY

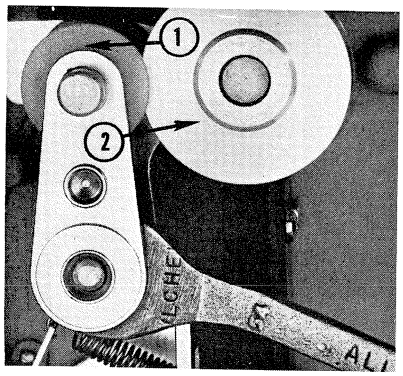
Reassemble the reverse of disassembly and lubricate recesses in the sound optics with Plastilube #1 lubricant (part No. 763002).

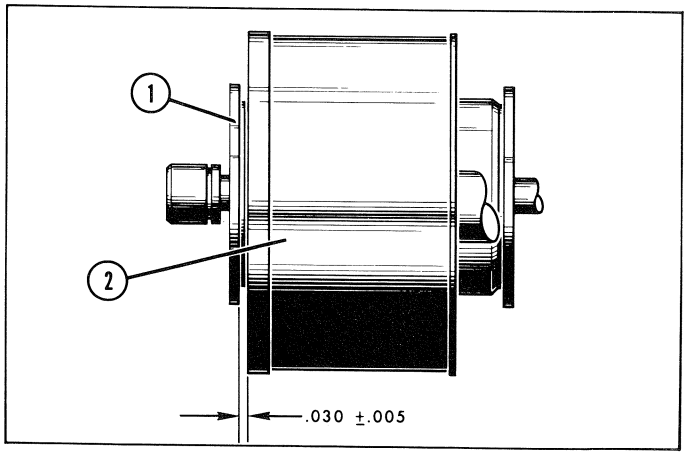
7.1.3 ADJUST

a. Adjust sound optics bracket assembly (1) to center the scanning beam. Observe the beam in reference to the lower edge of sound drum and center of solar cell. The edge of the scanning beam should clear the rim of the sound drum by .012-inch, and the light from the scanning beam should strike the solar cell in the center. Loosen setscrew (2) and locknut (3); then turn adjusting screw (4) as needed. Tighten locknut (3) and apply a small amount of air-drying cement to screw and locknut.

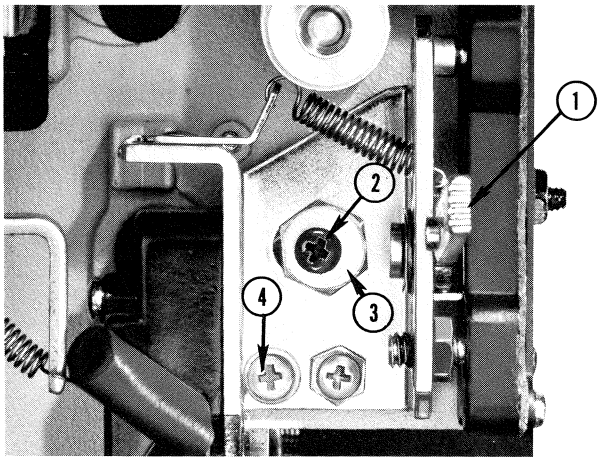


b. Adjust position of pressure roller for proper overhang of sound track beyond the sound drum. The distance between the inner surface of flange (1) on pressure roller and the flat surface of the sound drum (2) should be .030-inch ± .005-inch. Roller position must be such that the inner raised surface of sound drum contacts the film only in the area between picture and sound track. Use buzz track test film (part No. 760383) and turn the hexagonal spacer to move pressure roller assembly in or out, as required, so that neither tone is heard or both tones can be heard at the same level.

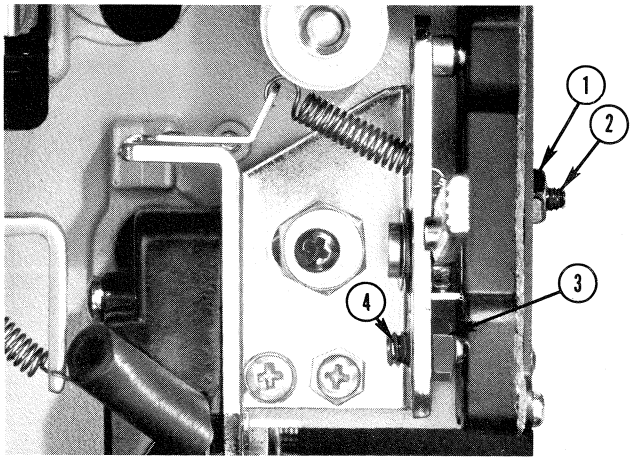




c. Adjust sound optics bracket assembly to focus the sound optics, using 5000 Hz test film (part No. 760382). With the fidelity control lever (1) in the center of its travel, loosen the lockscrew (2) and turn the eccentric (3) until the sound output is at maximum. Tighten lockscrews (2 and 4) and apply a small amount of air-drying cement to them.



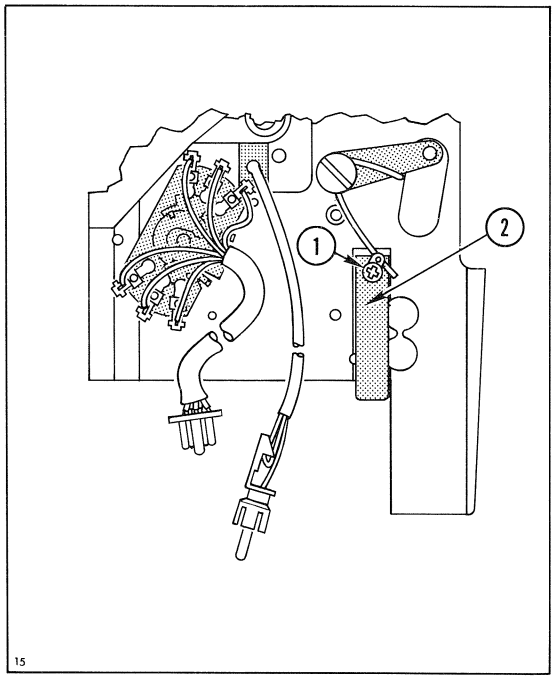
d. Adjust sound optics for azimuth alignment and for minimum microphonics. Loosen locknut (1) and turn screw (2) to adjust sound optics for maximum response using 5000 Hz test film (part No. 760382). Loosen locknut (3), turn the volume up to maximum and, while tapping the sound head casting, turn screw (4) to adjust for minimum microphonics. It may be necessary to replace the exciter lamp to get minimum microphonics. Tighten locknut (3) and apply a small amount of air-drying cement to screw and nut. Repeat azimuth adjustment. Tighten locknut (1) and apply a small amount of air-drying cement to screw and nut.



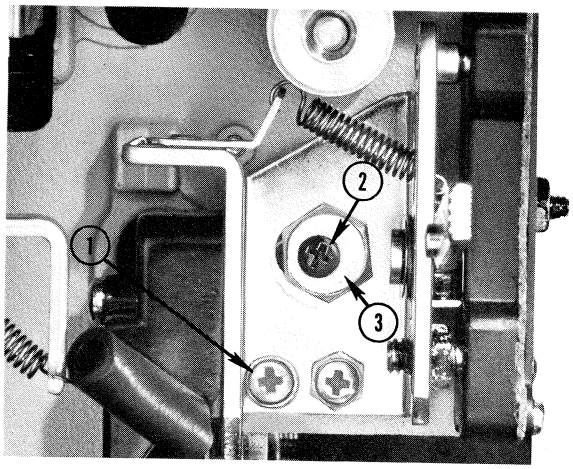
7.2 EXCITER LAMP BRACKET

7.2.1 DISASSEMBLY

a. Remove sound optics (Instruction 7.1.1).
b. Remove mechanism from case (Instruction 6.13.1).
c. Disconnect exciter lamp lead (blue) from amplifier power supply terminal strip.
d. Loosen sound optics bracket screw (1) and disengage bracket spring (2) from the bracket.

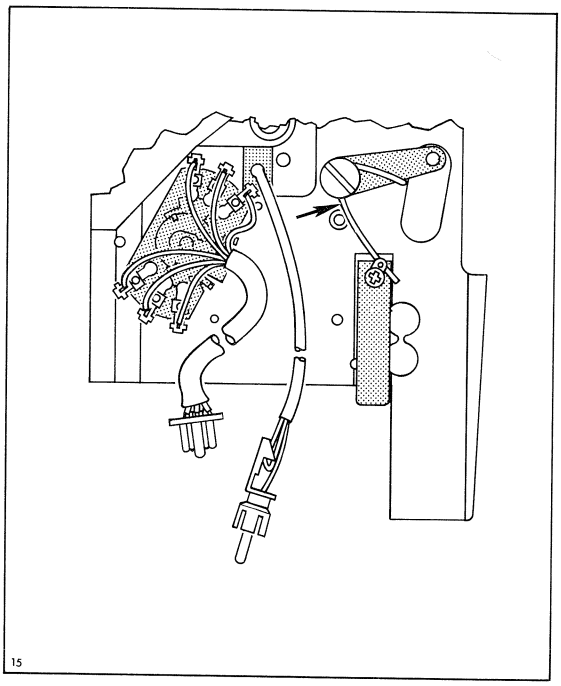


e. Remove clamp screw (1), eccentric screw (2), and eccentric (3); then remove the bracket.



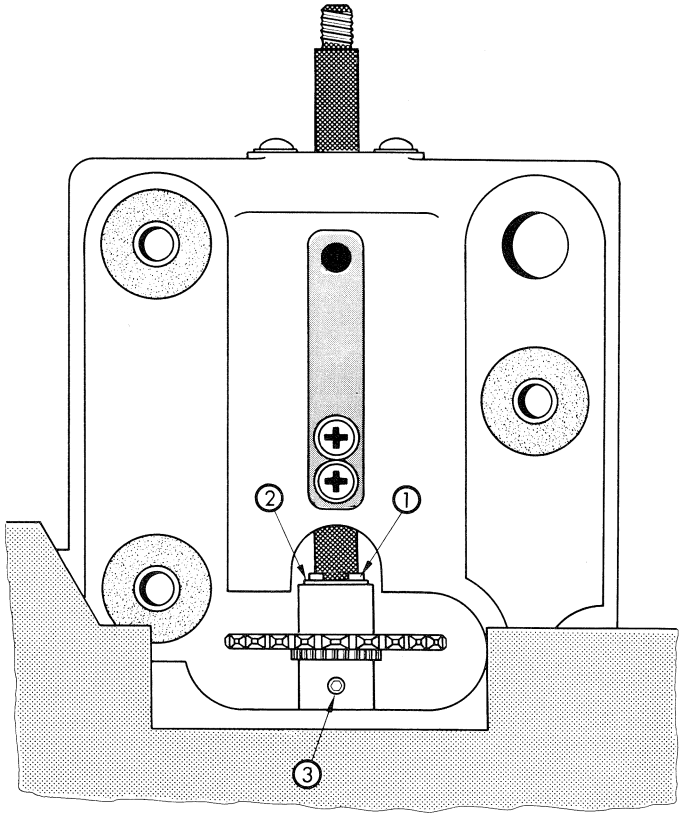
7.2.2 REASSEMBLY
Reassemble the reverse of disassembly being sure loop-former arm spring (arrow) is connected properly.

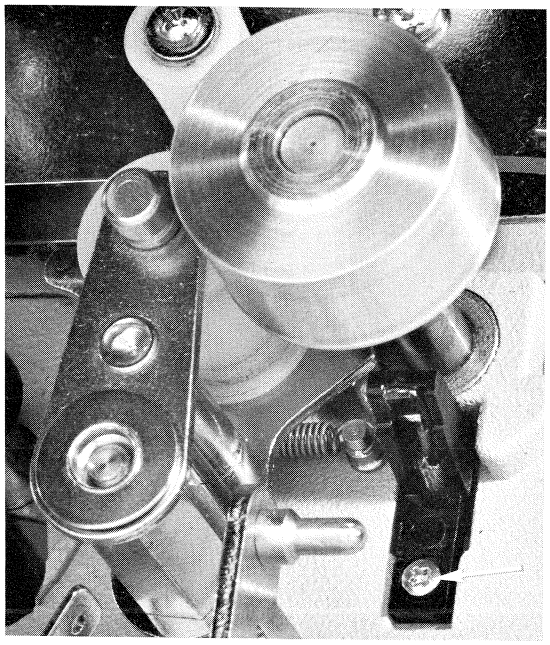
7.2.3 Check and make necessary adjustments to sound optics (Instruction 7.1.3).



7.3 SOLAR CELL MOUNT AND CABLE ASSEMBLY

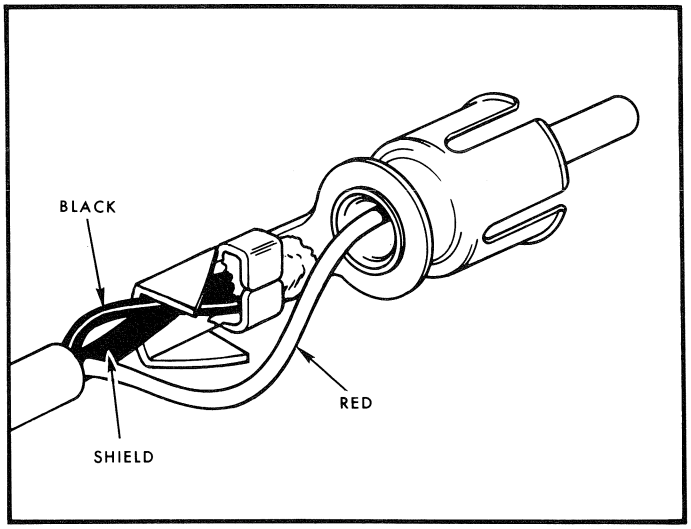
7.3.1 DISASSEMBLY
a. Remove sound optics (Instruction 7.1.1).
b. Remove flywheel and spacer (Instruction 6.21.1).
c. Unsolder solar cell plug.
d. Remove retaining ring (1) and loosen setscrew (3) in ratchet.
e. Hold pressure roller back and withdraw sound drum shaft far enough to gain access to the solar cell mount screw (arrow) and remove screw.
f. Remove the solar cell mount and cable assembly.





7.3.2 REASSEMBLY

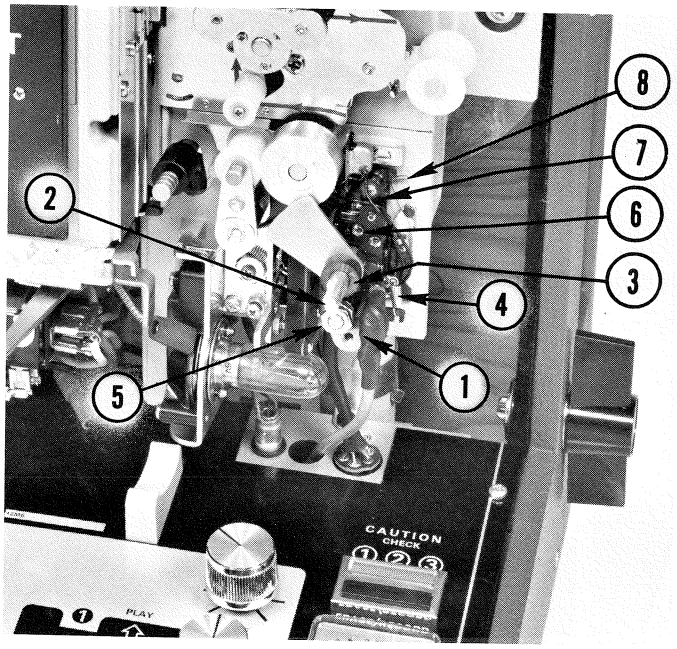
Reassemble the reverse order of disassembly.



8. MAGNETIC SOUND PICK-UP AND RELATED AREAS; DISASSEMBLY, REASSEMBLY, AND ADJUSTMENTS

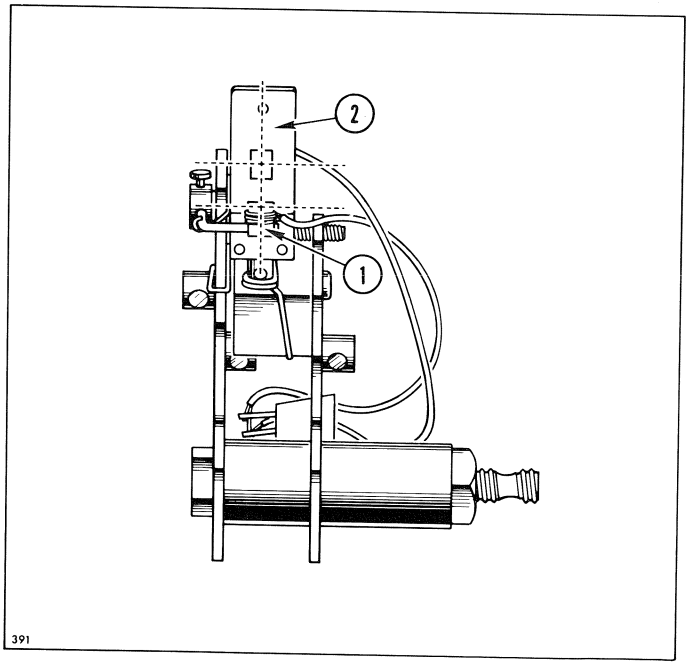
8.1 MAGNETIC HEAD ASSEMBLY

8.1.1 DISASSEMBLY



a. Remove exciter lamp cover (Instruction 6.9.1).
b. Disconnect cable connector (1).
c. With the Opt/Mag selector switch shaft (2) in the "Opt" position (fully counterclockwise), loosen the arm and hub assembly setscrew (3) and slide assembly off the shaft.
d. Disconnect upper loop of magnetic head return spring (4).
e. Remove the adjusting nut and locknut (5) (later models have only one locknut) and carefully slide both the sound head and mounting bracket assembly (6) and the erase head and mounting bracket assembly (7) off the shaft, noting the position of the erase head return spring (8).
f. Either the erase head or sound head can now be easily replaced.

8.1.2 REASSEMBLY



a. Prior to reassembly, hold the head assemblies in the position they will assume when assembled in the projector and check the approximate adjustment of the erase head (1). Note that the two assemblies can be held together with a threaded shaft with a body diameter of .202-inch, or use a spare mounting plate assembly (191423). The erase head (1) should be parallel to and centered on the playback head (2), and the gap in the erase head should be about 1/2-inch from the mounting pivot (arrow). It may be necessary to re-form the erase head mounting arm a slight amount to center the two heads.
b. Reassemble the spring with the large diameter closest to the casting and the washer.
c. Remove any burrs or nicks from the mounting shaft, and lubricate shaft with a light coat of SAE #20 Oil (part No. 763001).

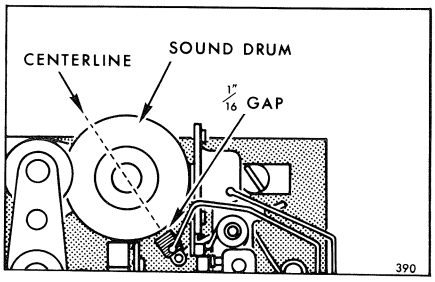
d. Reassemble the remaining parts the reverse of disassembly.

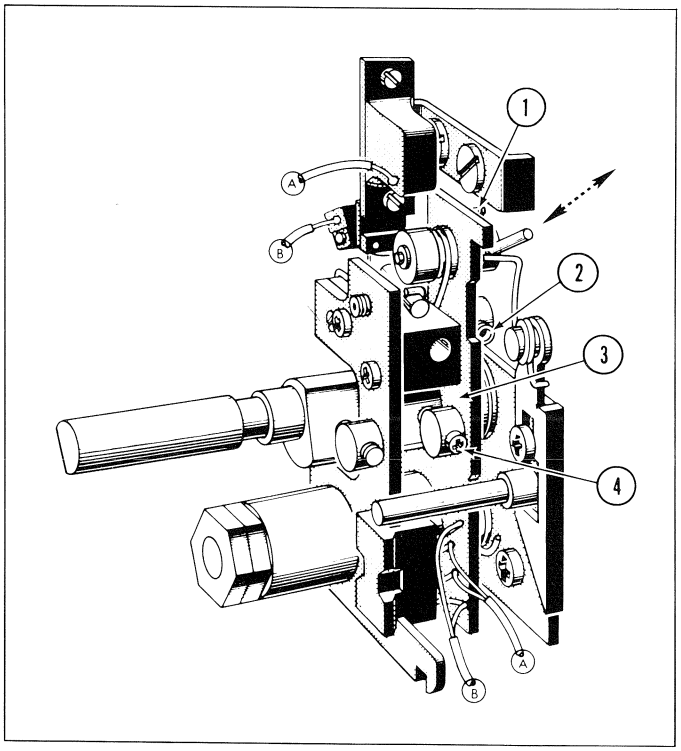
8.1.3 ADJUST (Preliminary)

With the erase and sound head assemblies secured approximately in their operating positions, adjust to meet the following requirements:

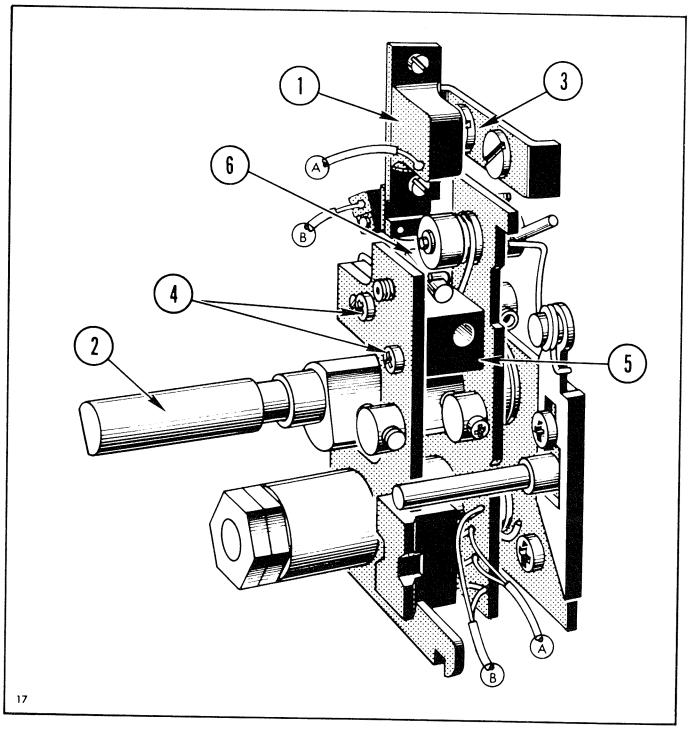
a. Turn the Opt/Mag switch shaft to the "Mag" position so that it overlaps the inside edge of the sound drum by a very slight amount. This can be accomplished by positioning the entire head assembly in or out as required with the head assembly holding nut. When the desired adjustment is achieved, activate the Opt/Mag switch selector several times to make sure everything is properly seated.

b. With the Opt/Mag selector switch shaft back in the "Mag" position, the flat or face of the erase head should be approximately, but not less than, 1/16-inch from the surface of the sound drum and tangent to a centerline of the sound drum. To accomplish this, there are three adjustment points to be considered and which affect each other. Loosen locking screw (1) and move the erase head arm as required (arrow) to obtain the tangent point of the adjustment. To gain access to the locking screw, it will be necessary to partially remove the head assemblies. Moving setscrew (2) in or out will change the gap between the sound drum and the erase head. This adjustment will also affect the tangency adjustment. If proper gap cannot be achieved by using these two adjustments, slight repositioning of the erase head mounting plate (3) may be required. Accomplish this by slightly loosening the positioning screw (4) and moving the assembly up or down as required. It may be necessary to repeat the adjustments several times until all mechanical requirements are met.





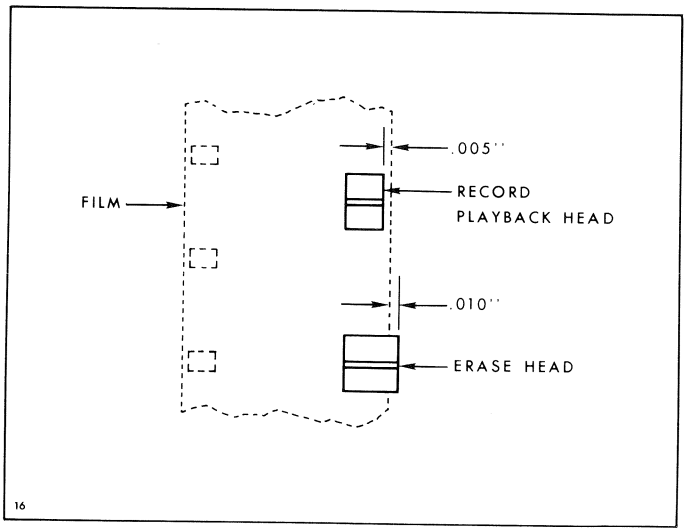
c. The magnetic head (1) must exert a pressure of 1 1/2 ounces against the film. With the Opt/Mag selector shaft (2) in the "Mag" position, the magnetic head should just touch the film shoe (3). Note that this shoe has been precisely positioned during manufacture and should not be moved. Use Tool #TL1079 and measure the force required to move the magnetic head (1) away from contact with the film shoe (3). If it is more or less than 1 1/2 ounces, loosen screws (4) and rotate the head assembly mounting block (5) as required until the proper tension is obtained. Should further adjustment be required than movement of the block permits, the head mounting spring can be carefully re-formed a small amount at point (6).



8.1.4 ADJUST (Final)

a. Thread the projector with azimuth alignment test film (part No. 760952).

b. Turn the Opt/Mag selector switch shaft to the "Mag" position and set up the magnetic head assembly to meet the requirements shown in illustration. To do this, turn the magnetic head assembly adjusting nut in until the far edge of the record head is even with the far edge of the film; then back the nut off one flat. This will set up the .005-inch between the edge of the record head and the edge of the film. Operate selector switch several times to make sure heads are properly seated and adjustment is permanent.



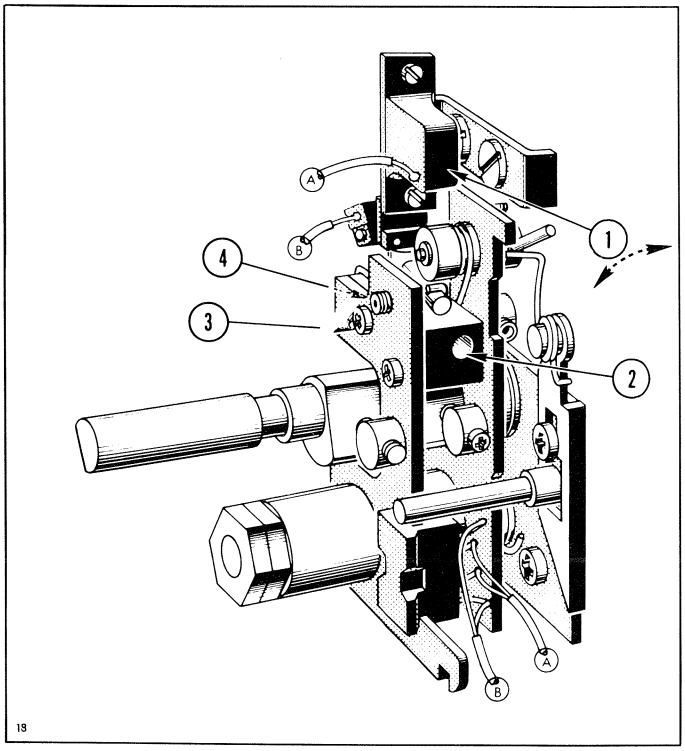
c. Set the projector controls as follows:
   1. Play/Record switch in "Play" position.
   2. Play selector switch in "Mag" position.
   3. Head selector switch in "Mag" position.

4. Tone control - Normal
5. Phono volume - Off
6. Volume control - Full

d. Connect a 6-ohm, 10-watt resistor to the speaker outlet and a vacuum tube voltmeter or equivalent across this load.

e. Run the loop of test film through the projector and adjust the record/playback head for maximum peak reading. Three adjustments will have to be coordinated for peak output. They are as follows:
   1. Azimuth - Use Tool #TL962 or equivalent and adjust as required for maximum output (1).
   2. Vertical Position - Loosen lockscrew (2) and adjust screw (3) as required for maximum output.
   3. Parallel Position - Adjust screw (4) for maximum output.

f. Repeat above adjustments several times until a maximum peak reading is obtained.



8.2 MAGNETIC TEST PROCEDURES

8.2.1 RECORD/PLAYBACK

a. Set projector controls as follows:
   1. Play/Record switch in "Play" position
   2. Play selector switch in "Mag" position
   3. Head selector switch in "Mag" position
   4. Tone control - Normal
   5. Phono volume - Off
   6. Volume control - Full

b. Connect a 6-ohm, 10-watt resistor to the speaker outlet and a vacuum tube voltmeter or equivalent across this load.

c. Specifications
   1. Noise Level - With no input to Mic or Phono, set volume and phono controls clockwise (maximum) and the tone control counterclockwise; set the Rec/Play switch to "Record", the input selector switch to "Mic" and the head position indicator switch to "Mag". Vary the Mic level control to maximum. Noise level measured at the preamp output jack should not exceed 270 millivolts.
   2. Magnetic Sensitivity - Set volume control clockwise. Monitor output with VTVM or oscilloscope. Adjust Microvolier to supply 400 Hz input to the magnetic head. Vary input voltage from 110 microvolts to 230 microvolts to achieve a 6.3-volt output from the amplifier.

3. Frequency Response - Using a loop of 16mm test film (part No. 760949), and a signal input of 500 millivolts to the phono input and the phono level at maximum, set the master volume control for an indication of -7 on the VU meter for a 400 Hz signal. Maintain a constant input signal level for all frequencies (do not use the VU meter as an input level indicator as it measures amplifier input) and record the following frequencies:

400 Hz	0 db (reference)
50 Hz	-2 db
1000 Hz	-2 db
5000 Hz	-2 db
7000 Hz	-4 db

4. Audible Flutter - Listen to test film (part No. 760950) as it runs through the projector at silent speed (18 fps). The overall sound performance should be good. Record a musical selection such as Leroy Anderson's "Syncopated Clock," at silent speed on test film (part No. 760951) and listen to the playback. Overall performance should be good, and compare to test film (part No. 760950).
5. Crossover Distortion - Apply a 500-millivolt, 400 Hz signal to the phono input and adjust the master volume control for 2.5-volt output. Monitor output with an oscilloscope. No significant crossover should be visible; or, listen to the tone. If it is pure, i.e., no buzz or harmonies, the amount of crossover is acceptable.

d. Service Hints
   1. Noise Level - Demagnetize the record/playback head or replace it.
   2. Magnetic Sensitivity - Check record/playback head for vertical position and flatness on film (Instruction 8.1.4) or physical condition.
   3. Frequency Response - Check azimuth adjustment (Instruction 8.1.4).
   4. Audible Flutter - Check sound drum for binds; check pressure roller tension for required 12 to 18 ounces (Instruction 6.26.3).

8.2.2 HEAD CURRENTS

a. Erase Head - Minimum of 300 milliamperes measured across a 1-ohm $\pm$ 1% resistor in series with the erase head, on the return (ground) side. This corresponds to a minimum of 300 millivolts RMS across the series resistor as measured by a *BALLANTINE* Type 321 Meter or equivalent.
b. Record Head - 16 $\pm$ .5-milliampere as measured across a 1-ohm $\pm$ 1% resistor in series with the record/play ground lead. This corresponds to 16.5 millivolts RMS, across the series resistor as measured by a *BALLANTINE* Type 321 Meter or equivalent.

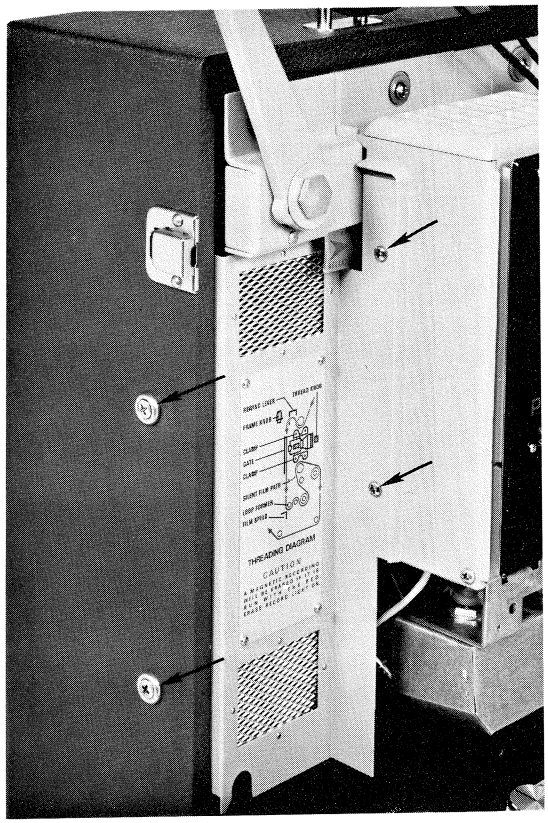
8.2.3 ERASE

a. Set projector tone control in normal position and master volume control counterclockwise (minimum).
b. Set head position indicator switch at "Mag", input selector switch at "Mic", and record/play switch at "Record".
c. Record a 1000 Hz signal at "zero" on the VU meter, on test film (part No. 760949).
d. Erase the signal just recorded (run through the projector in the "Record" mode) with the master volume control counterclockwise (minimum). When this film is then replayed, the 1000 Hz tone shall be essentially inaudible in the loudspeaker.

e. Service Hints

Full Erase - Adjust erase head for proper contact (Instruction 8.1.3) and check erase head for current (Instruction 8.2.2).

9. AMPLIFIER



9.1 AMPLIFIER FROM CASE

9.1.1 DISASSEMBLY

a. Remove exciter lamp cover (Instruction 6.9.1).

b. Remove mechanism drive cover assembly (four screws -- arrows).

c. Disconnect input selector switch cable.

d. Disconnect the head cable from the socket.

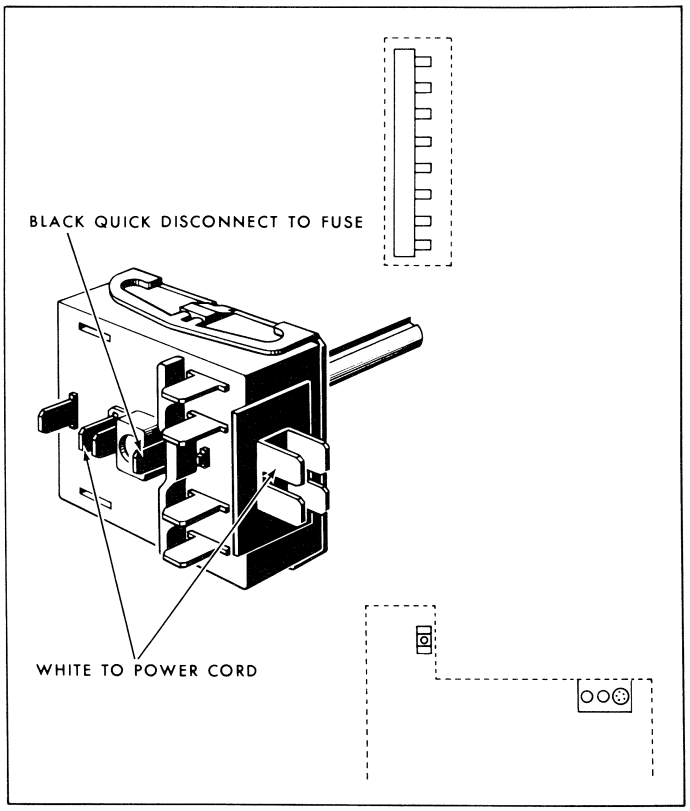
e. Disconnect solar cell plug from jack.

f. Remove four amplifier mounting screws (arrows) and lift amplifier from case; manipulate wires as needed.

g. Amplifier can be operated at this point by connecting line voltage to the power cord.

WARNING: TERMINAL STRIP AND ALL SWITCH CONNECTIONS WILL BE "HOT". DANGEROUS VOLTAGE.

h. Disconnect leads shown in illustration and quick disconnect from transformer (black lead) to amplifier switch (red-and-white lead) to completely remove amplifier from case.



9.1.2 AMPLIFIER OPERATION OUT OF CASE

WARNING: DANGEROUS VOLTAGE.

a. Connect 30V dc (with a current capacity of about 750 ma) to the amplifier. Negative (-) to orange lead, positive (+) to chassis ground OR
b. Connect extension clip leads from amplifier leads to proper terminals in the projector (refer to wiring diagram), and connect line voltage to power cord as above, OR
c. Connect amplifier to Tool #TL1034.

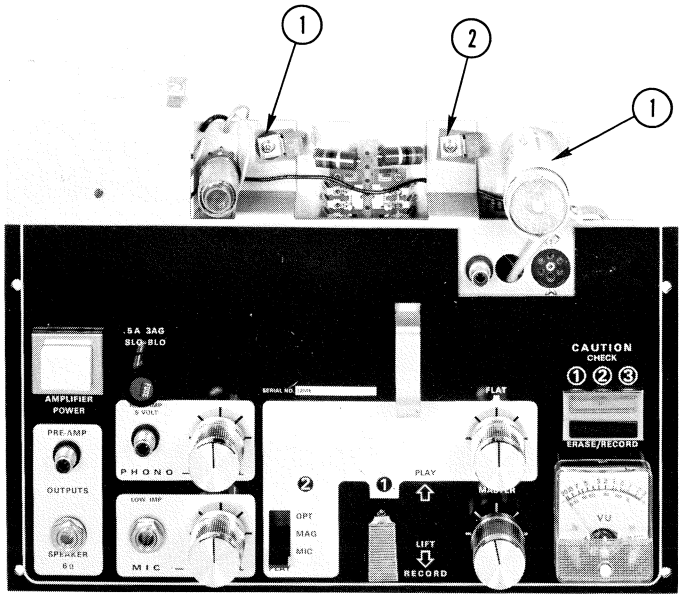
9.1.3 Reassemble the reverse of disassembly. Refer to wiring diagram as necessary.

9.2 AMPLIFIER CIRCUIT BOARD

Although many of the components can be removed and replaced without separating the printed circuit from the amplifier plate, these operations can be more easily performed if the amplifier is "opened up", as follows:

9.2.1 DISASSEMBLY

a. Completely remove amplifier from the case (Instruction 9.1.1).
b. Remove the four control knobs (friction fit) and the nut and two washers now exposed under the control knobs.
c. Remove the screw retaining C31 to the mounting plate and remove the bracket (arrow No. 1) on C31.
d. Remove the screws, lockwashers, and nuts (arrow No. 2) holding transistors Q8 and Q9 to the mounting plate.
e. Unsolder the black and gray leads from the Mic jack and the red lead from the Phono jack.
f. Move the board away from the mounting plate so that potentiometer shafts clear the mounting plate and slide the board toward the top of the mounting plate to disengage the transistors (Q8 and Q9) from the mounting plate.
g. The circuit board can now be swung out far enough to permit component replacement.



9.2.2 Reassemble the reverse of disassembly.

9.3 AMPLIFIER SERVICE HINTS

9.3.1 The 500-kilohm amplifier balance control (R36) is variable so that the exact value of correct bias may be selected for any given set of transistors. If any of the transistors are replaced, it may be necessary to adjust R36 to obtain the proper undistorted output (Instruction 9.4.1).

9.3.2 When replacing either Q8 or Q9 (D42C2 transistor), apply a moderate amount of transistor Z-5 silicon compound #8101 (GC Electronics Company) to both sides of the insulating washers.

9.4 AMPLIFIER SPECIFICATIONS (INPUT VOLTAGE TO AMPLIFIER, 117V)

9.4.1 OUTPUT

6.9 volts* minimum using 400 Hz test film (part No. 760386) as signal source, no visible distortion on an oscilloscope (a slight amount of "filling-in" may be visible in the lower half of the signal which does not affect the undistorted output).

9.4.2 SENSITIVITY (Tone control fully counterclockwise)

a. Film Channel:
8 watts (6.9 volts*) output, 1000 Hz signal of 66 millivolts ± 1.5 db applied directly to the solar cell input socket.

b. Microphone Channel:
8 watts (6.9 volts*) output, 1000 Hz signal of 22 millivolts ± 3 db applied directly to the microphone input receptacle.

c. Phonograph Channel:
8 watts (6.9 volts*) output, 1000 Hz signal of 220 millivolts ± 3 db applied directly to the phonograph input receptacle.

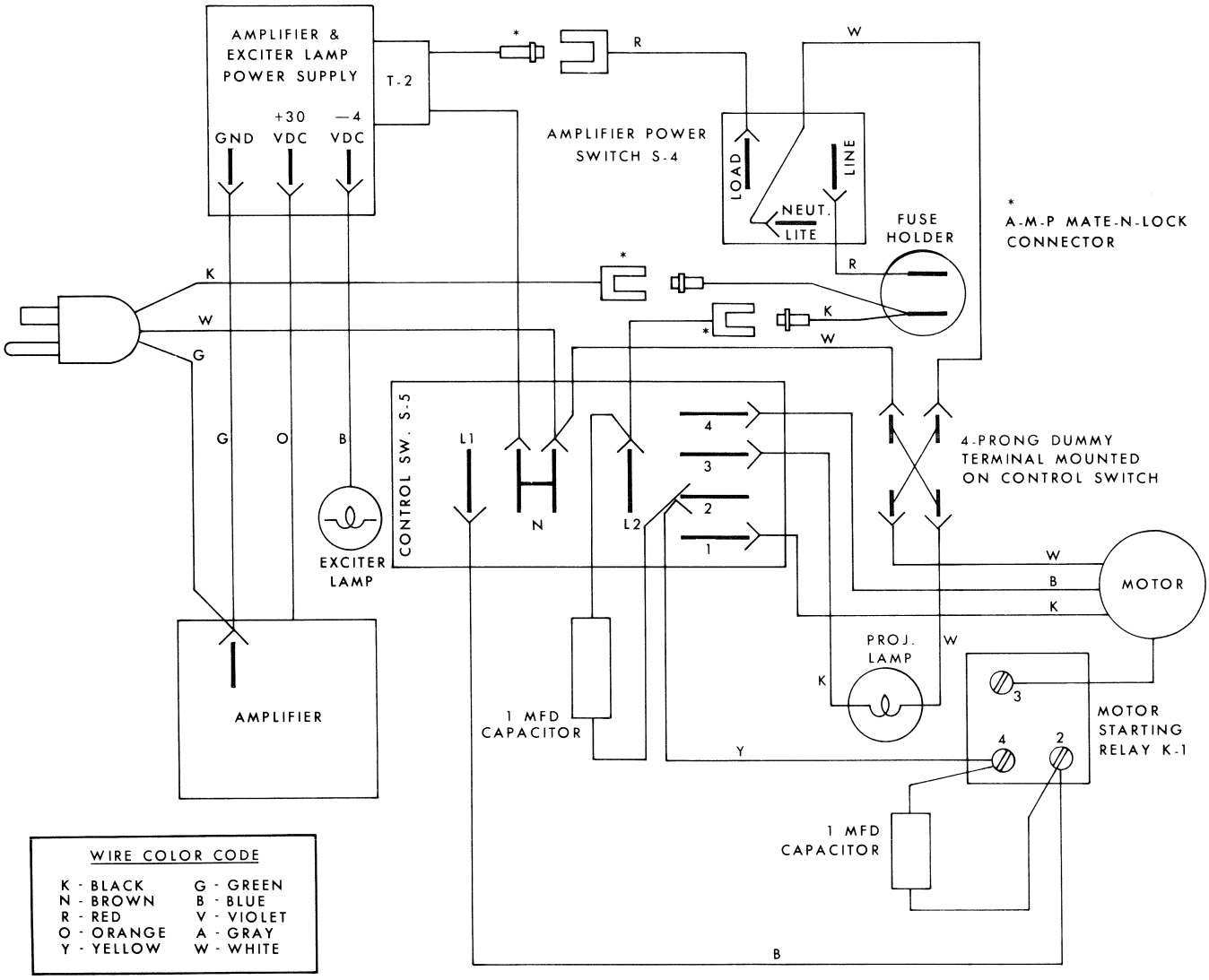
9.4.3 POWER SUPPLY:

a. dc voltage to the amplifier:
25 to 30 volts (no load) measured across the filter capacitor C37.

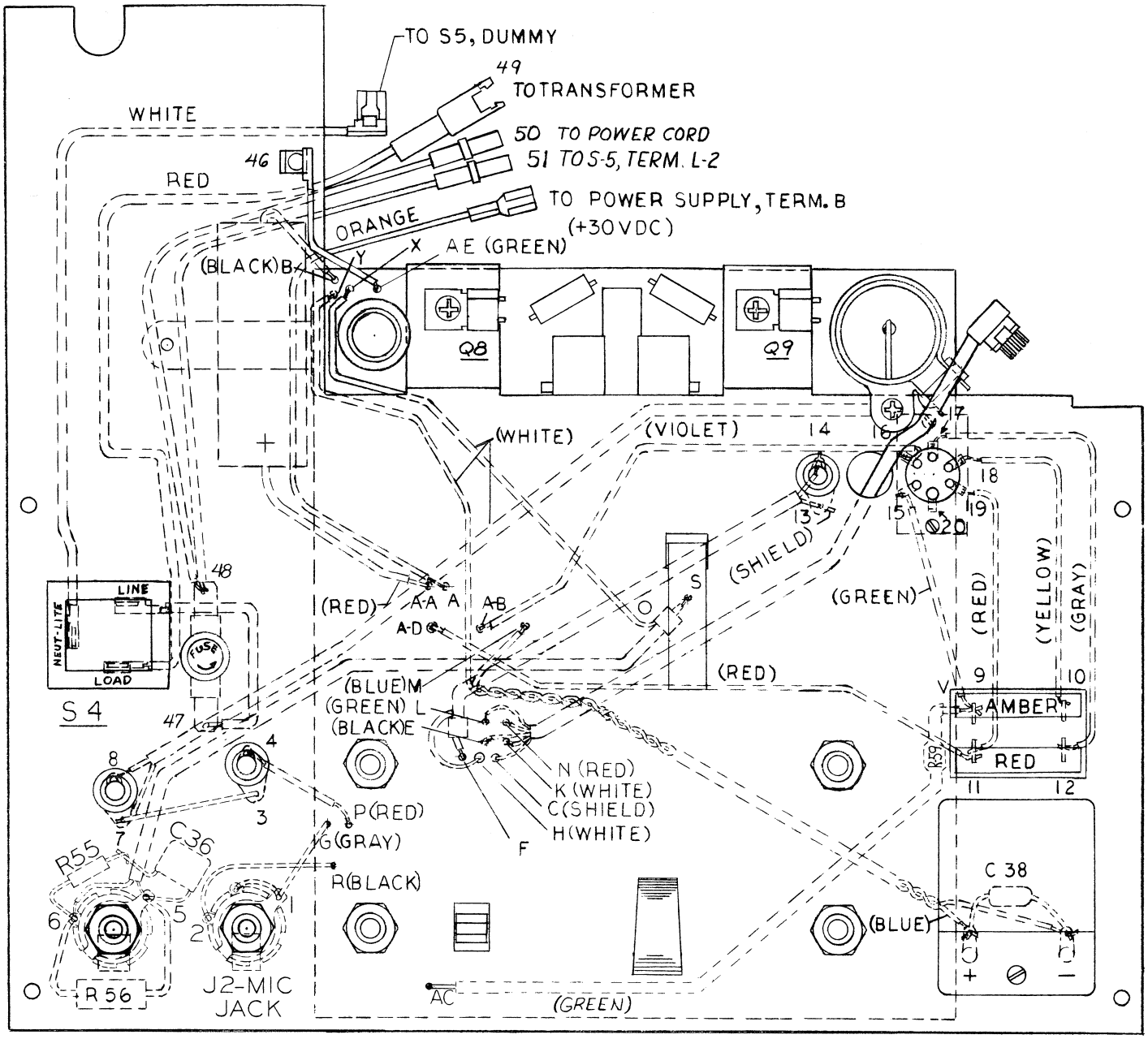
b. dc voltage to exciter lamp:
4.0 ± 0.2 volts with ripple content not exceeding 100 millivolts, RMS, measured across a resistor load of 5 ohms ± 1%, 5 watts (in place of exciter lamp).

NOTE*: Measured across a 6-ohm, 25-watt, dummy speaker load.

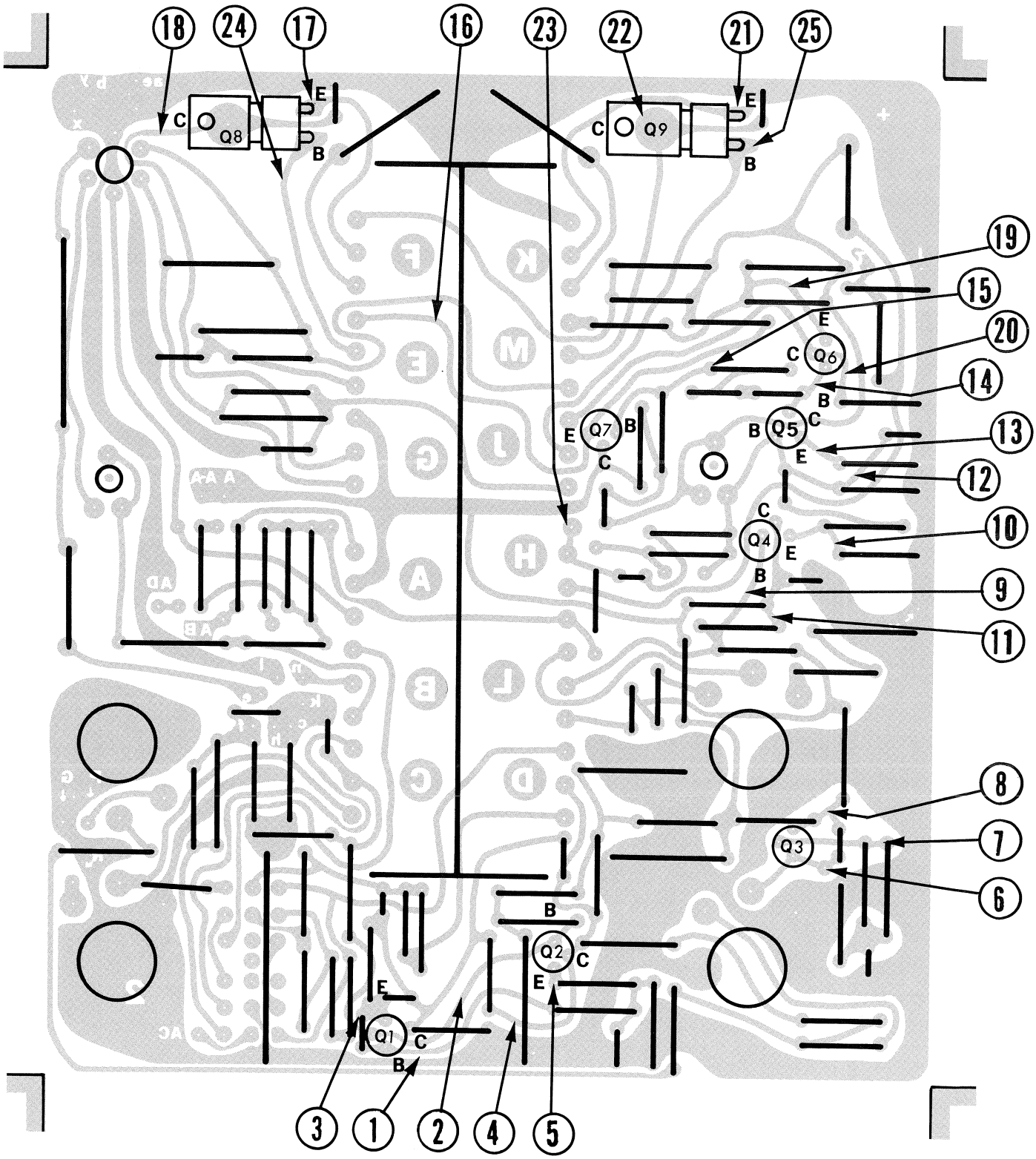
WIRING DIAGRAM--PROJECTOR COMPLETE

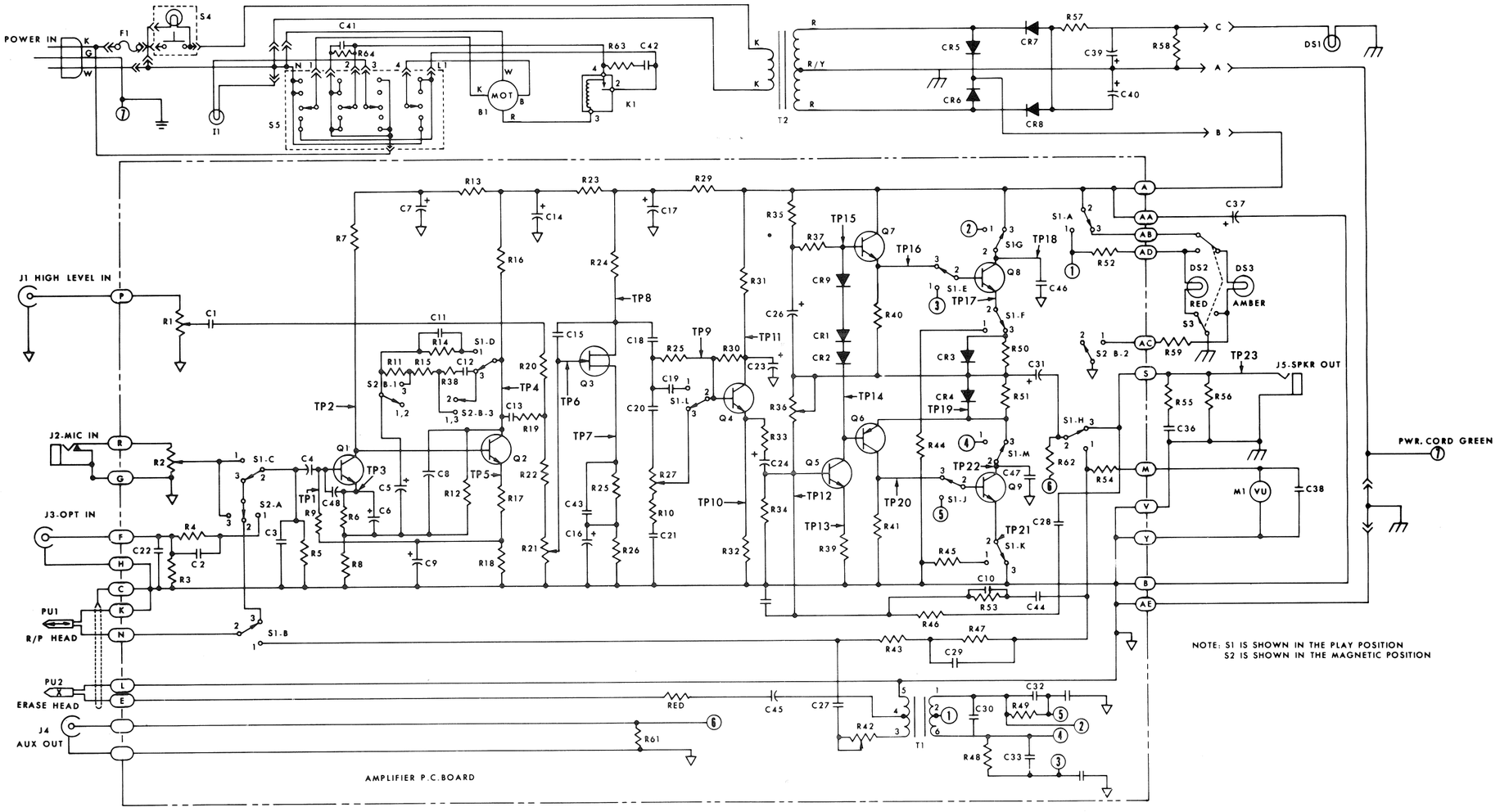


WIRING DIAGRAM--AMPLIFIER



VOLTAGE CHECK AND TEST POINTS





VOLTAGE AND TEST POINTS

No Signal/No Load
Controls; Mic Level - Min (CCW)
Tone - Flat
Phono Level - Min (CCW)
Volume - Min (CCW)
S2 - Mag
S1 - Play

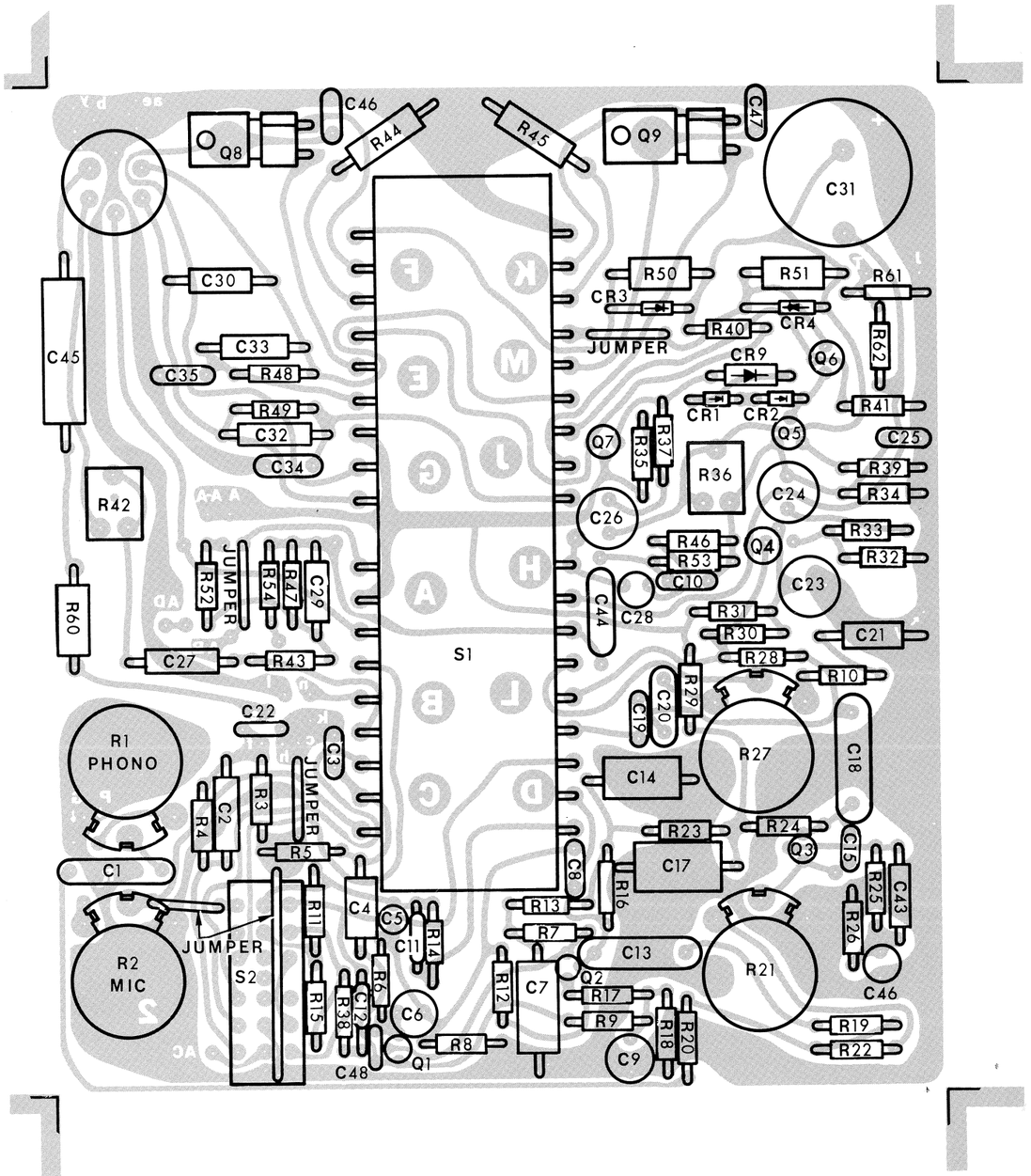
Test Point	D.C. Volts ± 10%	Test Point	D.C. Volts ± 10%
1	3.6	13	0.24
2	5.2	14	11.1
3	3.1	15	12.9
4	11.1	16	12.4
5	4.8	17	11.7
6	0.0	18	27.0
7	2.25	19	11.7
8	12.8	20	0.61
9	4.7	21	0.0
10	4.1	22	11.7
11	6.8	23	0.0
12	0.83		

Transistors, V.D.C.	E	C	B
Q1	3.1	5.2	3.6
Q2	4.8	11.1	5.2
Q3	-	-	-
Q4	4.1	6.8	4.7
Q5	0.24	11.1	0.84
Q6	11.7	0.6	11.0
Q7	12.4	27.0	12.9
Q8	11.8	27.0	12.4
Q9	0.0	11.7	0.6

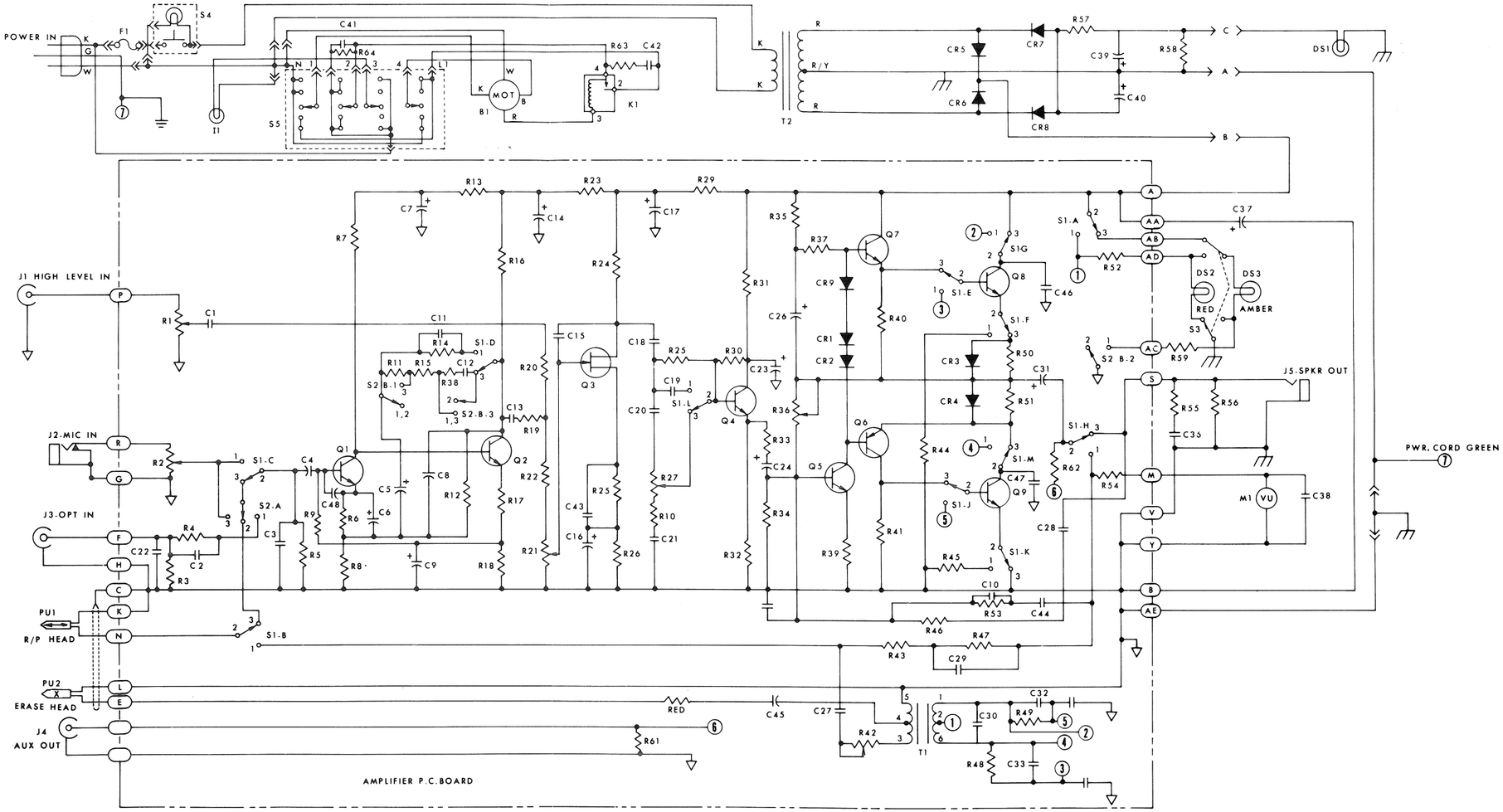
1000 Hz/6 ohm Load; 1.5mv R.M.S. to Mic Jack
Controls; Projector in Mic/Play Mode
Tone - Min (CCW)
Phono Level - Min (CCW)
Volume - Max (CW)
Mic - Max (CW)
Note - Peak to peak measured on oscilloscope, R.M.S. voltages measured on V.T.V.M.

Test Point	P.P. Volts	R.M.S. Volts
4	0.92	0.31
*6	0.27	0.096
9	0.48	0.17
10	0.48	0.17
14	20.0	7.07
15	20.0	7.07
16	20.0	7.07
17	18.5	6.54
19	18.5	6.54
20	0.92	0.42 (non-sinusoidal)
22	17.0	6.01

COMPONENT LOCATING DIAGRAM



SCHEMATIC DIAGRAM



C1	186554	.1 MFD 50V dc
C2	173300	.01 MFD ±5% 50V dc
C3	164757	.001 MFD 50V dc
C4	191404	2 MFD ELECT.
C5	173302	10 MFD 15 V dc ELECT.
C6	173297	100 MFD 10V dc ELECT.
C7	168096	10 MFD 25V dc ELECT.
C8	159411	50 PF
C9	173302	10 MFD 15V dc ELECT.
C10	173308	220 PF
C11	173307	500 PF 50V dc
C12	190949	.0015 MFD ±5% 50V dc
C13	186554	.1 MFD 50V dc
C14	191403	100 MFD 25V dc ELECT.
C15	179340	5 PF ±20%
C16	173302	10 MFD 15V dc ELECT.
C17	191403	100 MFD 25V dc ELECT.
C18	186554	.1 MFD 50V dc
C19	173307	500 PF 50V dc
C20	154712	.002 MFD 50V dc
C21	190950	.0039 MFD 50V dc
C22	154712	.002 MFD 50V dc
C23	173297	100 MFD 10V dc ELECT.
C24	173302	10 MFD 15V dc ELECT.
C25	173308	220 PF
C26	191402	30 MFD 25V dc ELECT.
C27	173296	.0033 MFD 50V dc
C28	173302	10 MFD 15V dc ELECT.
C29	191401	.0047 MFD 30V dc
C30	173303	.022 MFD 50V dc
C31	190945	1300 MFD 35V dc ELECT.
C32	173300	.01 MFD 50V dc

AMPLIFIER NOMENCLATURE

C33	173300	.01 MFD 50V dc
C34	173307	500 PF 50V dc
C35	173307	500 PF 50V dc
R1	190875	1 MEG Ω PHONO LEVEL CONTROL-AUDIO
R2	190876	2K Ω MIKE LEVEL CONTROL-AUDIO
R3	168031	5.1K Ω ±5%
R4	168031	5.1K Ω ±5%
R5	168031	5.1K Ω ±5%
R6	168032	6.8K Ω
R7	168039	30K Ω
R8	160671	160K Ω
R9	143303	560K Ω
R10	153447	200 Ω
R11	168037	20K Ω ±5%
R12	120512	1.5 MEG Ω
R13	112546	2.7K Ω
R14	168037	20K Ω ±5%
R15	168066	39K Ω ±5%
R16	154865	9.1K Ω
R17	173292	75 Ω
R18	154866	5.6K Ω
R19	126396	270K Ω
R20	126396	270K Ω
R21	190873	500K Ω VOLUME CONTROL-AUDIO
R22	161824	51K Ω ±5%
R23	151434	3.9K Ω
R24	161824	51K Ω ±5%
R25	160557	2.4K Ω
R26	152753	7.5K Ω
R27	190879	1 Meg Ω (LIN.) TONE CONTROL
R28	868663	100K Ω
R29	147756	1.8K Ω
R30	175895	68K Ω
R31	154866	5.6K Ω
R32	119816	1K Ω
R33	119816	1K Ω
R34	168037	20K Ω
R35	126397	1.5K Ω
R36	191299	500K Ω (LIN.) AMP. BAL CON.
R37	120505	3.3K Ω
R38	168037	20K Ω ±5%
R39	174898	82 Ω
R40	153447	200 Ω
R41	153447	200 Ω
R42	190382	5K Ω (LIN.) REC. BIAS CON.
R43	140836	1.5K Ω ±5%
R44	175860	27Ω 2 WATT
R45	175860	27Ω 2 WATT
R46	161824	51K Ω ±5%
R47	168035	12K Ω ±5%
R48	078671	47K Ω
R49	078671	47K Ω
R50	173294	1Ω 1 WATT
R51	173294	1Ω 1 WATT
R52	153447	200 Ω
R53	161824	51K Ω ±5%
R54	154865	9.1K Ω
Q1	190948	NPN 2N5232A
Q2	190948	NPN 2N5232A
Q3	191407	FET 2N5458
Q4	191408	NPN 2N3859
Q5	191408	NPN 2N3859
Q6	191409	PNP D29E1
Q7	191410	NPN D33D21
Q8	191411	NPN D42C2
Q9	191411	NPN D42C2
R61	132147	330 Ω
R62	127195	470 Ω
C48	164757	.001 MFD. 50V dc
CR9	191405	RECTIFIER DZ-800
CR1	191405	RECTIFIER DZ-800
CR2	191405	RECTIFIER DZ-800
CR3	181037	EK-1 RECTIFIER
CR4	181037	EK-1 RECTIFIER
S1	189974	REC./PLAYBACK SWITCH
S2	190955	SWITCH, INPUT SELECTOR
T1	189973	OSCILLATOR COIL
C47	173307	500 PF 50V dc
C43	154712	.002 MFD 50V dc
C44	173303	.022 MFD 50V dc
C45	191404	2 MFD
C46	173307	500 PF 50V dc
R60	193412	5Ω ±5% 3 WATT

POWER SUPPLY NOMENCLATURE

C39	159634	1300 MFD 35V dc ELECT.
C40	159634	1300 MFD 35V dc ELECT.
CR5	181037	RECTIFIER, EK-1
CR6	181037	RECTIFIER EK-1
CR7	181037	RECTIFIER EK-1
CR8	181037	RECTIFIER, EK-1
R57	159633	25Ω 25 WATT
R58	154868	500Ω 2 WATT

PROJECTOR NOMENCLATURE

B1	189965	MOTOR
C36	185051	.22 MFD 50V dc
C37	159416	1500 MFD 50V dc ELECT.
C38	173300	.01 MFD 50V dc
C41	120501	.1 MFD 600V dc
C42	120501	.1 MFD 600V dc
DS1	120359	EXCITER LAMP
DS2,3	191412	RECORDING INDICATOR LAMP ASSY.
F1	193690	FUSE
I1	054909	LAMP PROJECTION
J1	159429	HIGH LEVEL INPUT JACK
J2	154894	MIC INPUT JACK
J3	159429	PHOTOCELL INPUT JACK
J4	159429	AUX OUTPUT JACK
J5	147832	SPEAKER JACK
K1	190874	RELAY, MOTOR STARTING
M1	173313	VUMETER
PU1	190935	REC./PLAYBACK HEAD
PU2	190924	ERASE HEAD
R55	168181	10Ω ±5% 1 WATT
R56	159407	47Ω 2 WATT
S3	189967	SWITCH, HEAD POSITION INDICATOR
S4	191413	SWITCH, AMPLIFIER POWER
S5	189972	SWITCH, PROJECTOR CONTROL
T2	190872	POWER TRANSFORMER
R59	153447	200Ω
R63	823764	22Ω

Corrected to SEPTEMBER 1972 Parts List No. 775088

KODAK PAGEANT SOUND PROJECTOR
Magnetic Optical
Model AV-12M6

Order parts from / *Eastman Kodak Company, Central Parts Service*
800 Lee Road, Rochester, New York 14650

Order by PART NUMBER, NAME, and EQUIPMENT MODEL.

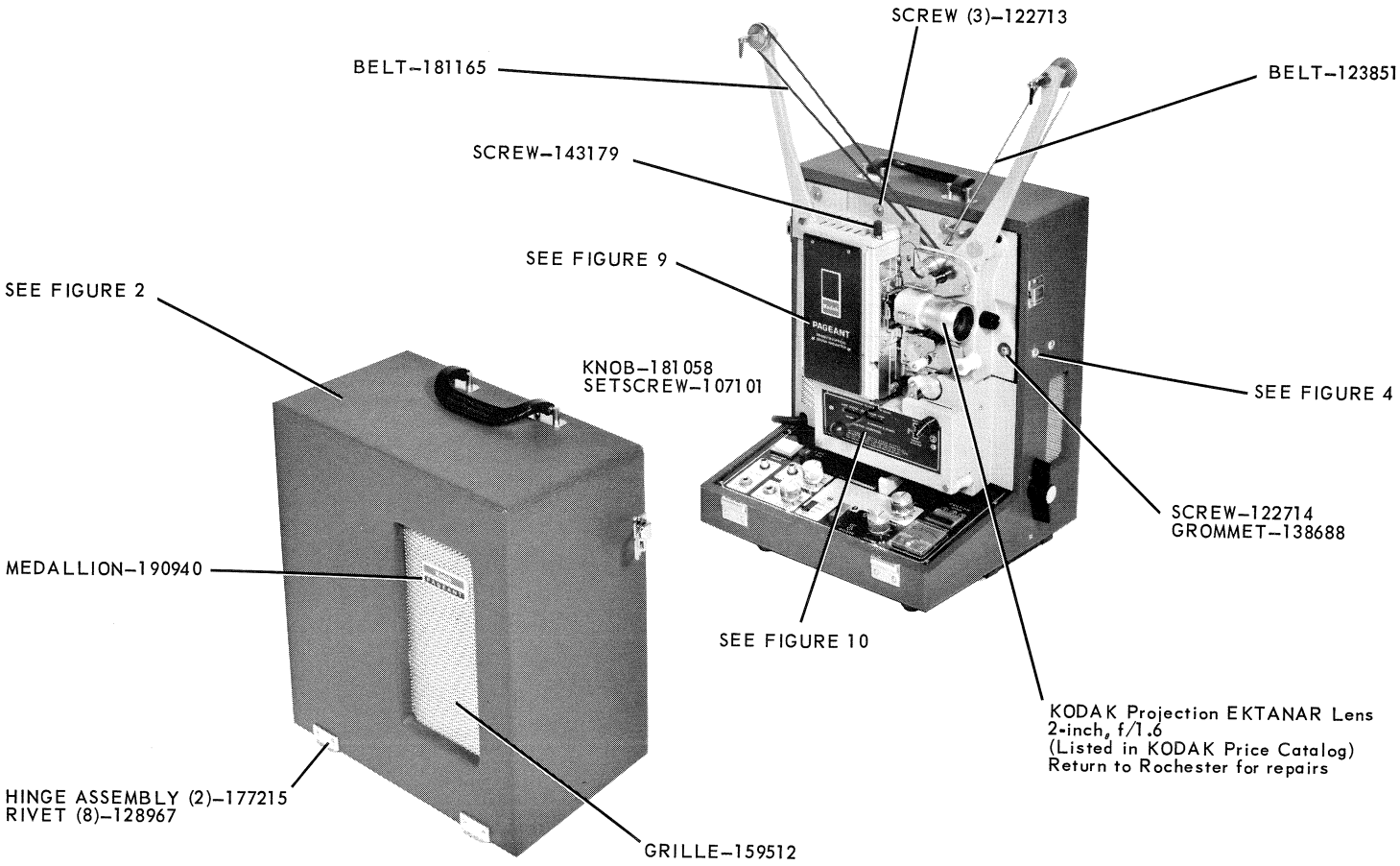


FIGURE 1

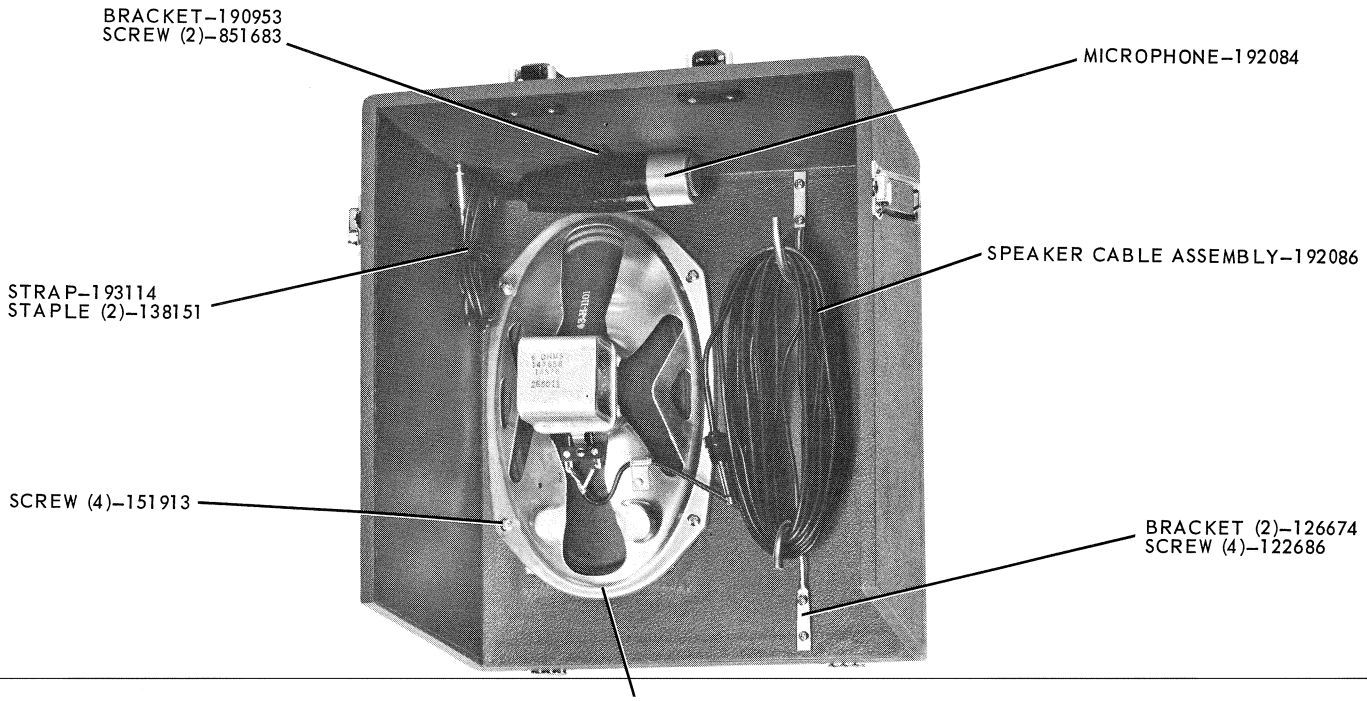


FIGURE 2

Order by PART NUMBER, NAME, and EQUIPMENT MODEL.

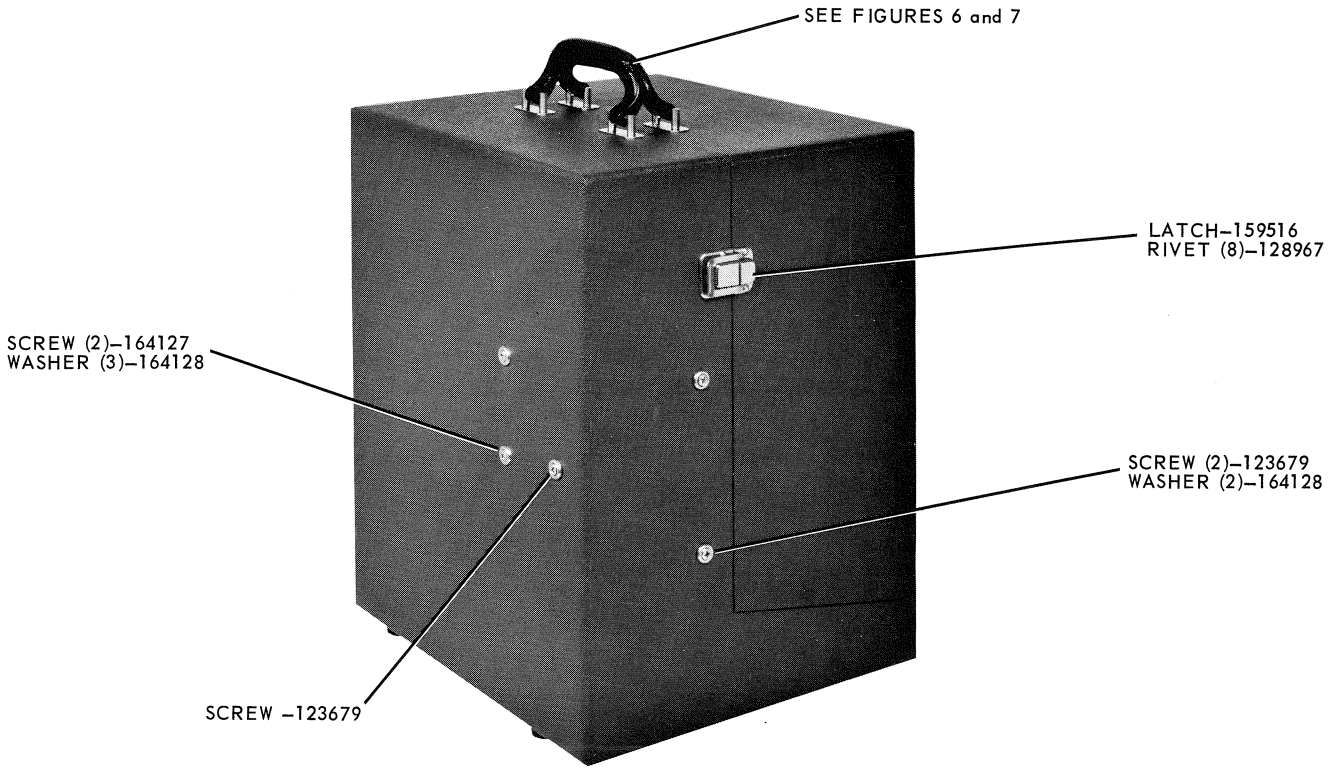


FIGURE 3 CASE ASSEMBLY–192869

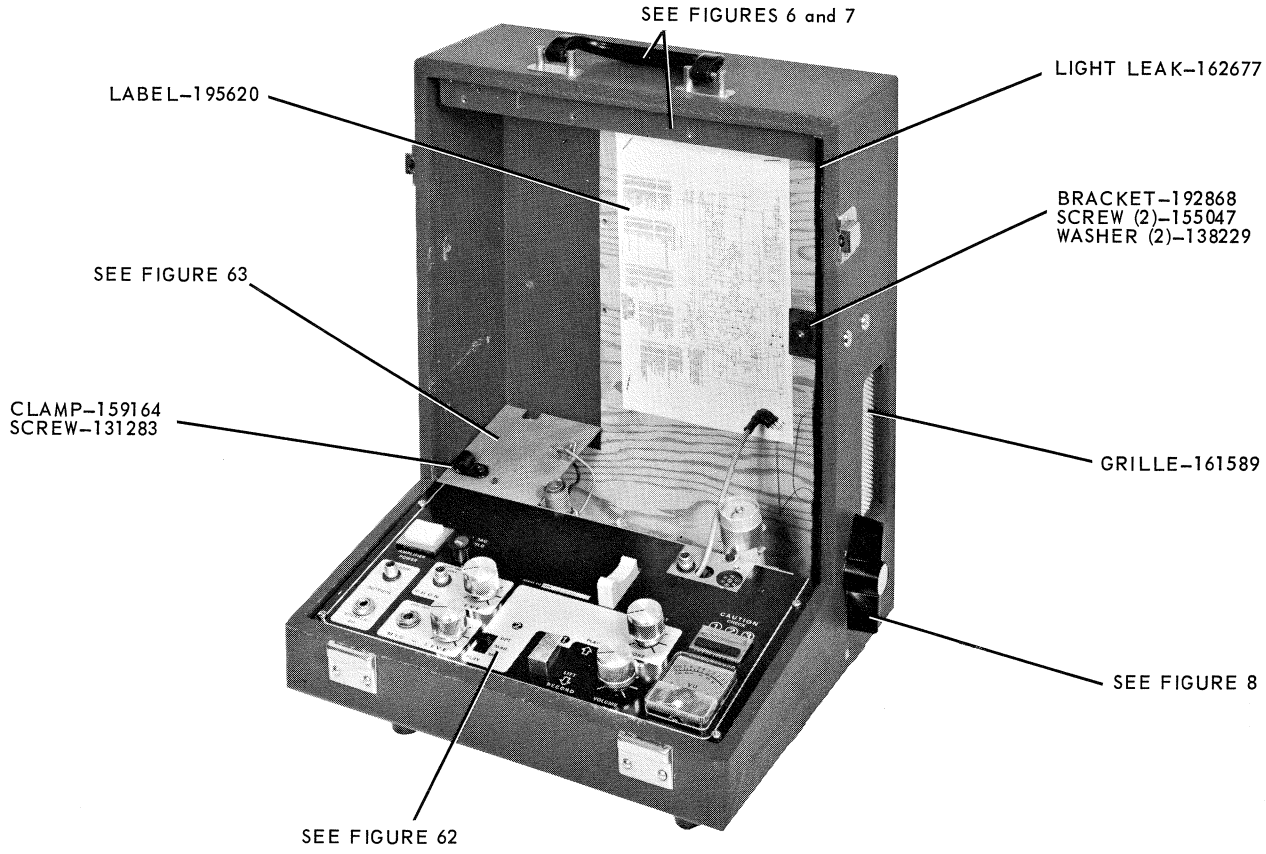


FIGURE 4

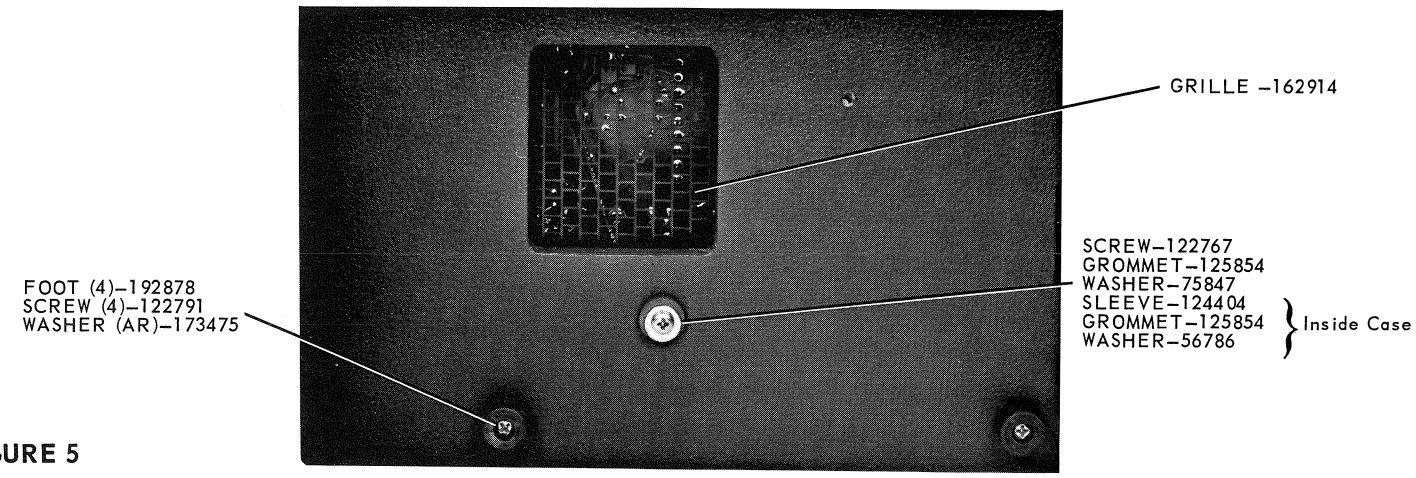


FIGURE 5

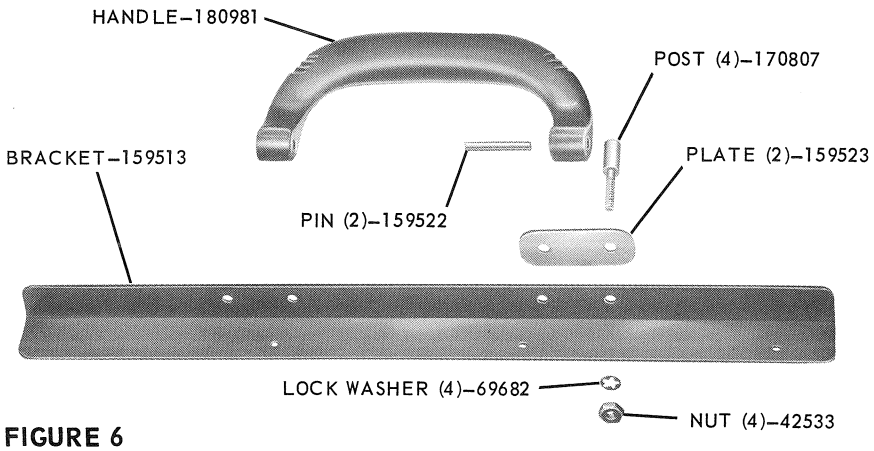


FIGURE 6

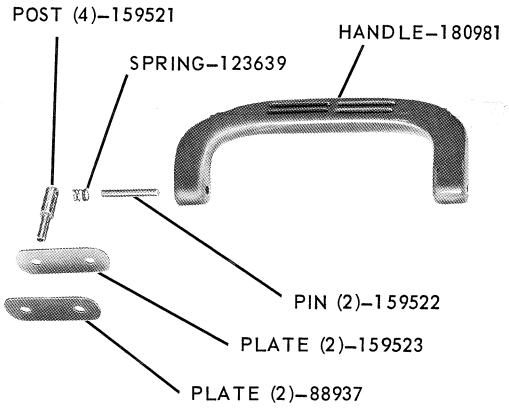


FIGURE 7

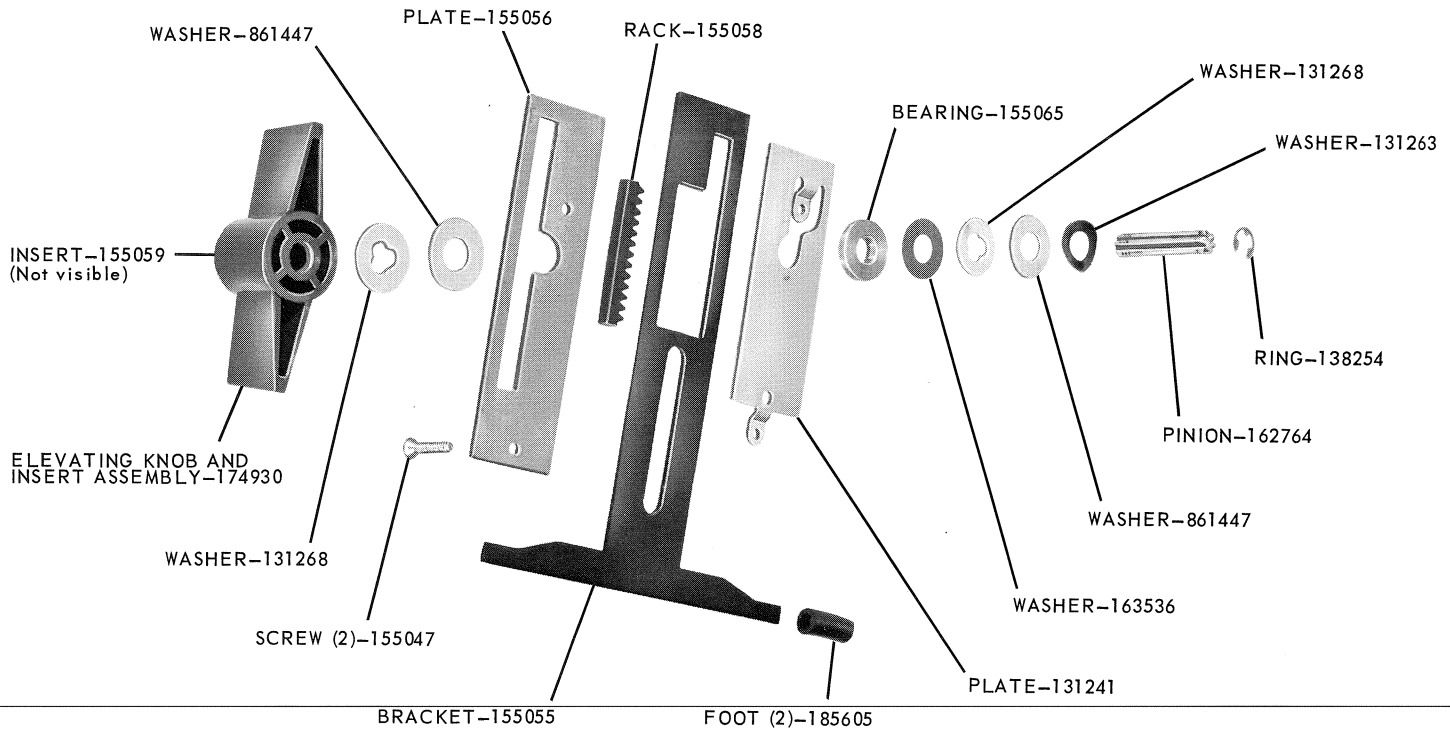


FIGURE 8

Order by PART NUMBER, NAME, and EQUIPMENT MODEL.

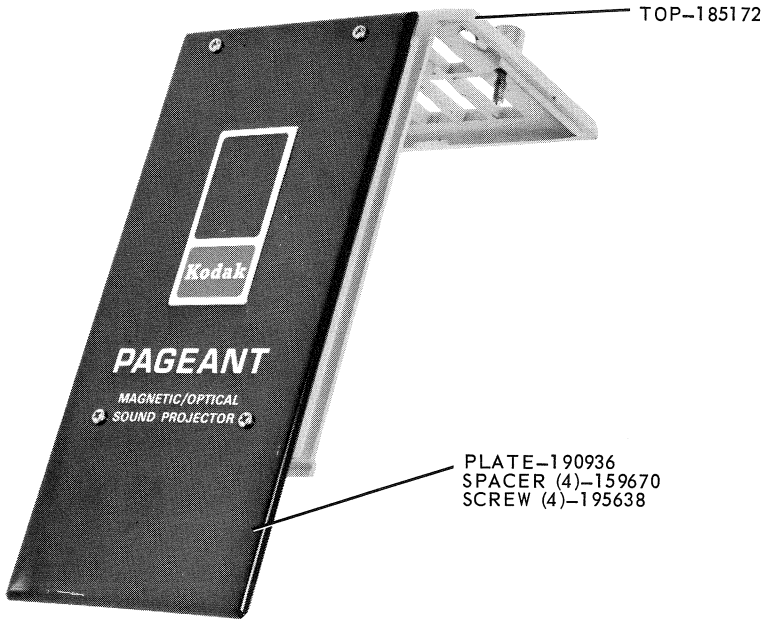


FIGURE 9 LAMPHOUSE COVER ASSEMBLY–191417

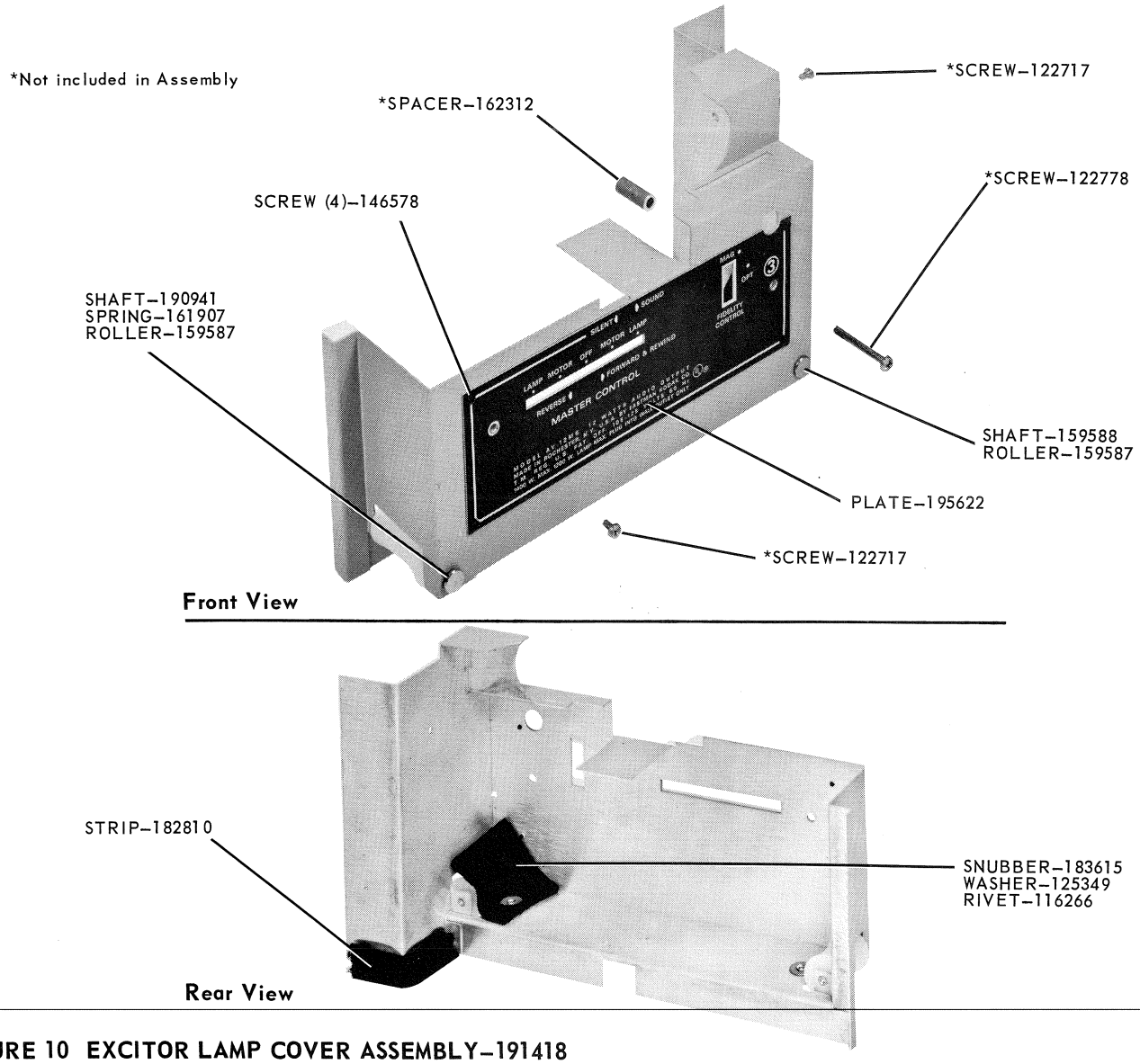


FIGURE 10 EXCITOR LAMP COVER ASSEMBLY–191418

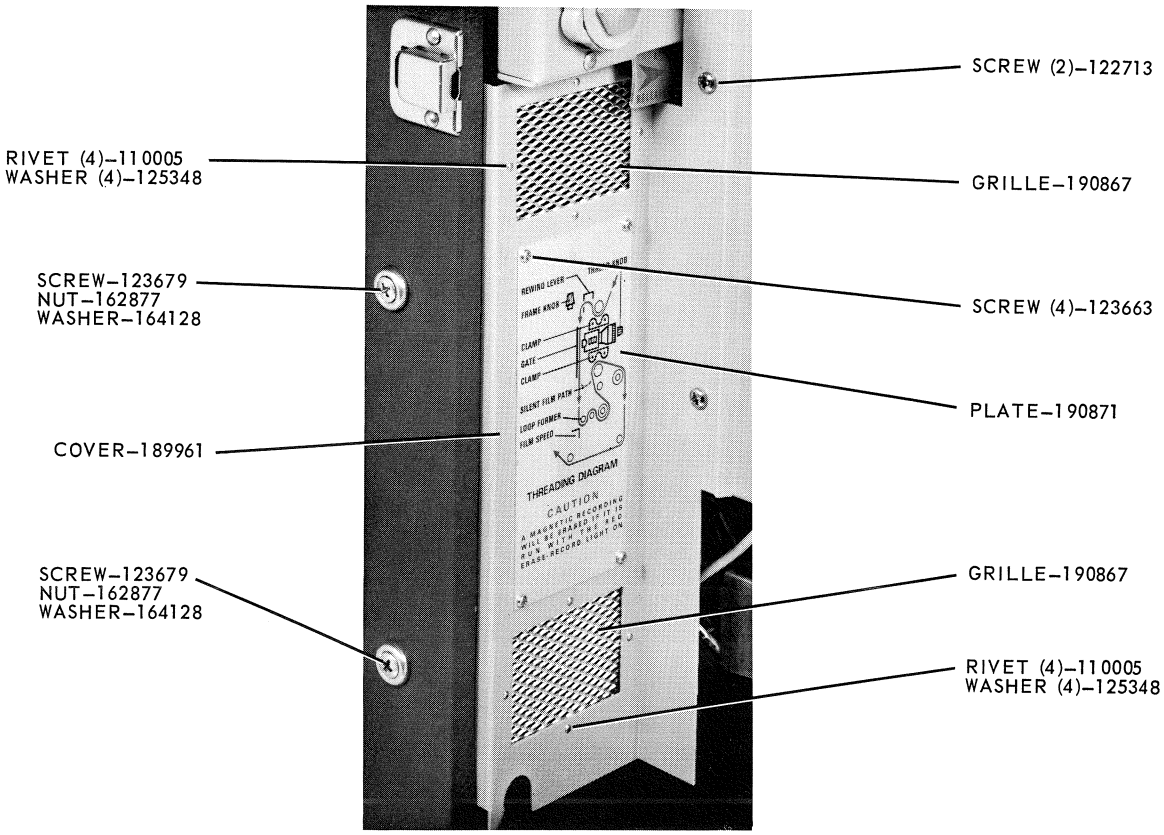


FIGURE 11 MECHANISM DRIVE COVER ASSEMBLY–191426

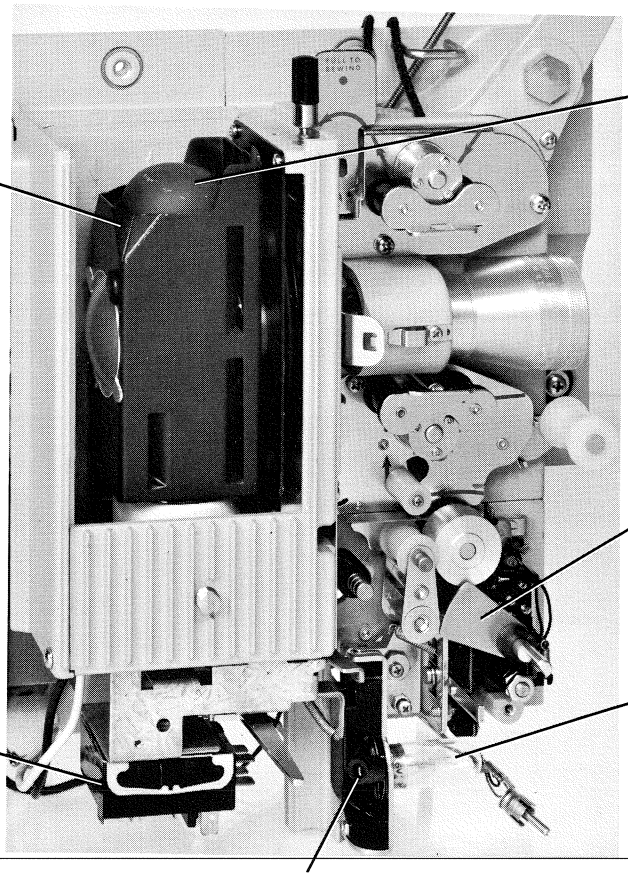


FIGURE 12

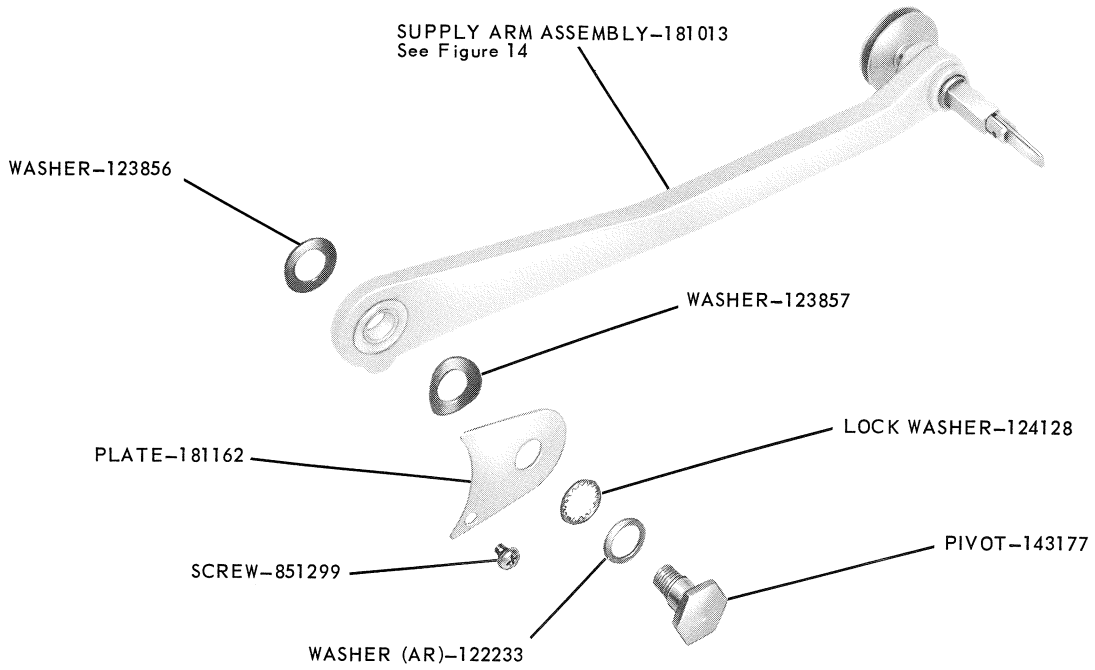


FIGURE 13

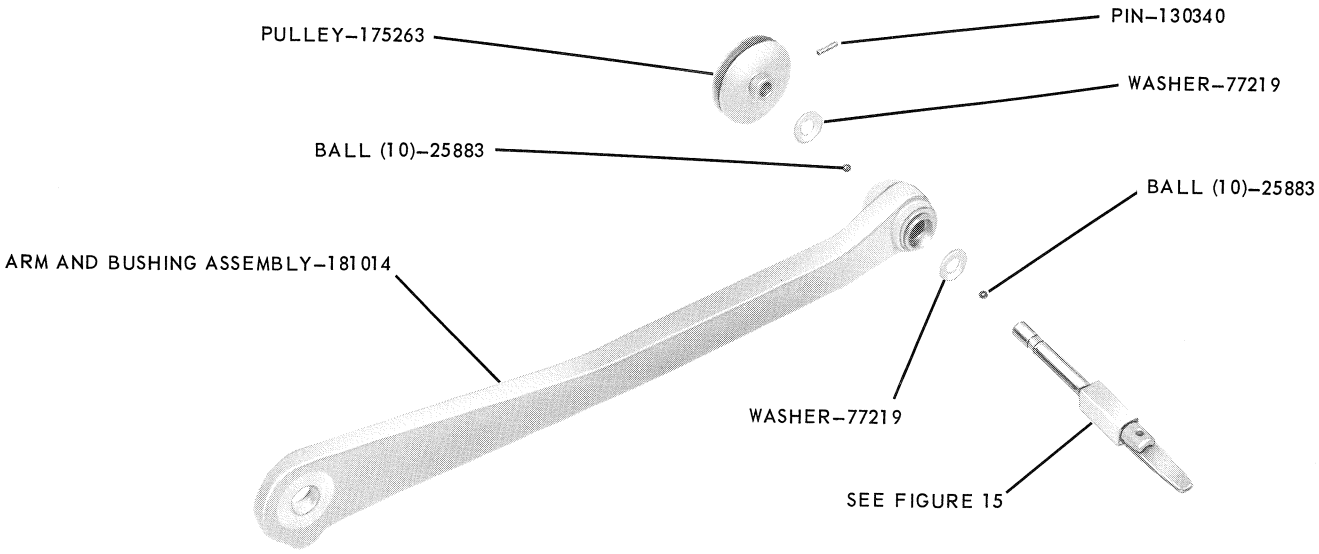


FIGURE 14 SUPPLY ARM ASSEMBLY–181013

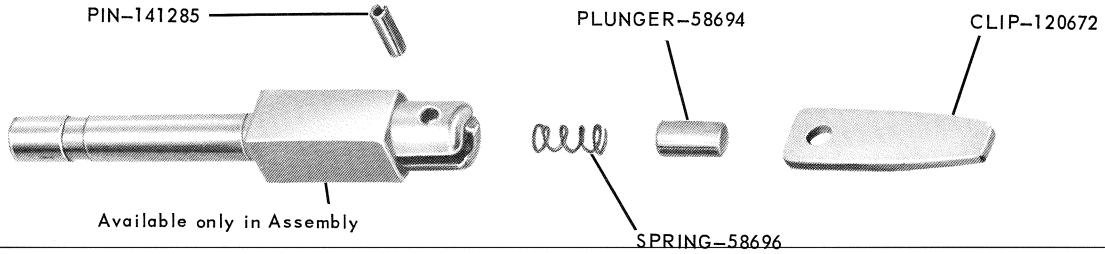


FIGURE 15 SUPPLY SPINDLE ASSEMBLY–165173

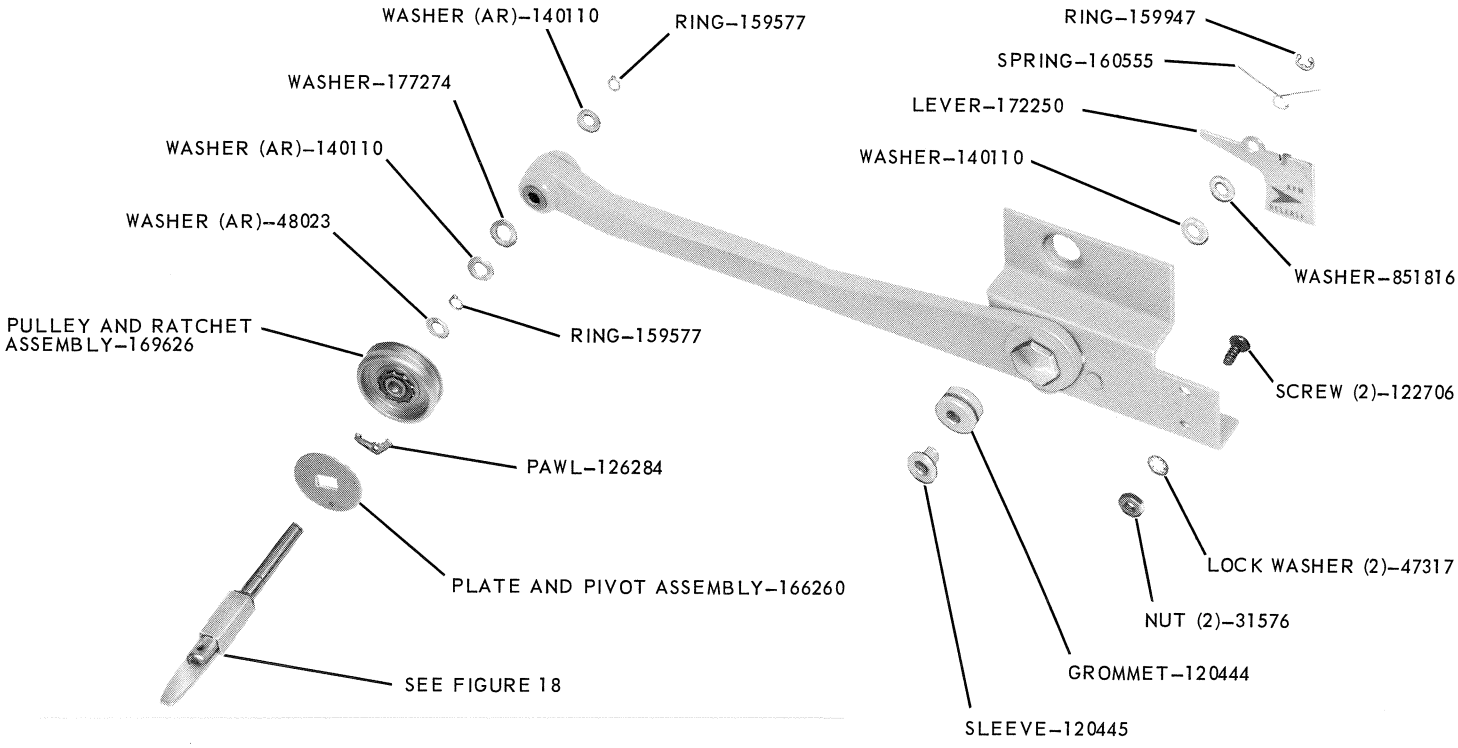


FIGURE 16

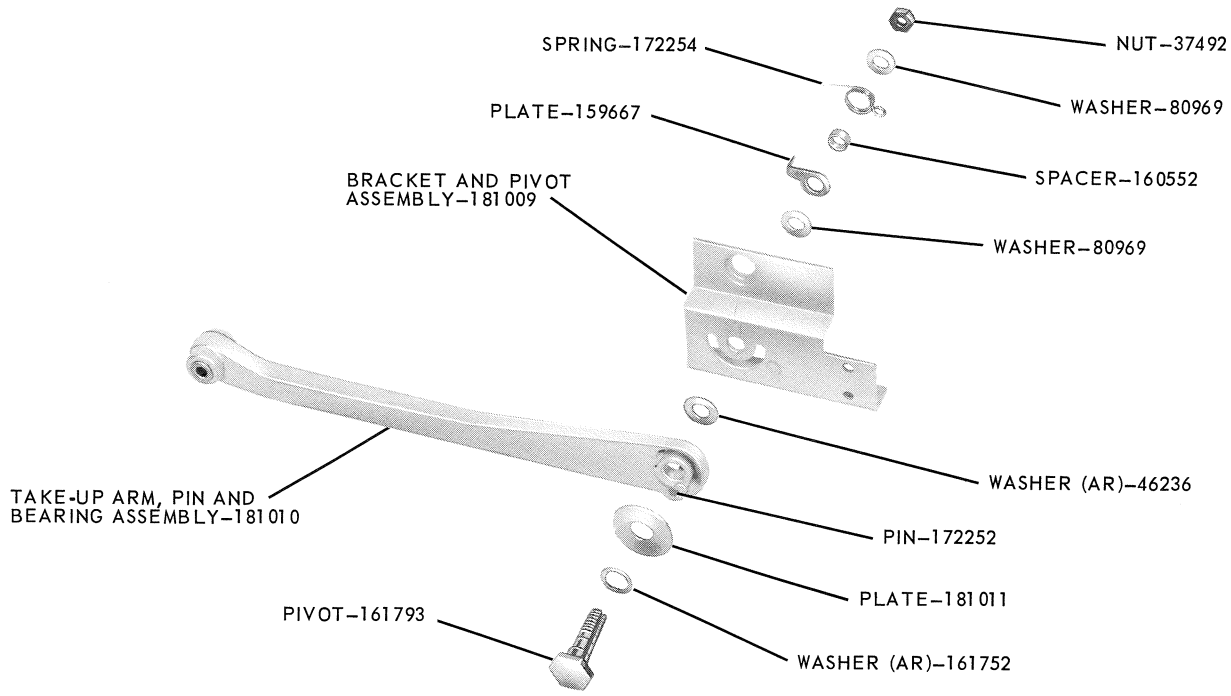


FIGURE 17

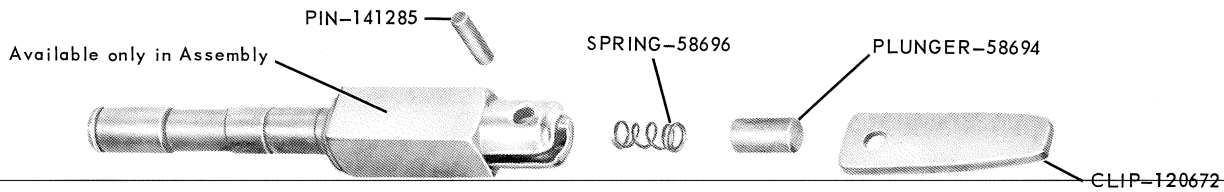


FIGURE 18 TAKE-UP SPINDLE ASSEMBLY–160716

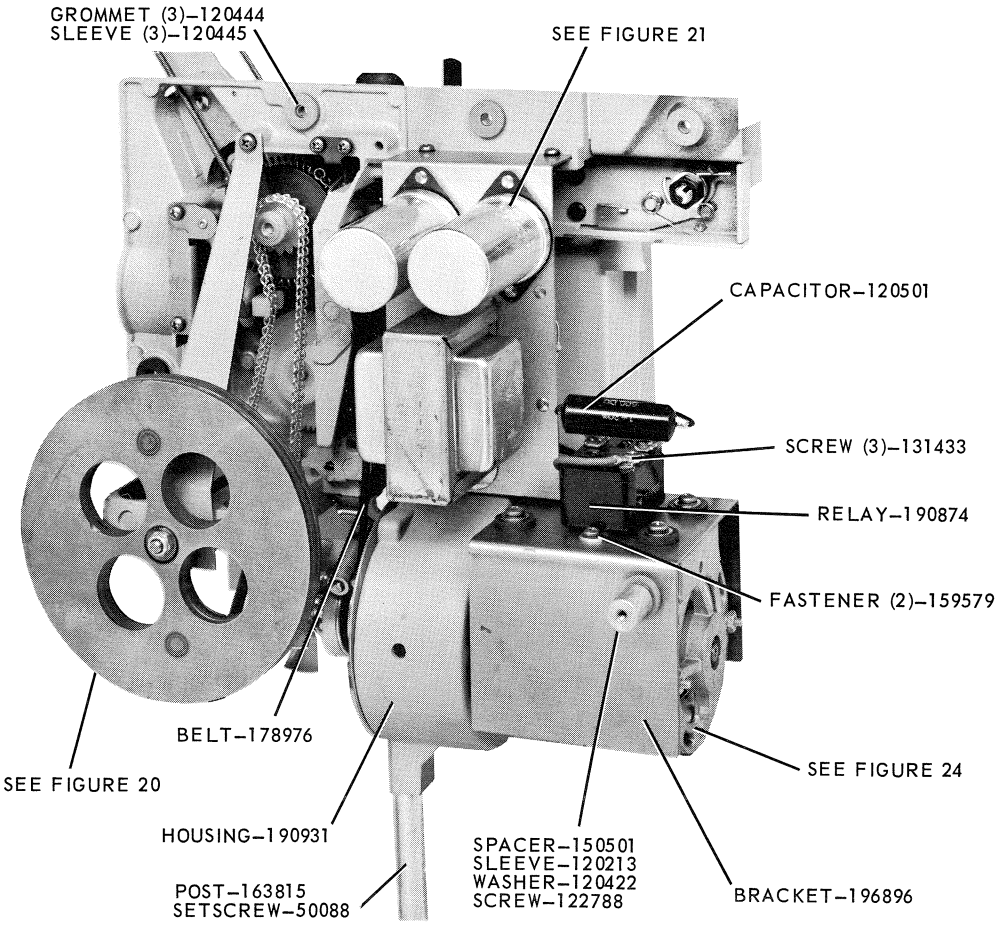


FIGURE 19

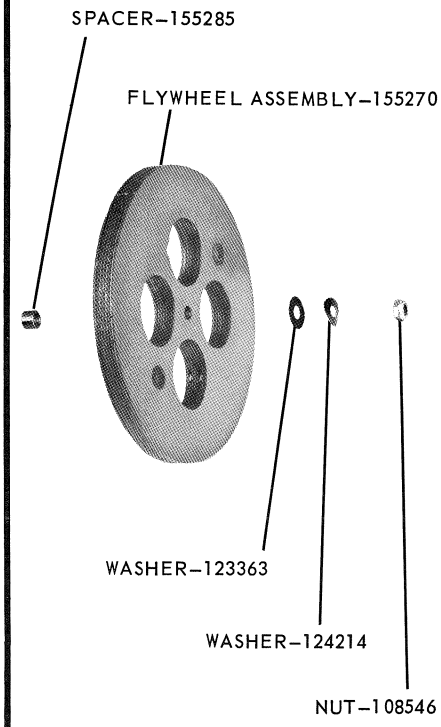
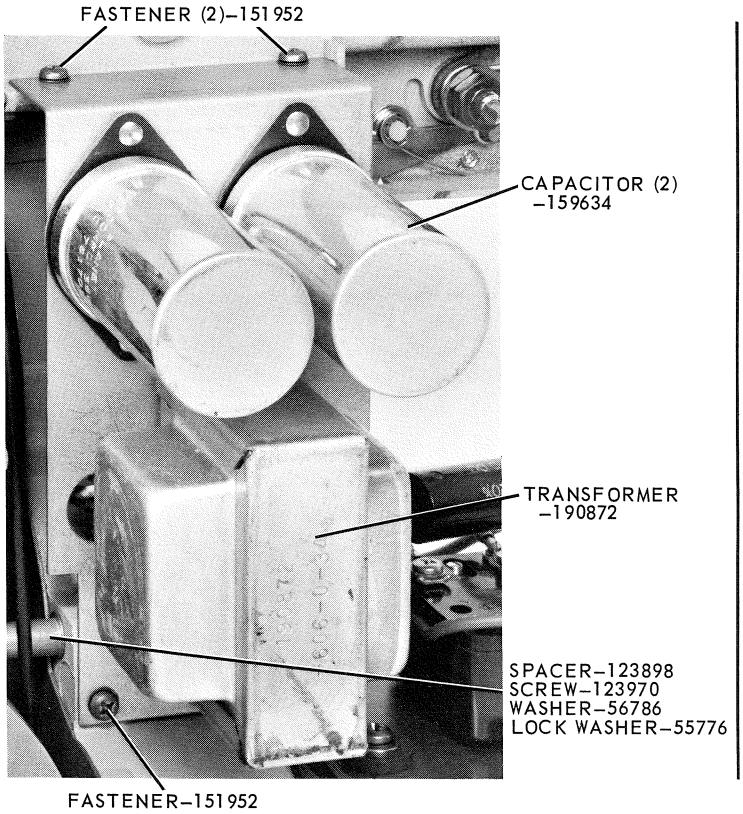


FIGURE 20



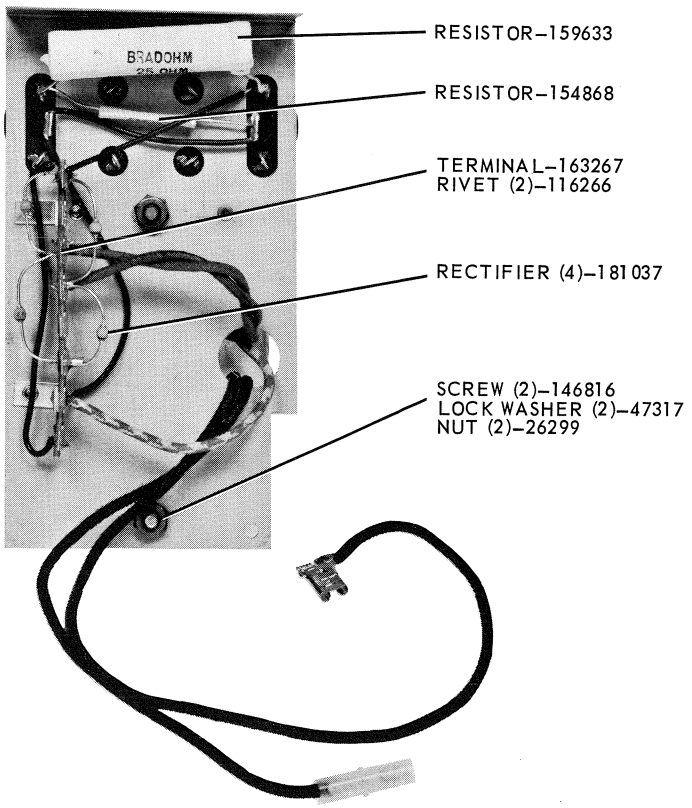


FIGURE 21 AMPLIFIER AND EXCITOR LAMP POWER SUPPLY ASSEMBLY–190861 (Front and rear views)

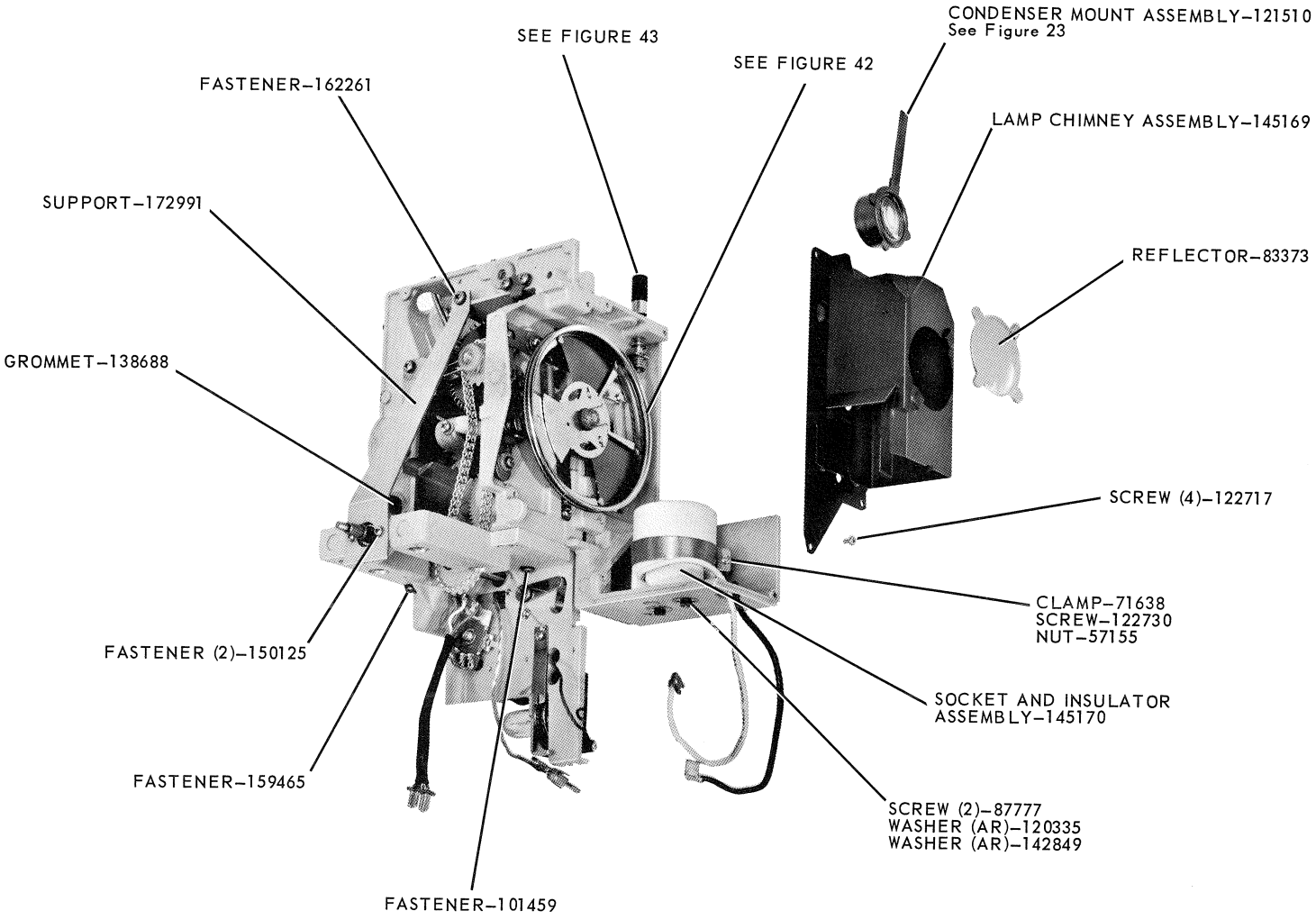


FIGURE 22

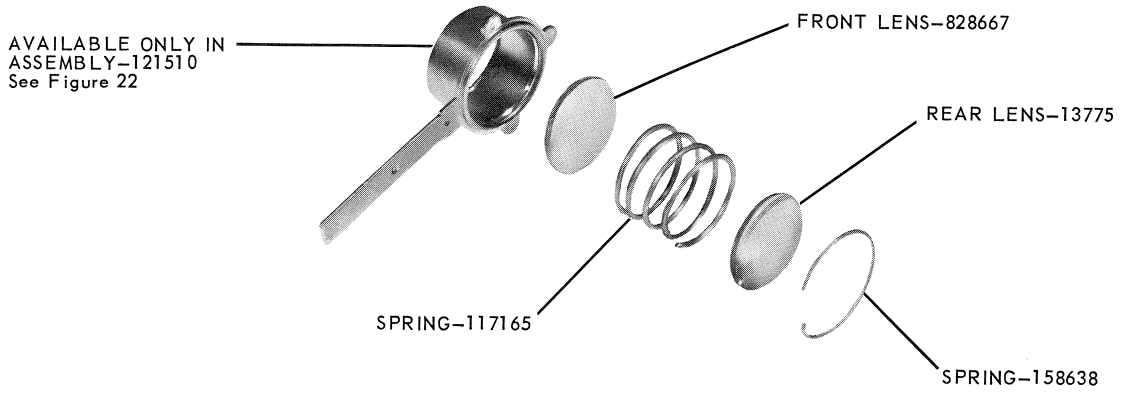


FIGURE 23 CONDENSER MOUNT ASSEMBLY–121510

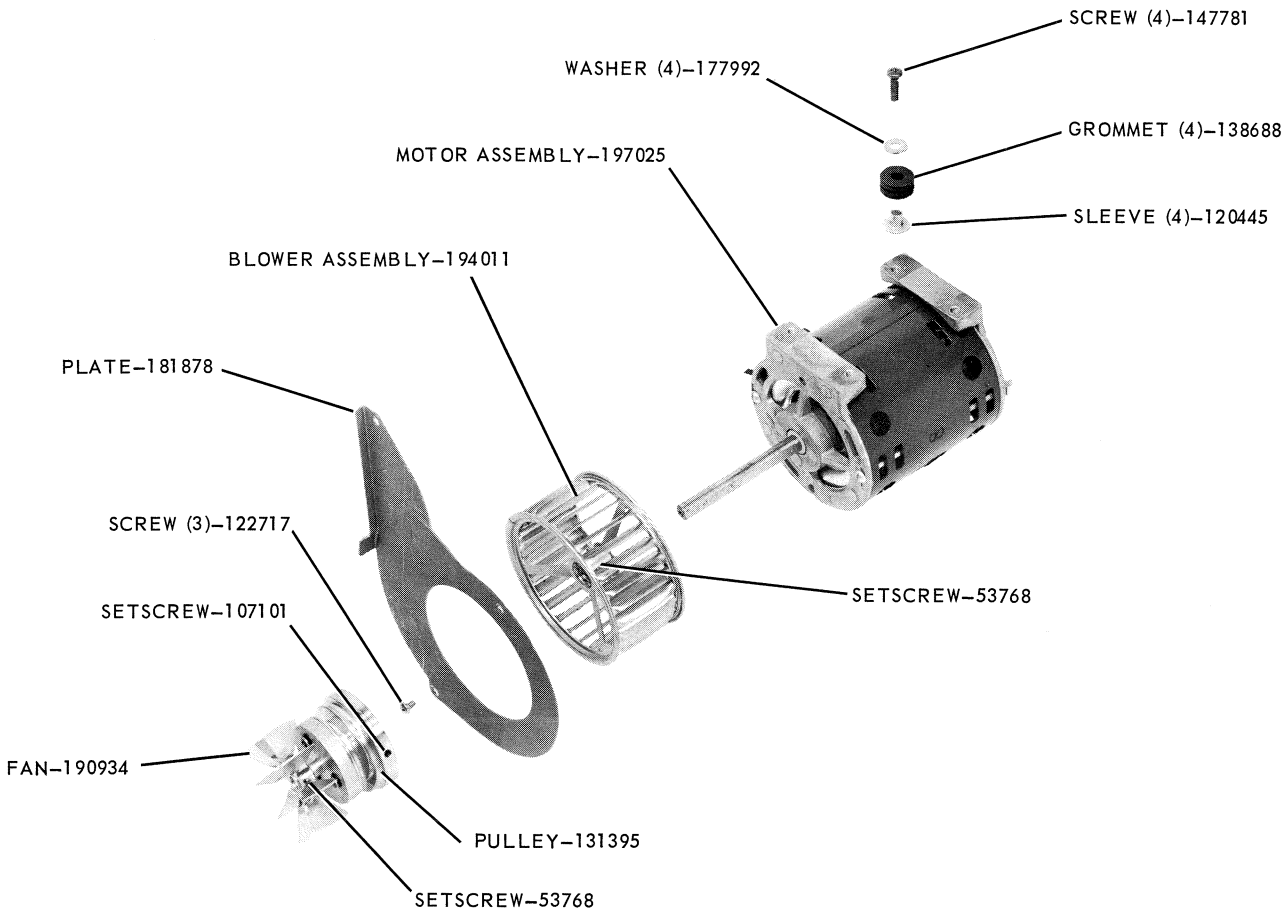


FIGURE 24

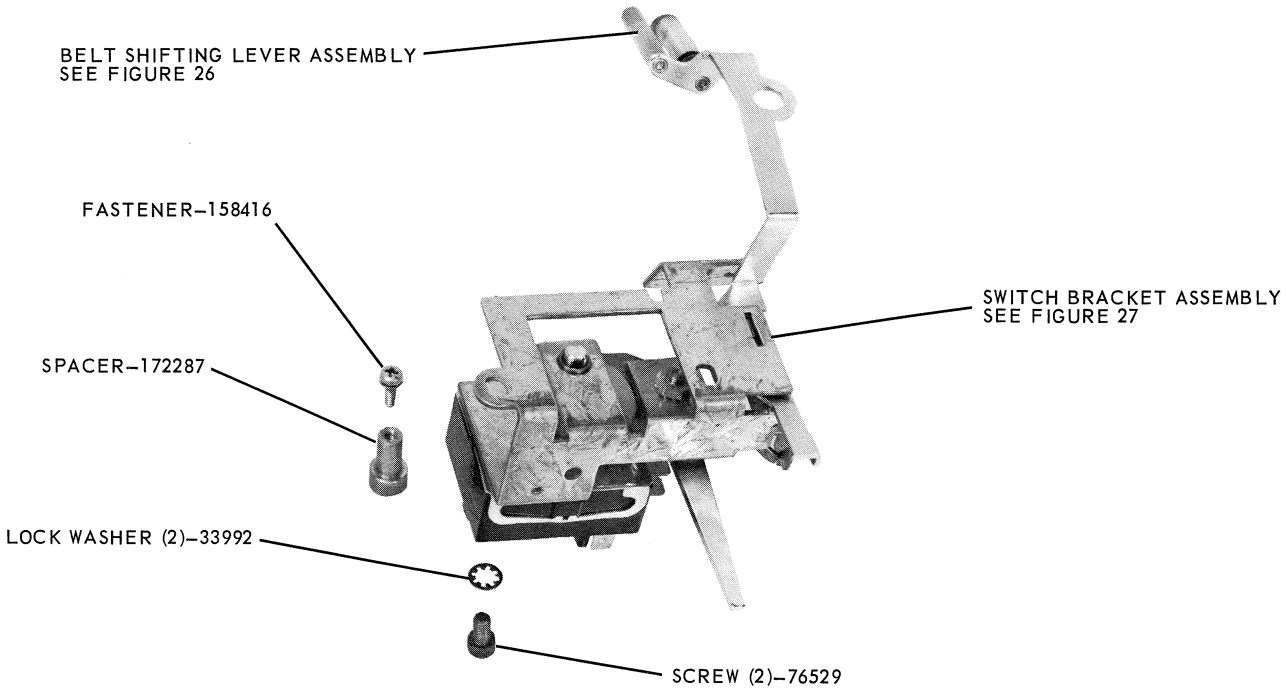


FIGURE 25

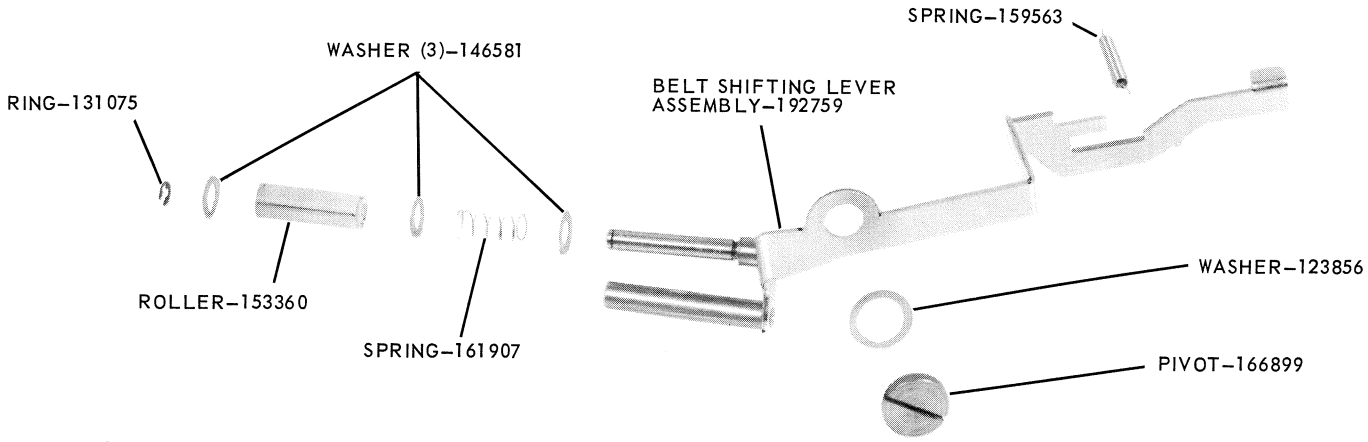


FIGURE 26

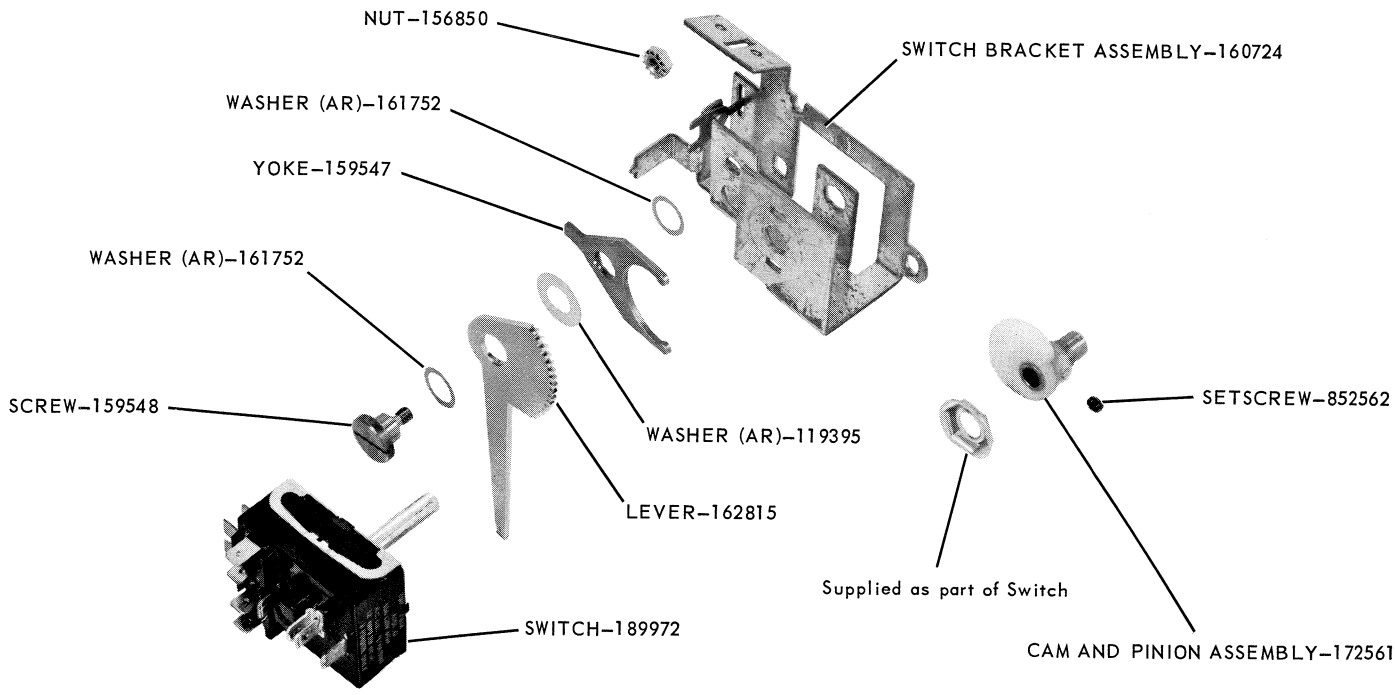


FIGURE 27

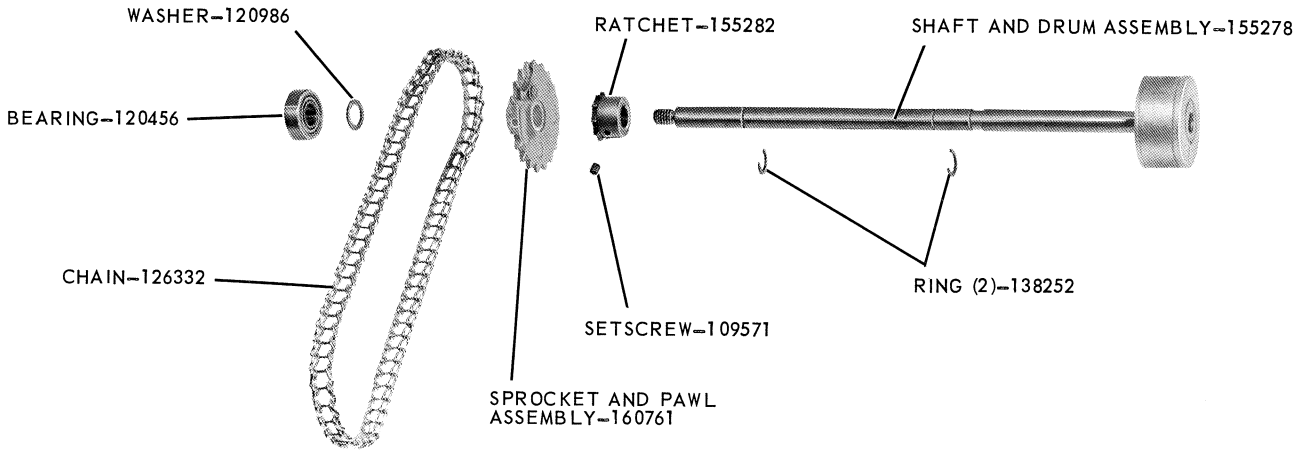


FIGURE 28

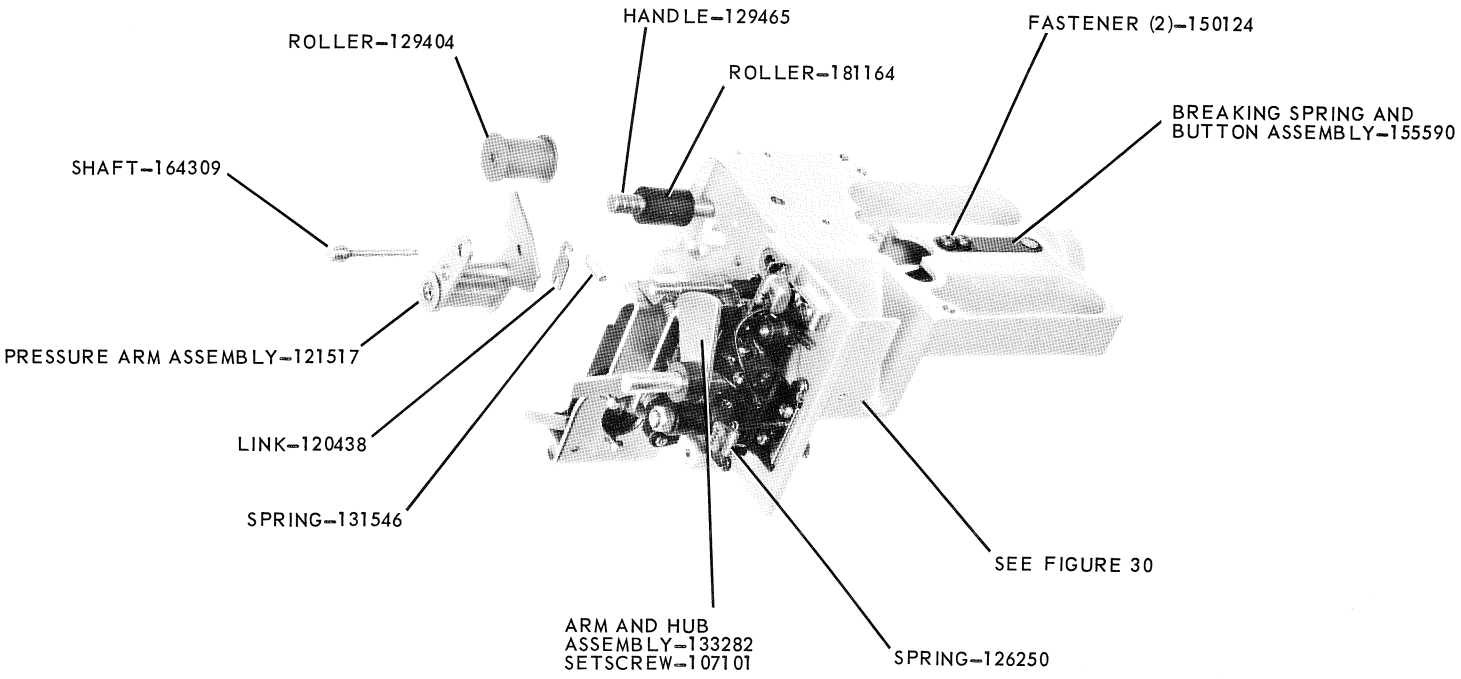


FIGURE 29

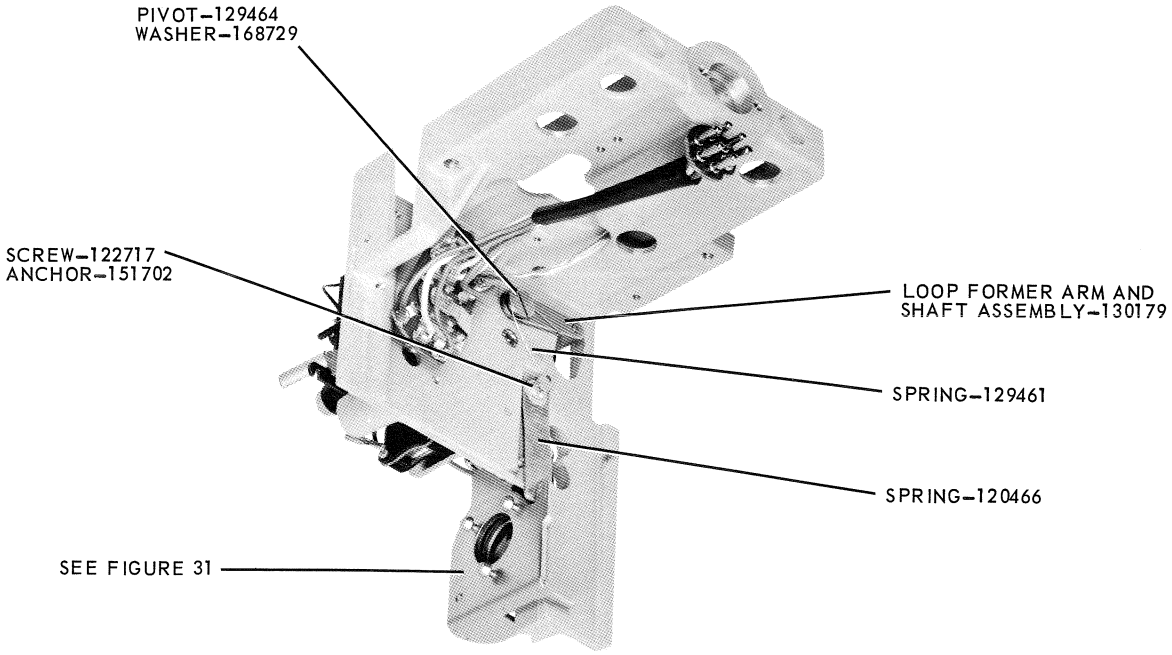


FIGURE 30

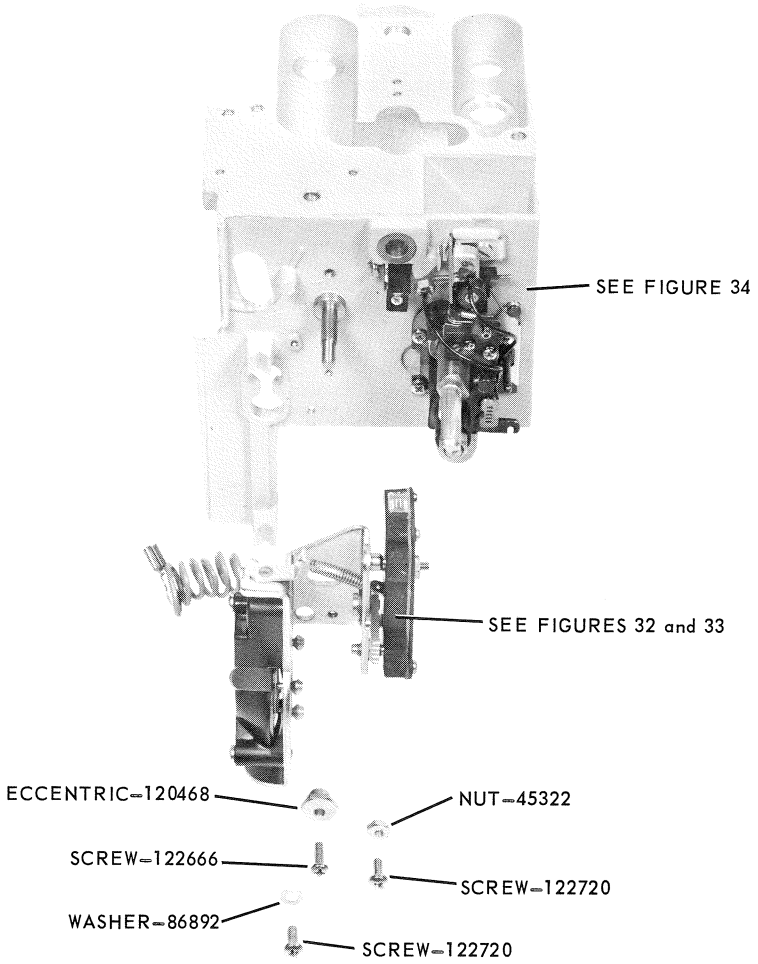


FIGURE 31

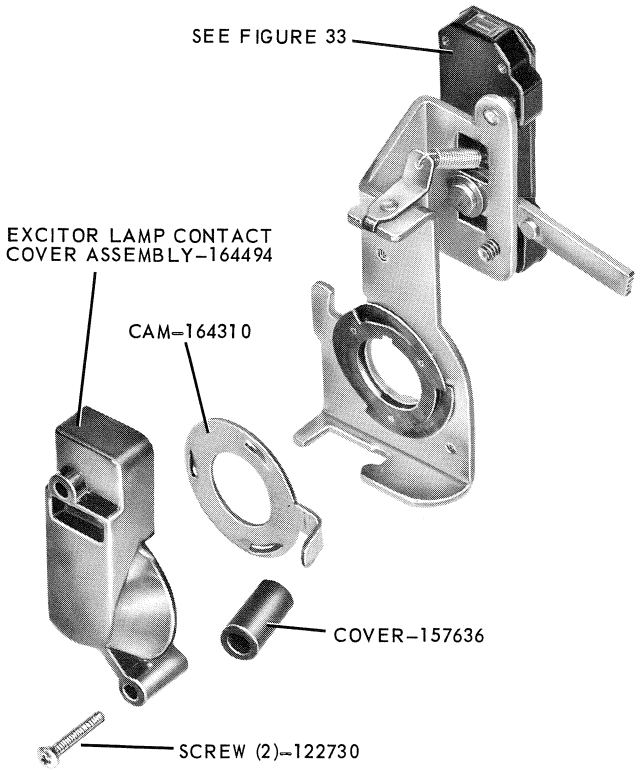


FIGURE 32

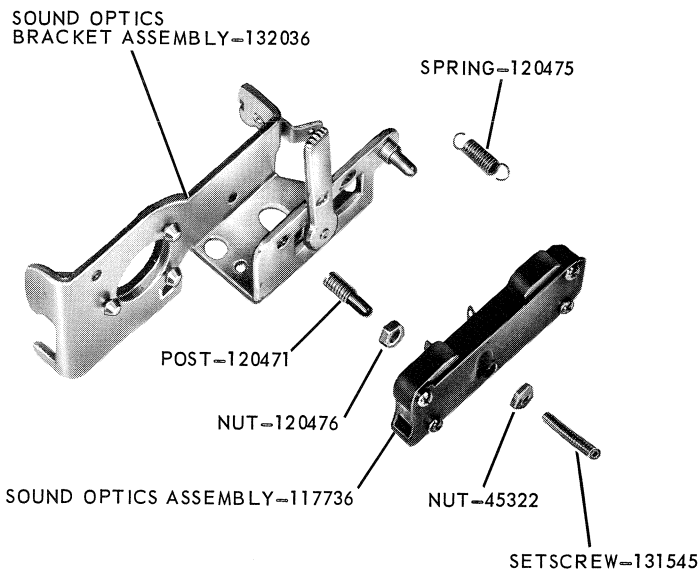


FIGURE 33

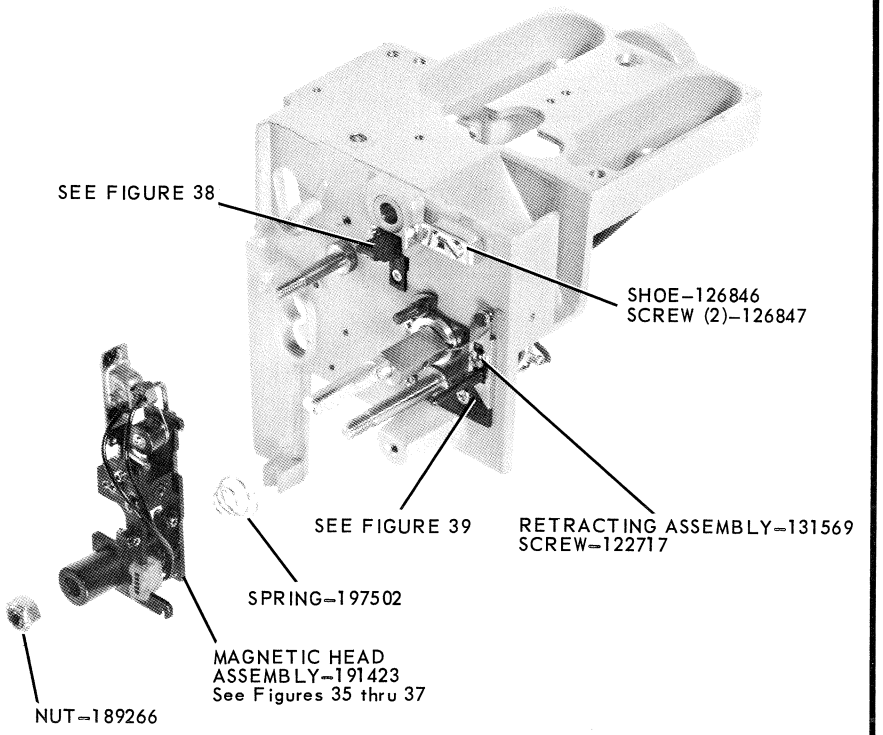


FIGURE 34

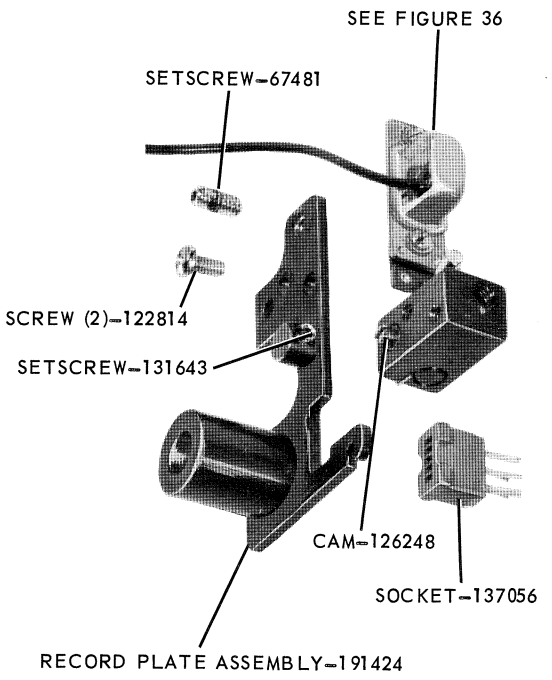


FIGURE 35

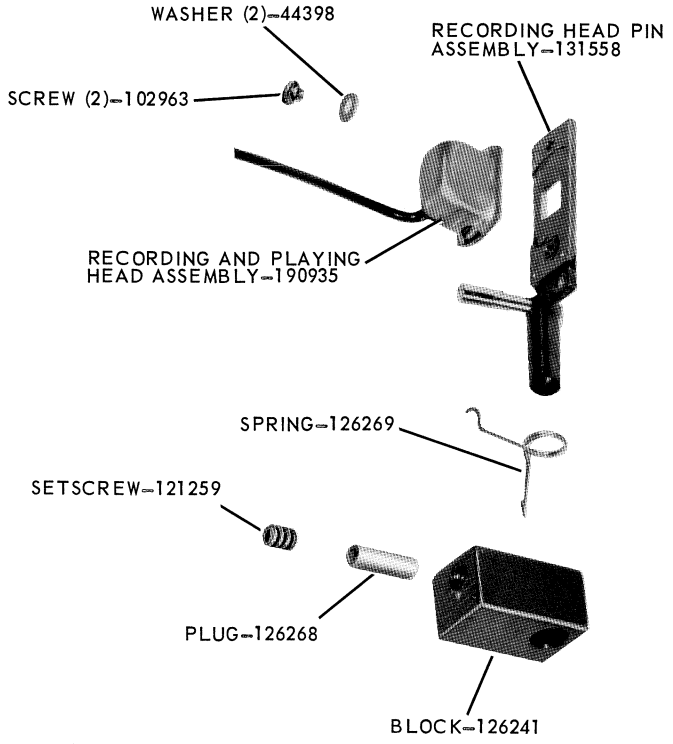


FIGURE 36

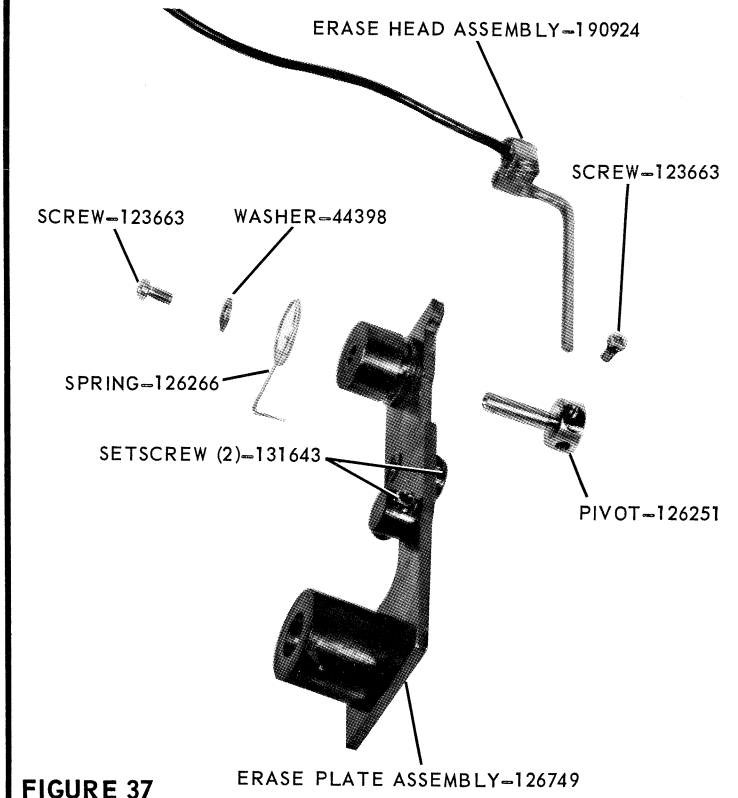


FIGURE 37

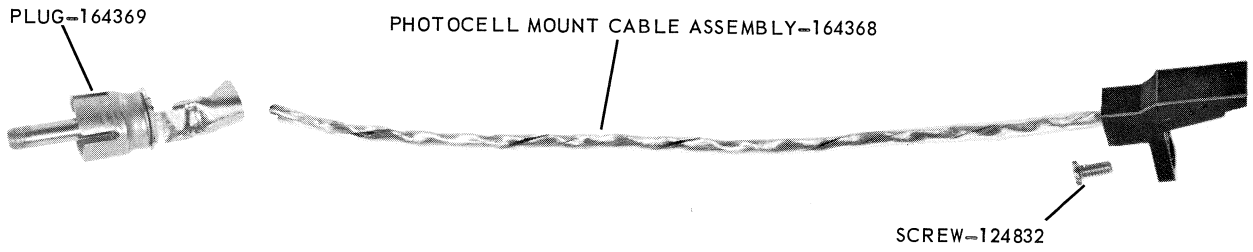


FIGURE 38

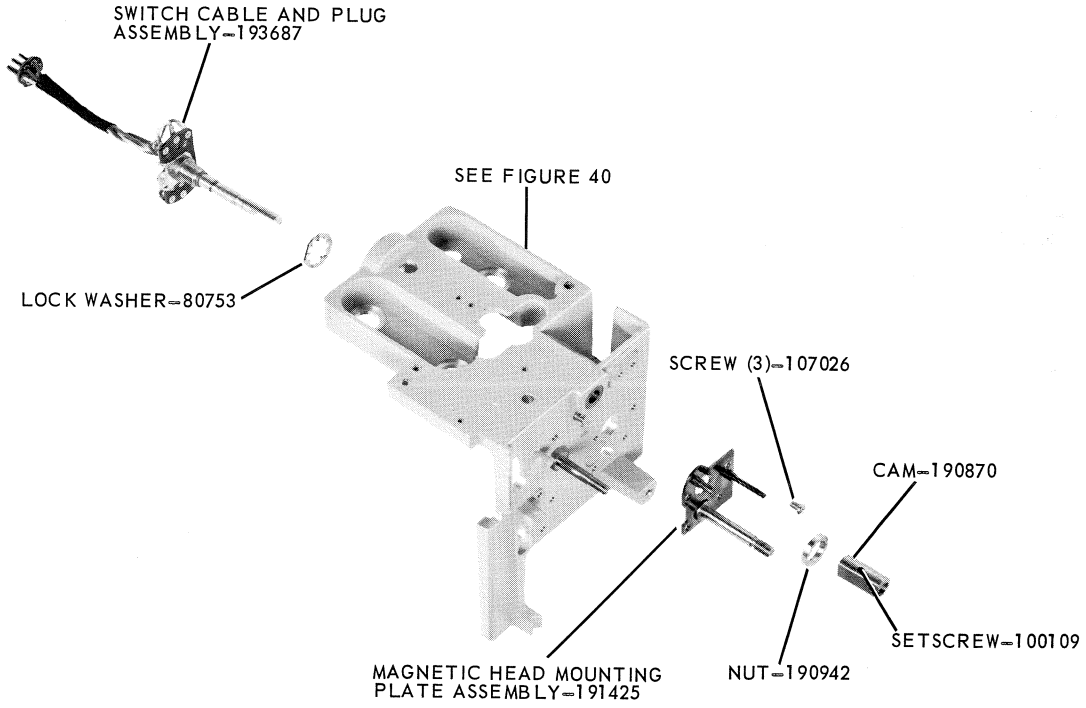


FIGURE 39

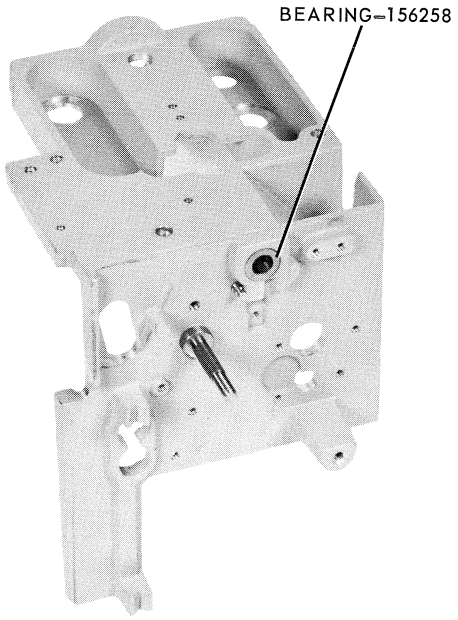


FIGURE 40 SOUND HEAD BRACKET ASSEMBLY–190929

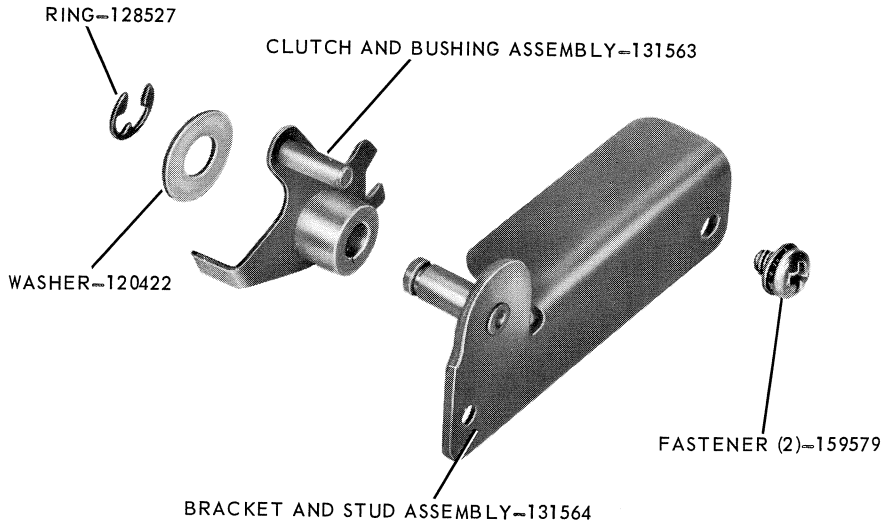


FIGURE 41

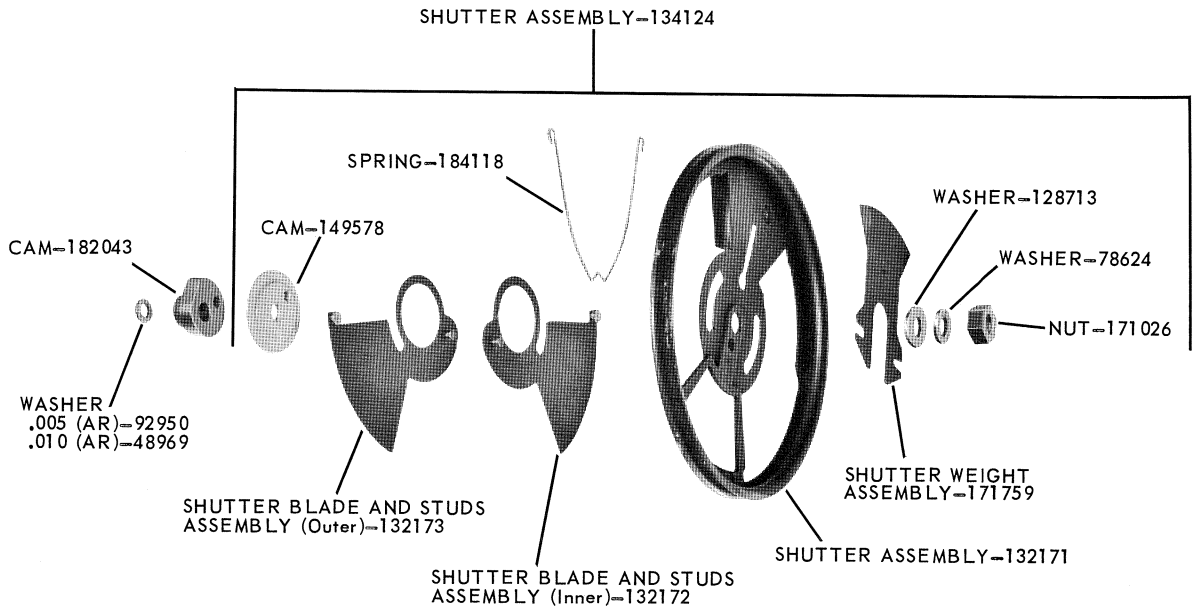


FIGURE 42

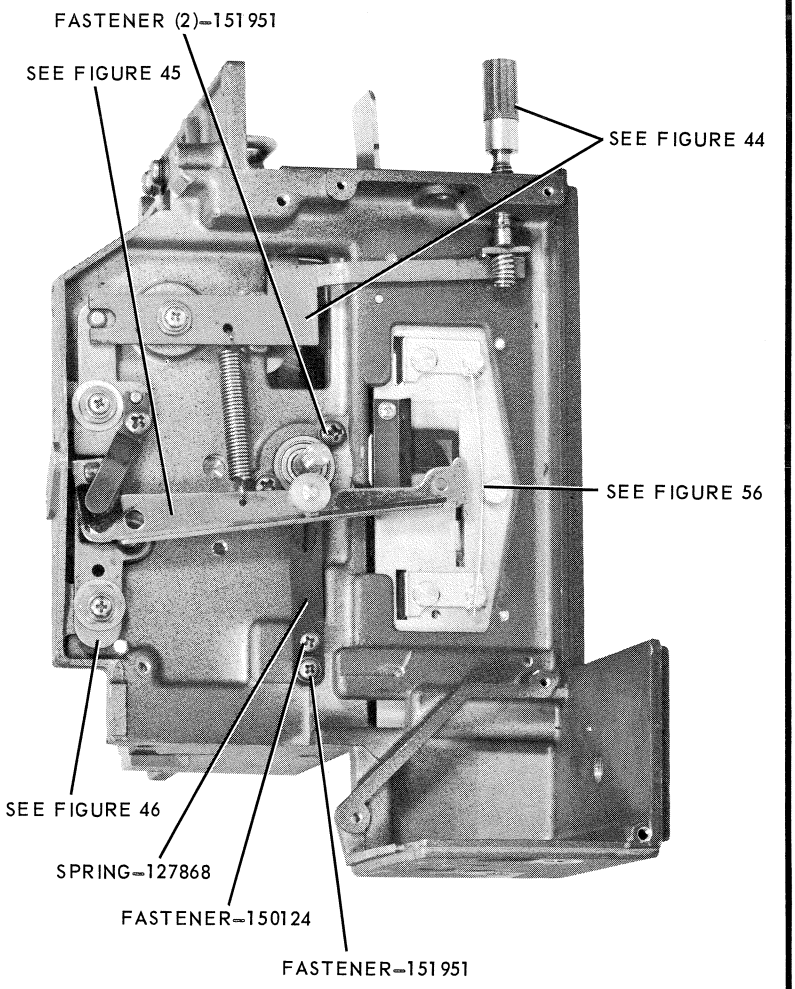


FIGURE 43

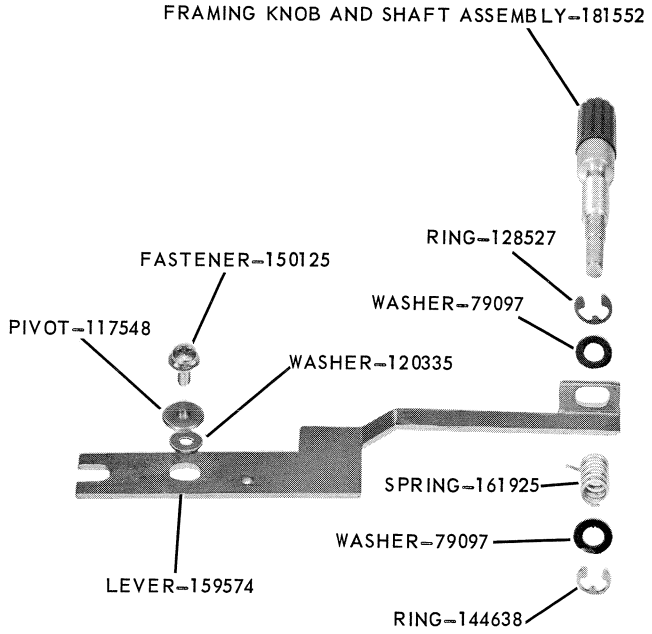


FIGURE 44

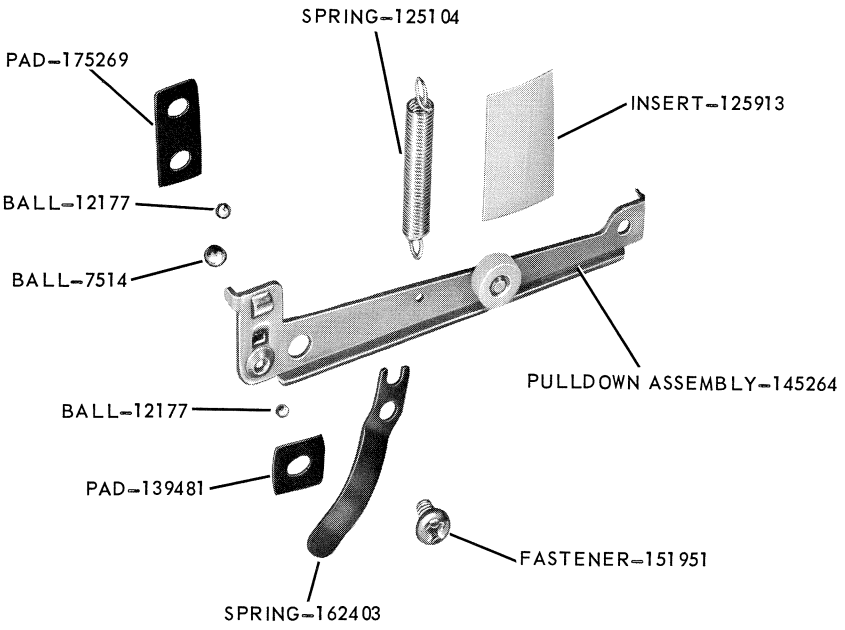


FIGURE 45

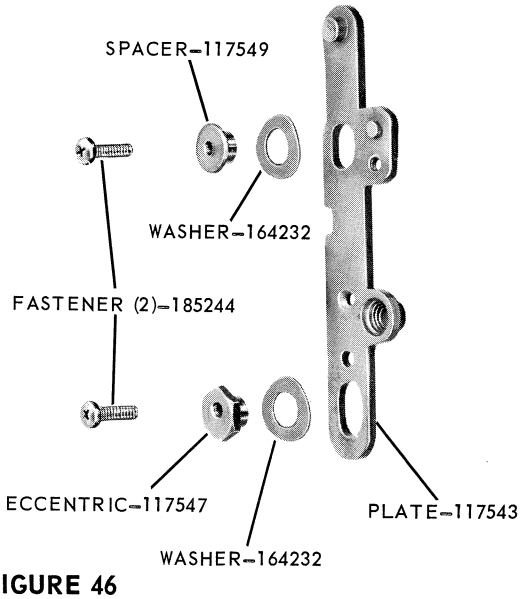


FIGURE 46

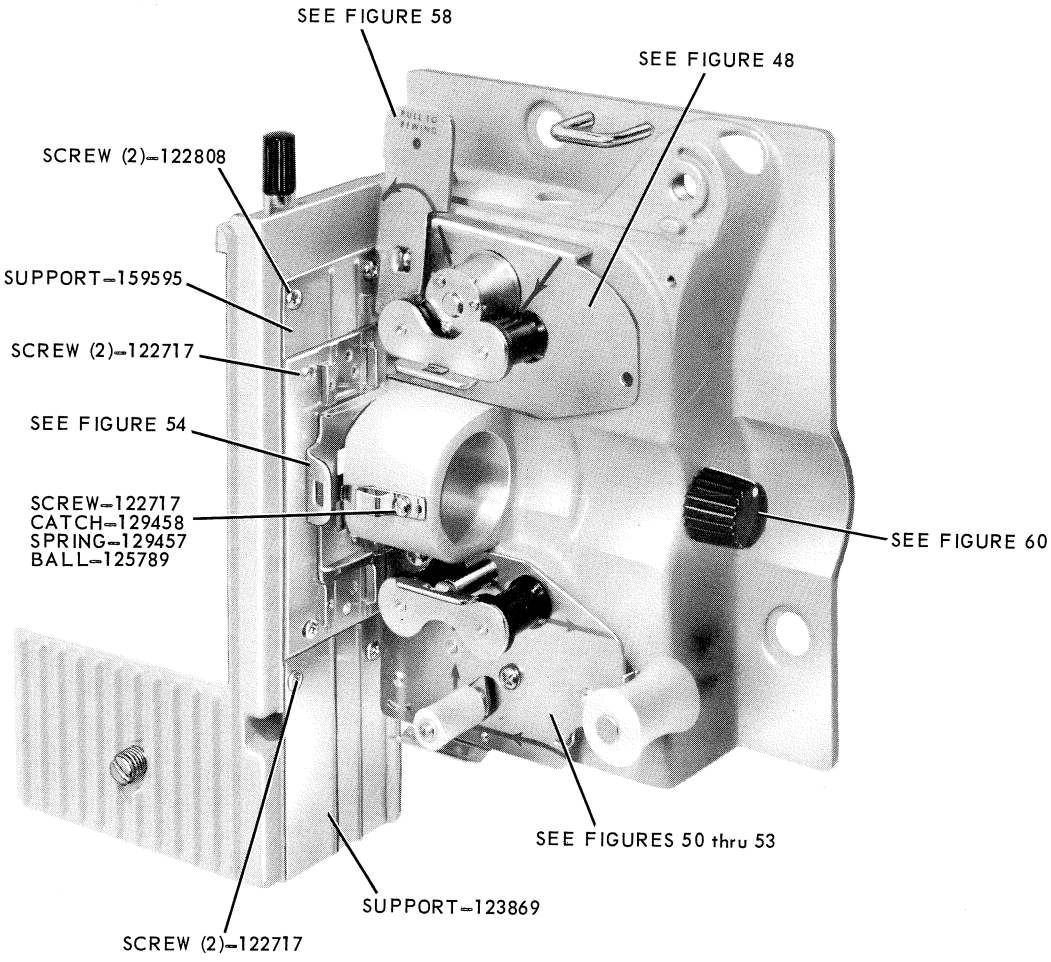


FIGURE 47

Order by PART NUMBER, NAME, and EQUIPMENT MODEL.

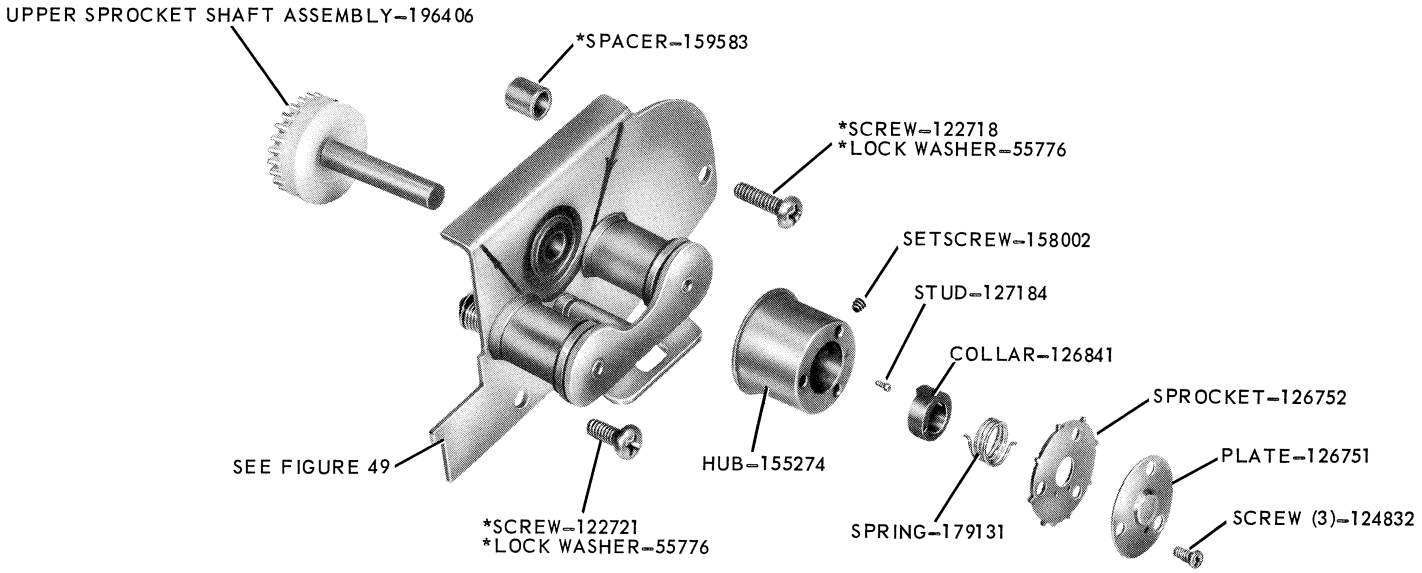


FIGURE 48

*Not included in assembly

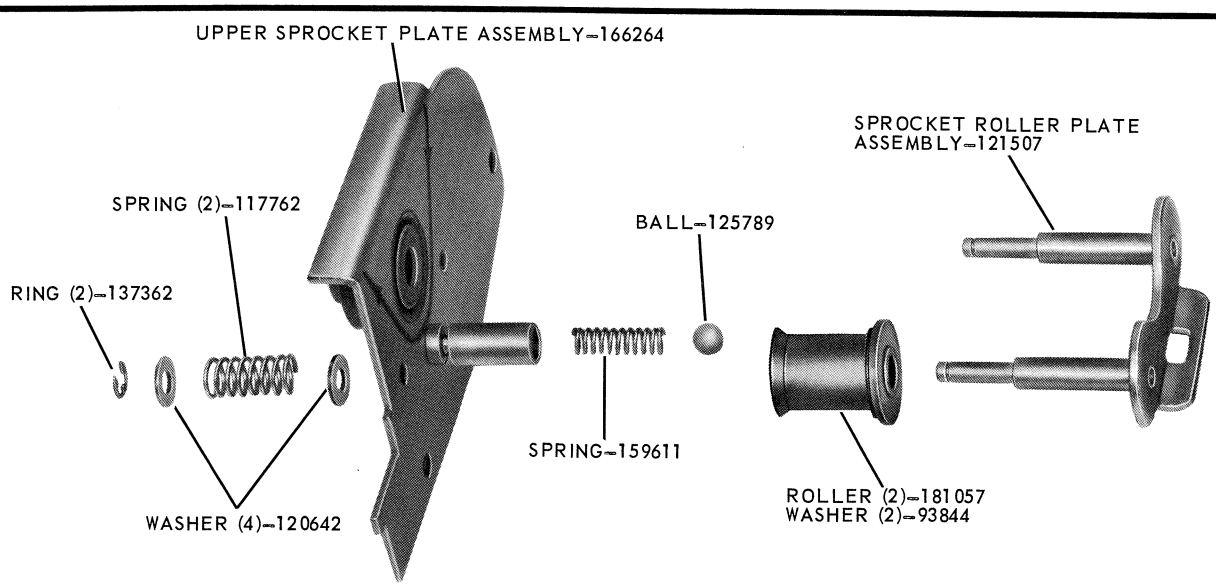


FIGURE 49

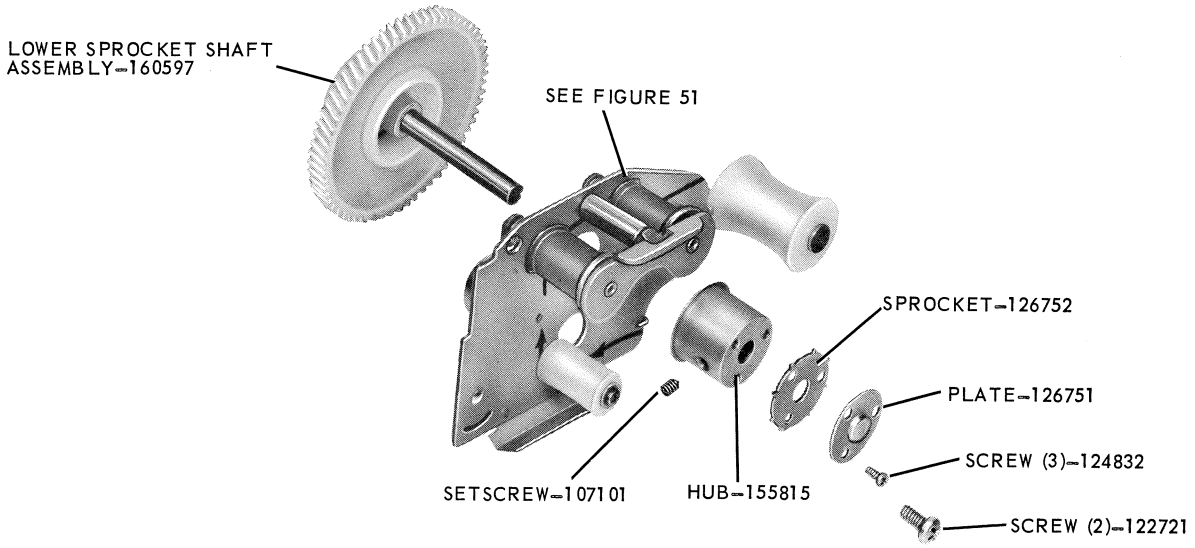


FIGURE 50

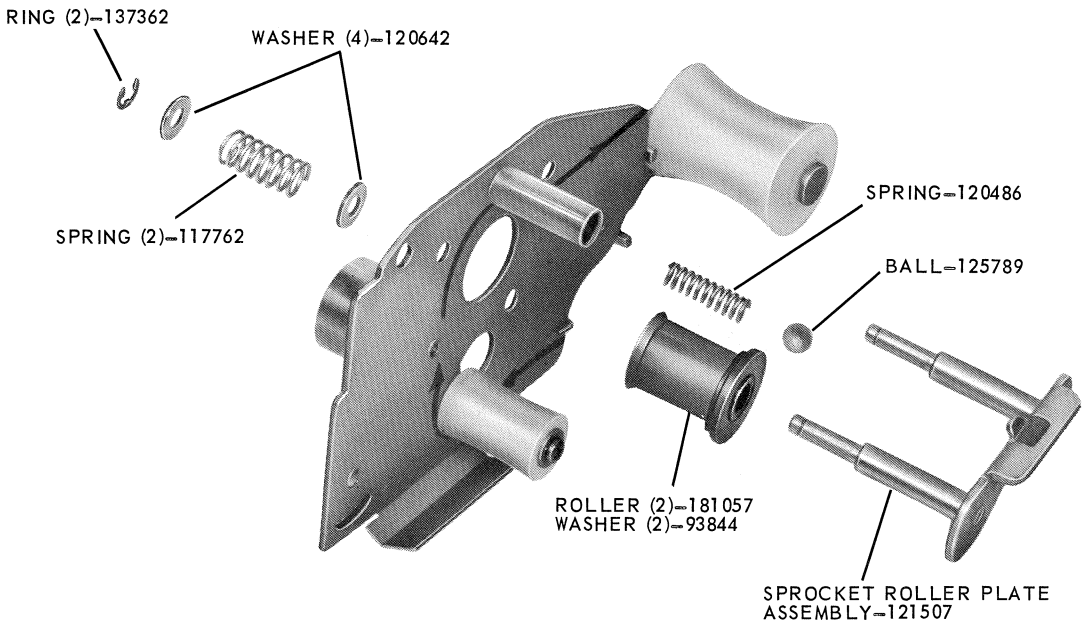


FIGURE 51 LOWER SPROCKET PLATE ASSEMBLY–181055

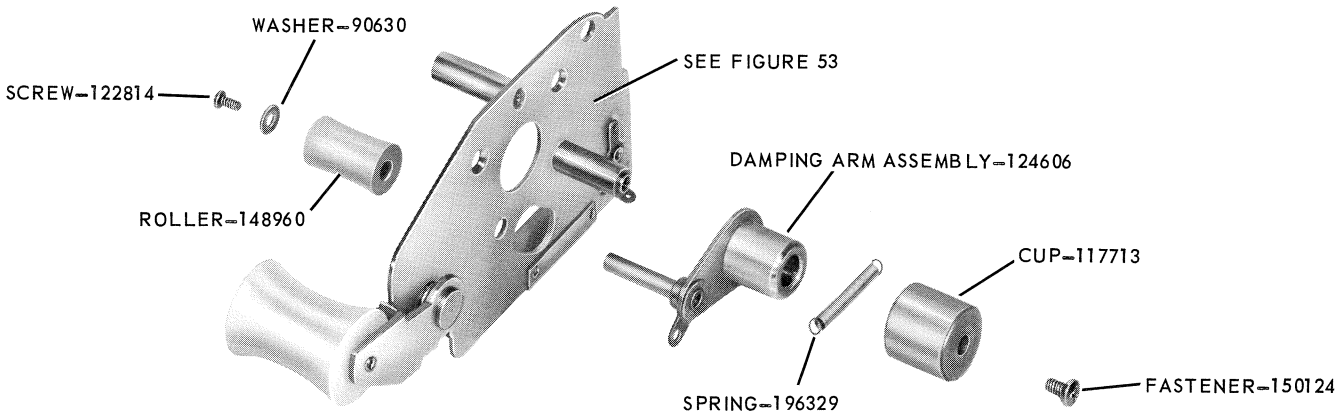


FIGURE 52

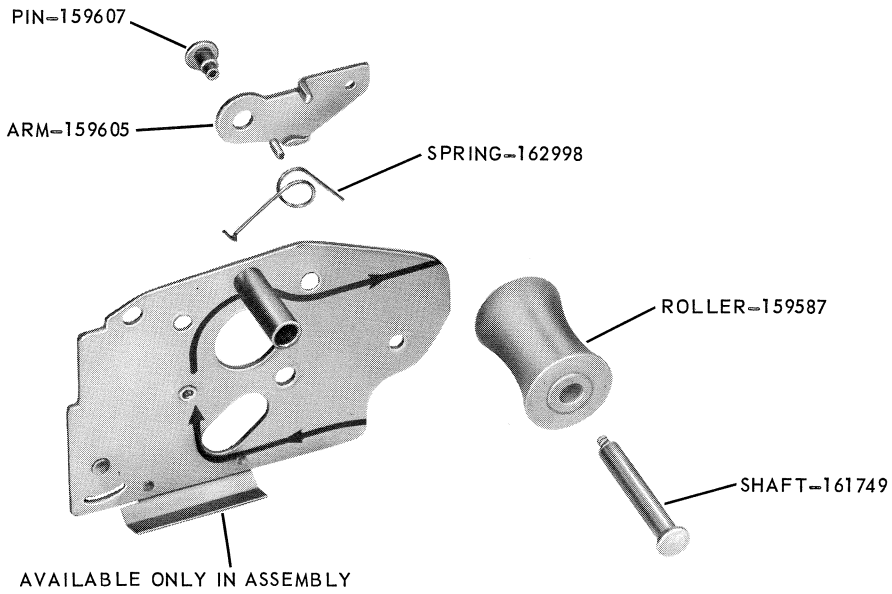


FIGURE 53

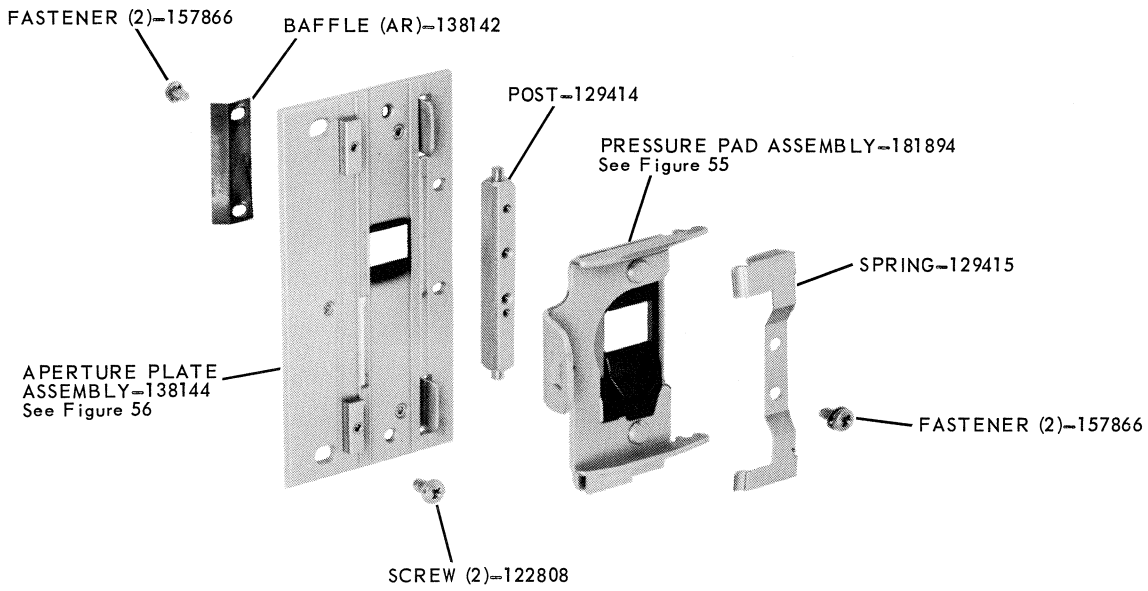


FIGURE 54 APERTURE PLATE AND PAD ASSEMBLY–181893

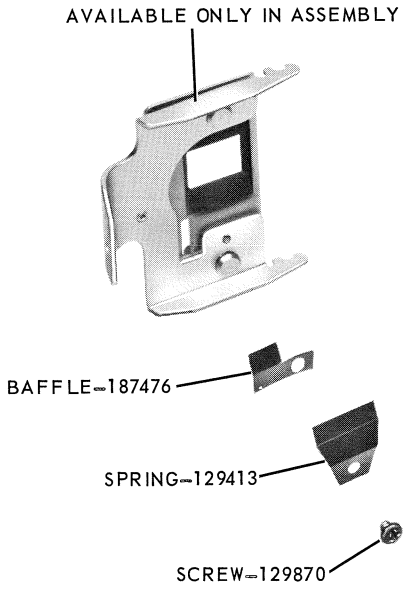


FIGURE 55 PRESSURE PAD ASSEMBLY–181894

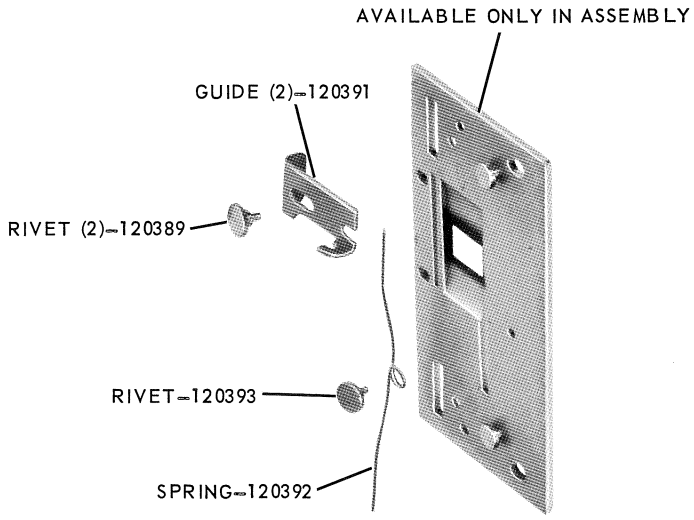


FIGURE 56 APERTURE PLATE ASSEMBLY–138144

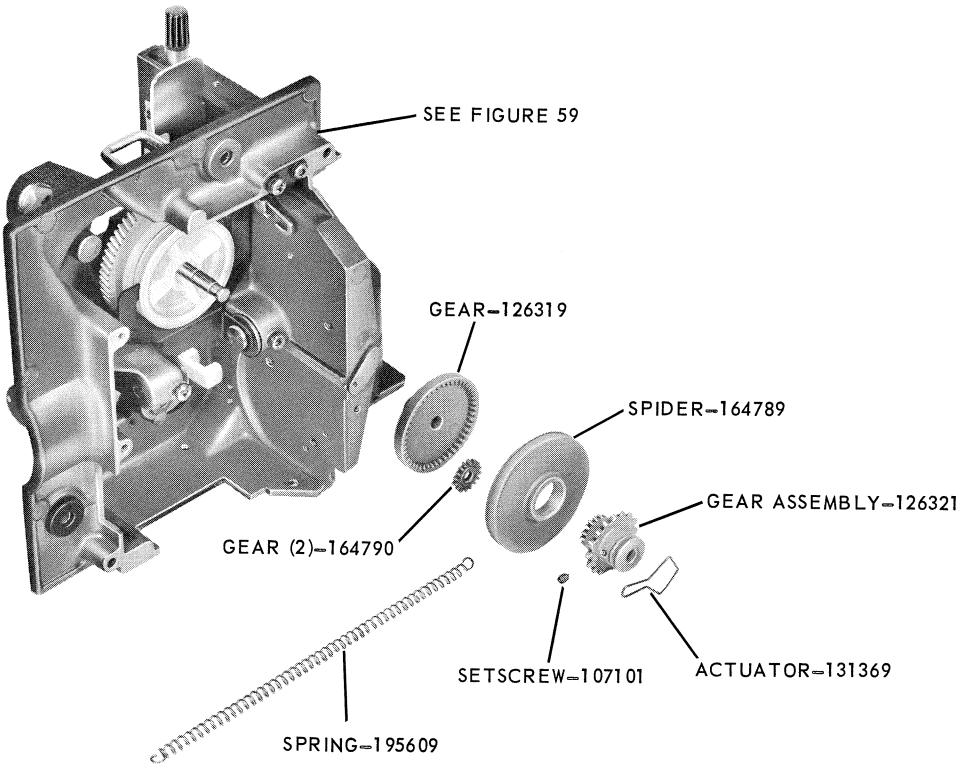


FIGURE 57

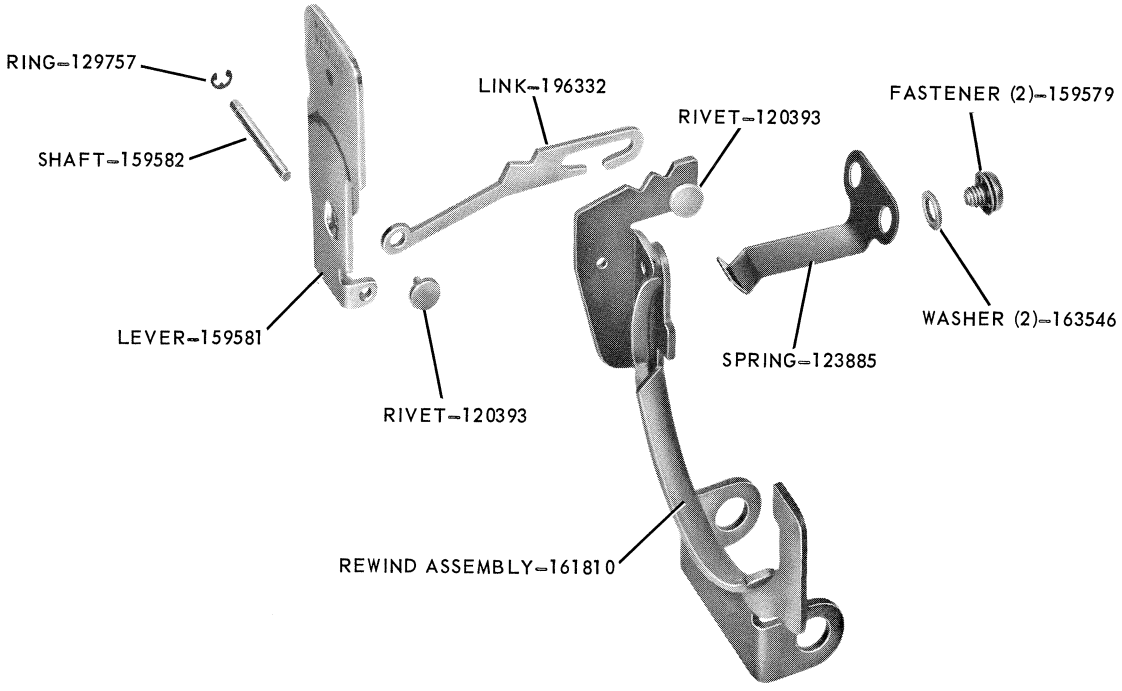


FIGURE 58

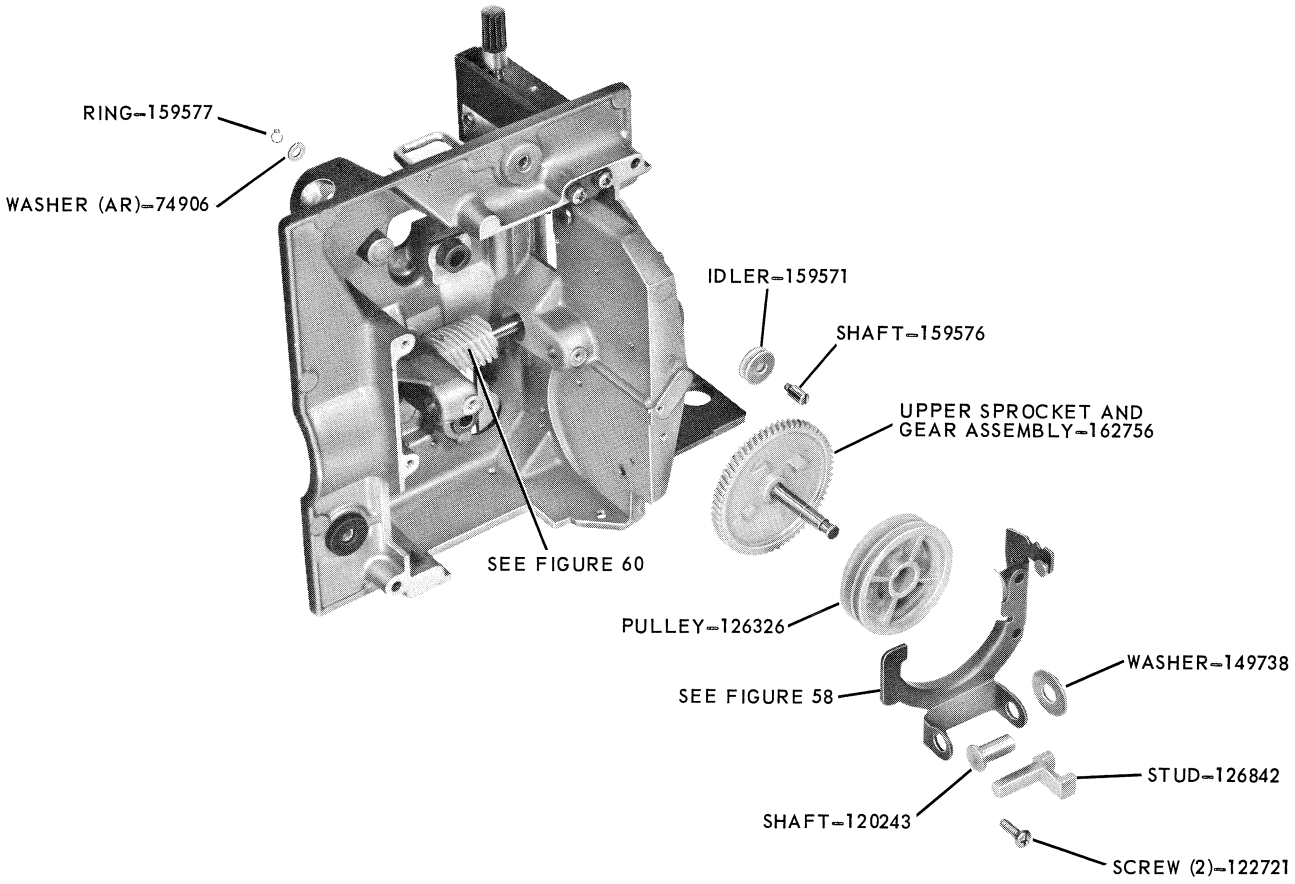


FIGURE 59

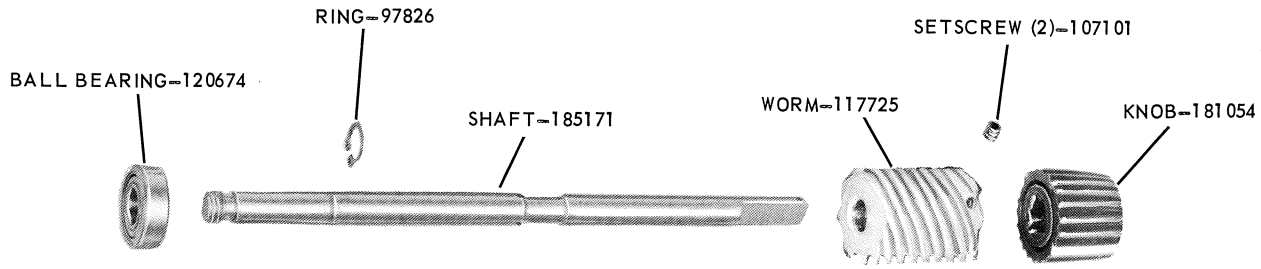
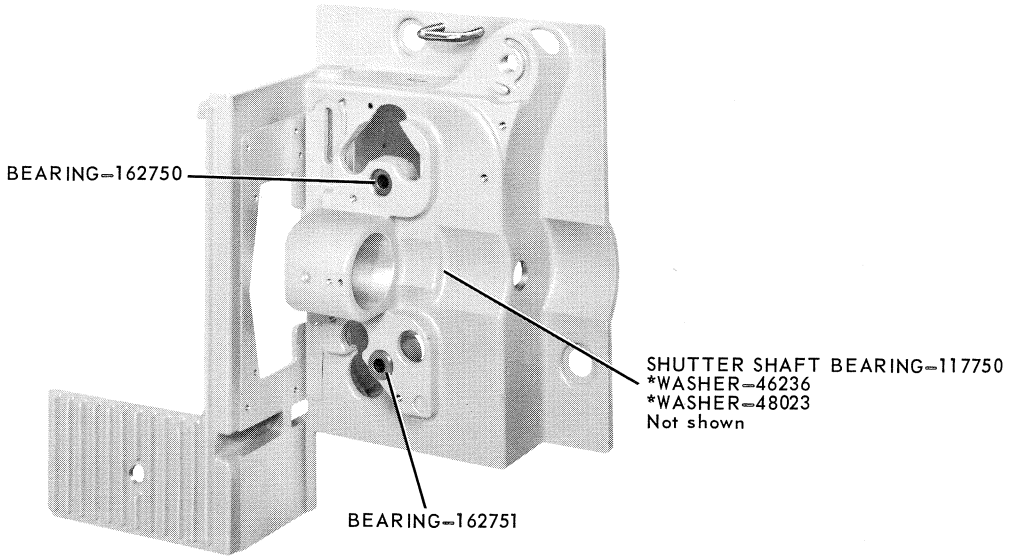


FIGURE 60



*Not included in Assembly

FIGURE 61 MECHANISM HOUSING ASSEMBLY–181004

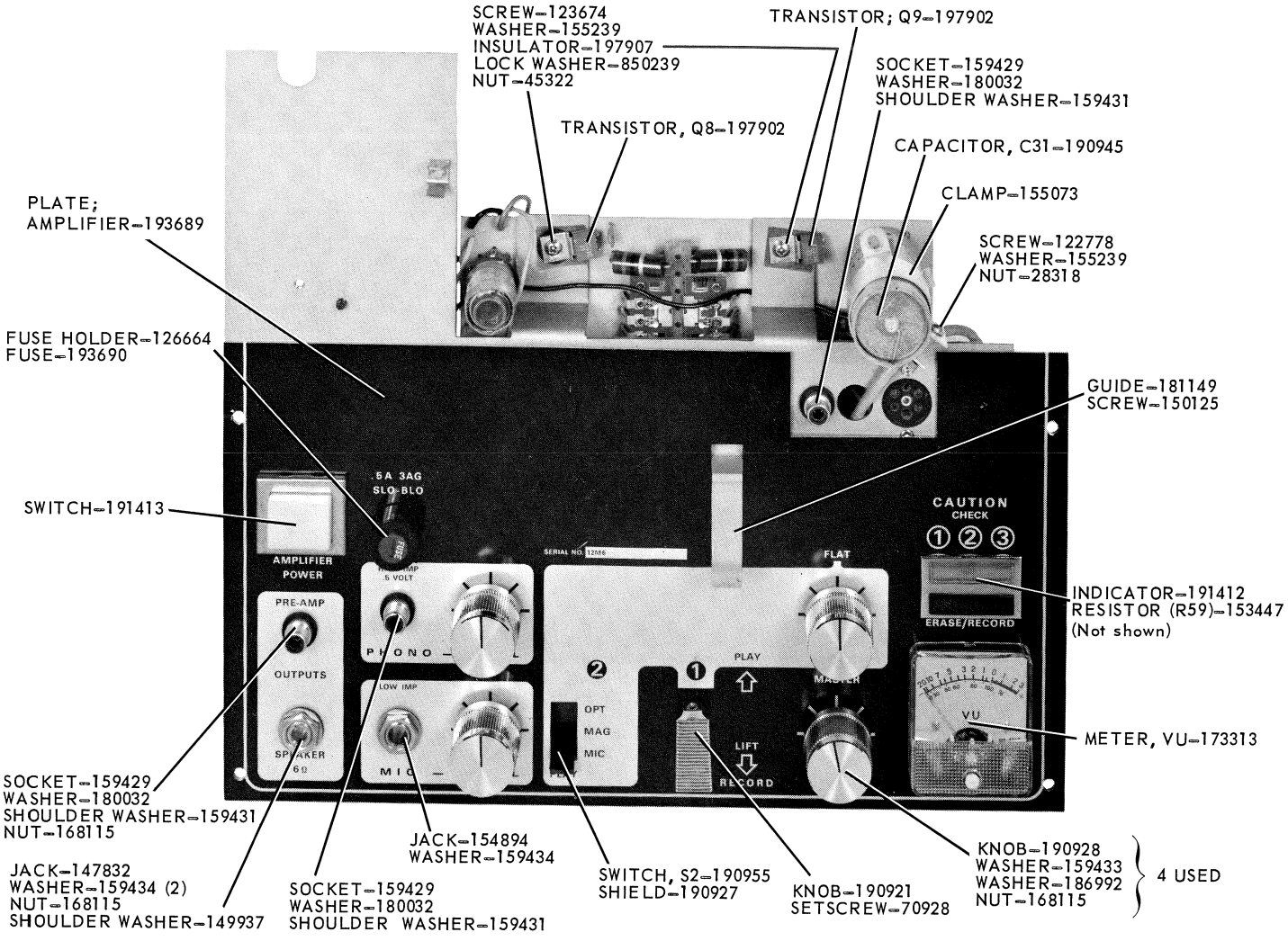


FIGURE 62 AMPLIFIER ASSEMBLY COMPLETE–190863

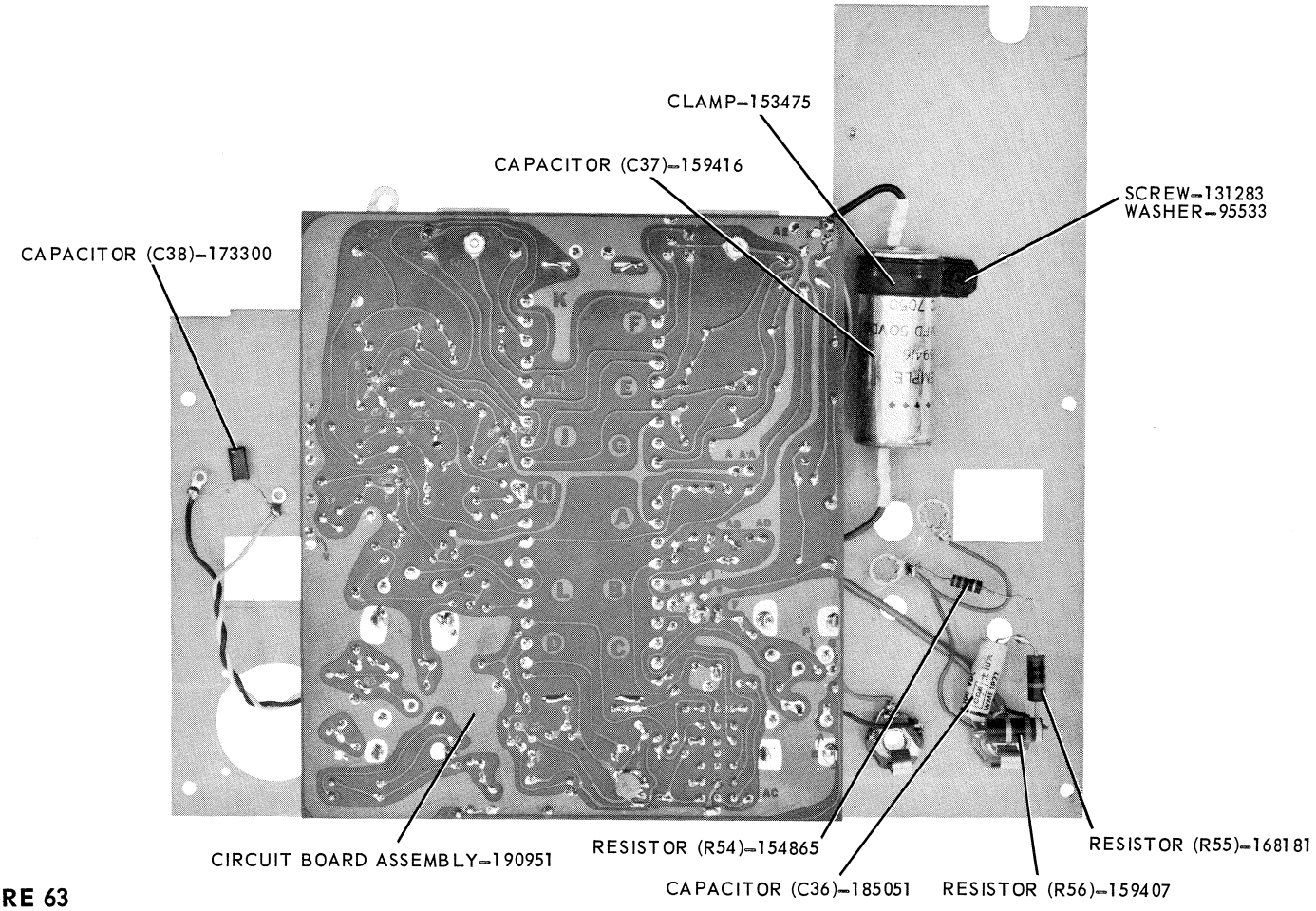


FIGURE 63

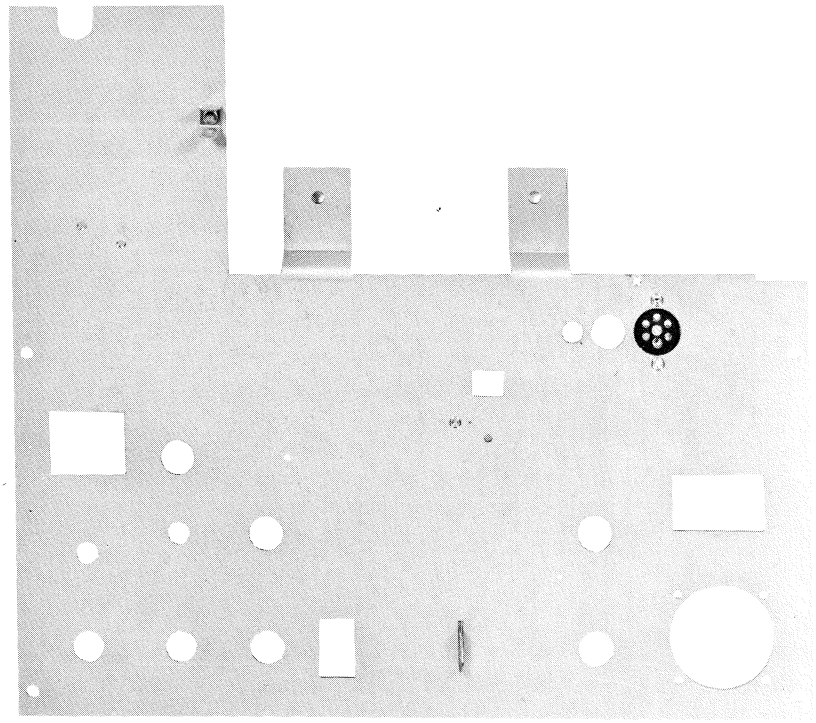


FIGURE 64 AMPLIFIER SUPPORT PLATE ASSEMBLY–190952

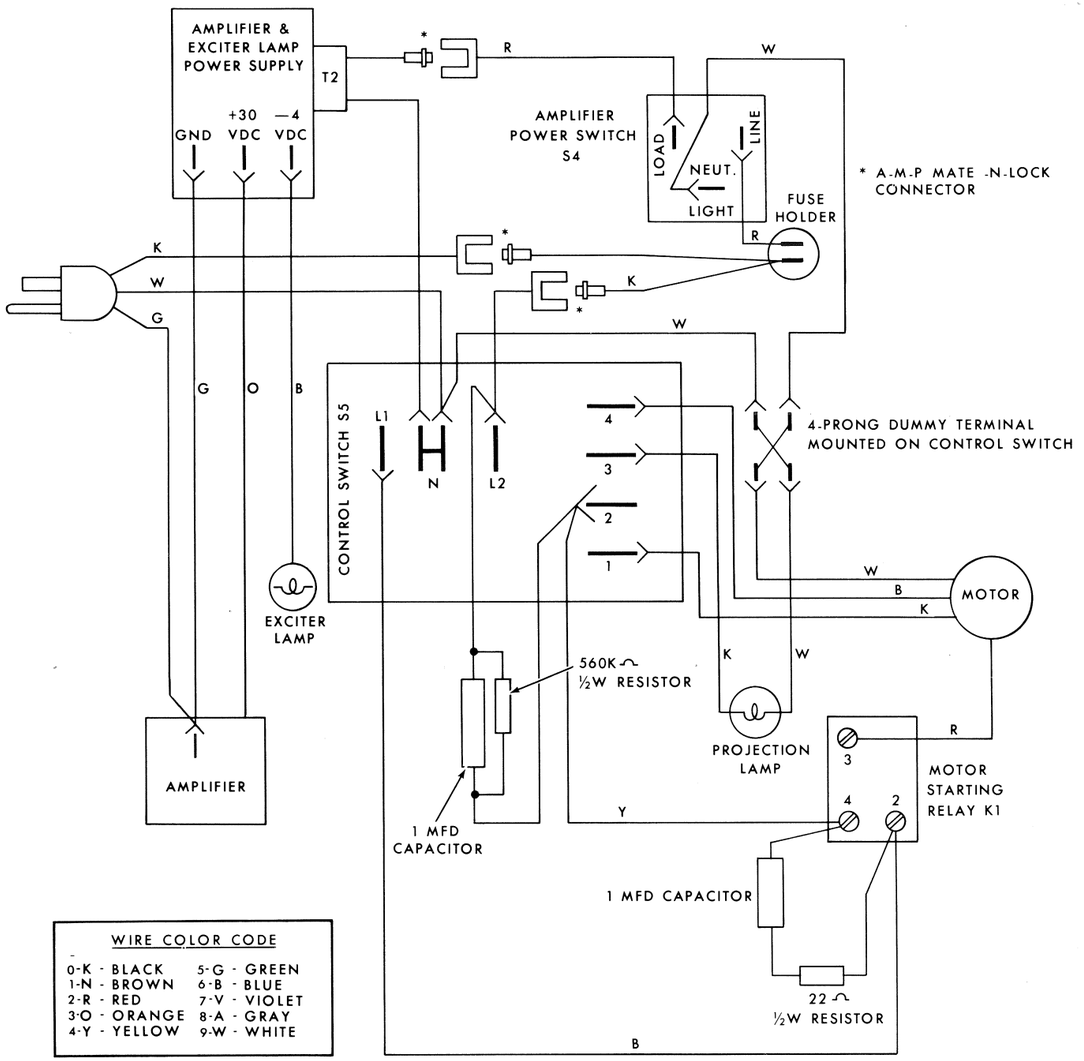


FIGURE 65 WIRING DIAGRAM–PROJECTOR

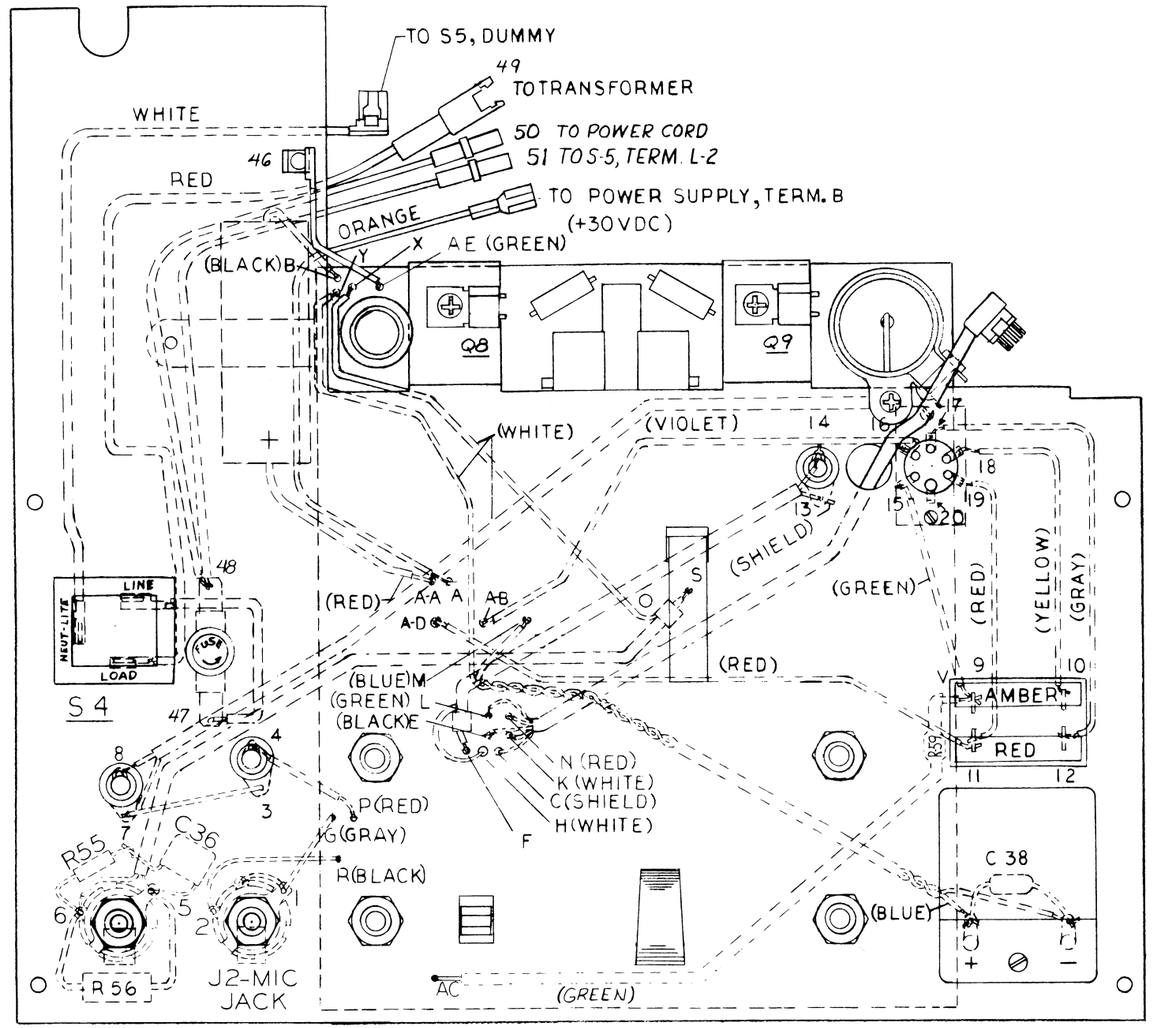


FIGURE 66 WIRING DIAGRAM–AMPLIFIER ASSEMBLY, COMPLETE

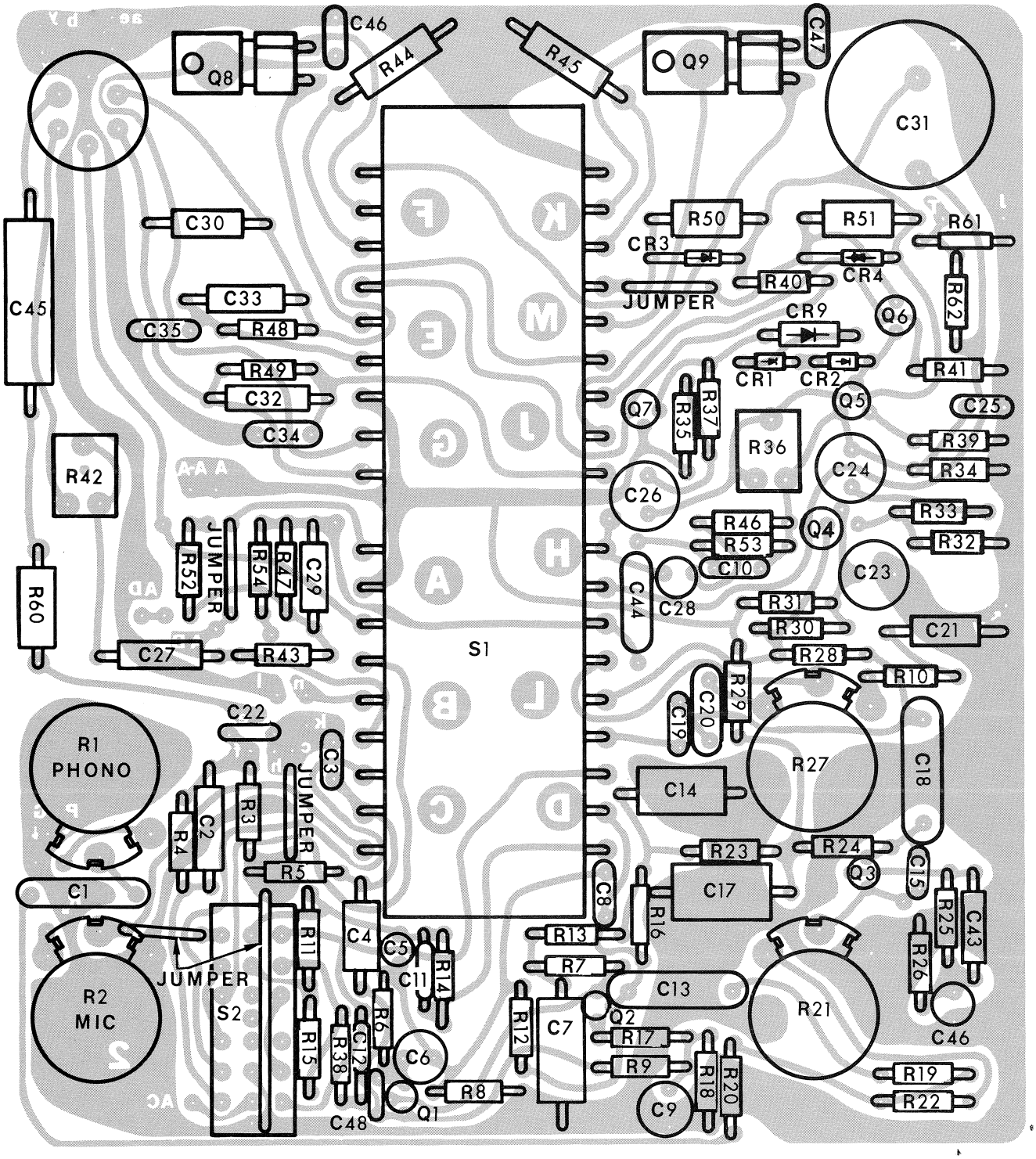
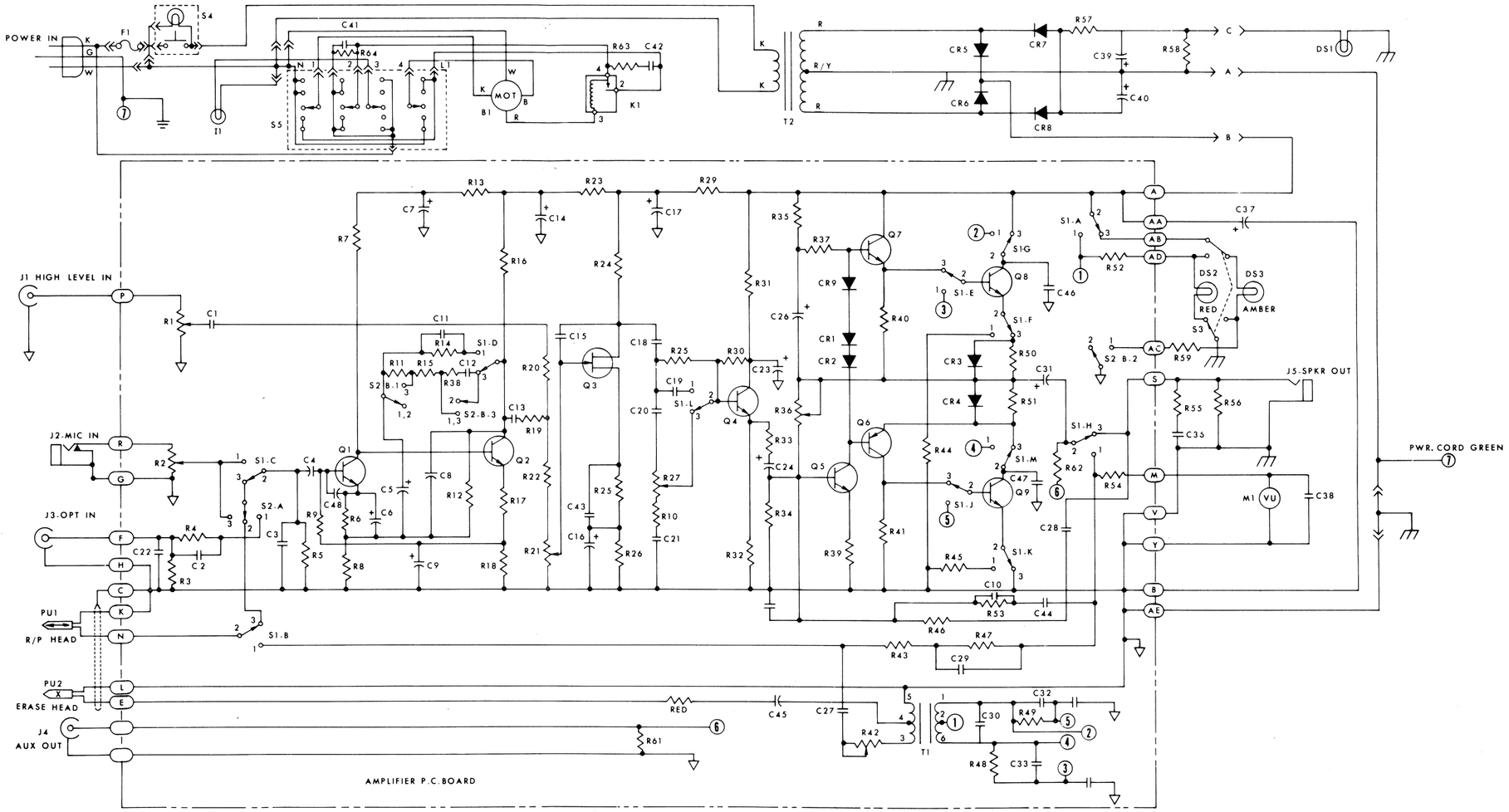


FIGURE 67 CIRCUIT BOARD ASSEMBLY–190951



C1	186554	.1 MFD 50V dc
C2	173300	.01 MFD ±5% 50V dc
C3	164757	.001 MFD 50V dc
C4	191404	2 MFD ELECT.
C5	173302	10 MFD 15 V dc ELECT.
C6	173297	100 MFD 10V dc ELECT.
C7	168096	10 MFD 25V dc ELECT.
C8	159411	50 PF
C9	173302	10 MFD 15V dc ELECT.
C10	173308	220 PF
C11	173307	500 PF 50V dc
C12	190949	.0015 MFD ±5% 50V dc
C13	186554	.1 MFD 50V dc
C14	191403	100 MFD 25V dc ELECT.
C15	179340	5 PF ±20%
C16	173302	10 MFD 15V dc ELECT.
C17	191403	100 MFD 25V dc ELECT.
C18	186554	.1 MFD 50V dc
C19	173307	500 PF 50V dc
C20	154712	.002 MFD 50V dc
C21	190950	.0039 MFD 50V dc
C22	154712	.002 MFD 50V dc
C23	173297	100 MFD 10V dc ELECT.
C24	173302	10 MFD 15V dc ELECT.
C25	173308	220 PF
C26	191402	30 MFD 25V dc ELECT.
C27	173296	.0033 MFD 50V dc
C28	173302	10 MFD 15V dc ELECT.
C29	191401	.0047 MFD 30V dc
C30	173303	.022 MFD 50V dc
C31	190945	1300 MFD 35V dc ELECT.
C32	173300	.01 MFD 50V dc

AMPLIFIER NOMENCLATURE

C33	173300	.01 MFD 50V dc
C34	173307	500 PF 50V dc
C35	173307	500 PF 50V dc
R1	190875	1 MEG Ω PHONO LEVEL CONTROL-AUDIO
R2	190876	2K Ω MIKE LEVEL CONTROL-AUDIO
R3	168031	5.1K Ω ±5%
R4	168031	5.1K Ω ±5%
R5	168031	5.1K Ω ±5%
R6	168032	6.8K Ω
R7	168039	30K Ω
R8	160671	160K Ω
R9	143303	560K Ω
R10	153447	200 Ω
R11	168037	20K Ω ±5%
R12	120512	1.5 MEG Ω
R13	112546	2.7K Ω
R14	168037	20K Ω ±5%
R15	168066	39K Ω ±5%
R16	154865	9.1K Ω
R17	173292	75 Ω
R18	154866	5.6K Ω
R19	126396	270K Ω
R20	126396	270K Ω
R21	190873	500K Ω VOLUME CONTROL-AUDIO
R22	161824	51K Ω ±5%
R23	151434	3.9K Ω
R24	161824	51K Ω ±5%
R25	160557	2.4K Ω
R26	152753	7.5K Ω
R27	190879	1 Meg Ω (LIN.) TONE CONTROL
R28	868663	100K Ω
R29	147756	1.8K Ω
R30	175895	68K Ω
R31	154866	5.6K Ω
R32	119816	1K Ω
R33	119816	1K Ω
R34	168037	20K Ω
R35	126397	1.5K Ω
R36	191299	500K Ω (LIN.) AMP. BAL CON.
R37	120505	3.3K Ω
R38	168037	20K Ω ±5%
R39	174898	82 Ω
R40	153447	200 Ω
R41	153447	200 Ω
R42	190382	5K Ω (LIN.) REC. BIAS CON.
R43	140836	1.5K Ω ±5%
R44	175860	27Ω 2 WATT
R45	175860	27Ω 2 WATT
R46	161824	51K Ω ±5%
R47	168035	12K Ω ±5%
R48	078671	47K Ω
R49	078671	47K Ω
R50	173294	1Ω 1 WATT
R51	173294	1Ω 1 WATT
R52	153447	200 Ω
R53	161824	51K Ω ±5%
R54	154865	9.1K Ω
Q1	190948	NPN 2N5232A
Q2	190948	NPN 2N5232A
Q3	191407	FET 2N5458
Q4	191408	NPN 2N3859
Q5	191408	NPN 2N3859
Q6	191409	PNP D29E1
Q7	191410	NPN D33D21
Q8	191411	NPN D42C2
Q9	191411	NPN D42C2
R61	132147	330 Ω
R62	127195	470 Ω
C48	164757	.001 MFD. 50V dc
CR9	191405	RECTIFIER DZ-800
CR1	191405	RECTIFIER DZ-800
CR2	191405	RECTIFIER DZ-800
CR3	181037	EK-1 RECTIFIER
CR4	181037	EK-1 RECTIFIER
S1	189974	REC./PLAYBACK SWITCH
S2	190955	SWITCH, INPUT SELECTOR
T1	189973	OSCILLATOR COIL
C47	173307	500 PF 50V dc
C43	154712	.002 MFD 50V dc
C44	173303	.022 MFD 50V dc
C45	191404	2 MFD
C46	173307	500 PF 50V dc
R60	193412	5Ω ±5% 3 WATT

POWER SUPPLY NOMENCLATURE

C39	159634	1300 MFD 35V dc ELECT.
C40	159634	1300 MFD 35V dc ELECT.
CR5	181037	RECTIFIER, EK-1
CR6	181037	RECTIFIER EK-1
CR7	181037	RECTIFIER EK-1
CR8	181037	RECTIFIER, EK-1
R57	159633	25Ω 25 WATT
R58	154868	500Ω 2 WATT

PROJECTOR NOMENCLATURE

B1	189965	MOTOR
C36	185051	.22 MFD 50V dc
C37	159416	1500 MFD 50V dc ELECT.
C38	173300	.01 MFD 50V dc
C41	120501	.1 MFD 600V dc
C42	120501	.1 MFD 600V dc
DS1	120359	EXCITER LAMP
DS2,3	191412	RECORDING INDICATOR LAMP ASSY.
F1	193690	FUSE
I1	054909	LAMP PROJECTION
J1	159429	HIGH LEVEL INPUT JACK
J2	154894	MIC INPUT JACK
J3	159429	PHOTOCELL INPUT JACK
J4	159429	AUX OUTPUT JACK
J5	147832	SPEAKER JACK
K1	190874	RELAY, MOTOR STARTING
M1	173313	VUMETER
PU1	190935	REC./PLAYBACK HEAD
PU2	190924	ERASE HEAD
R55	168181	10Ω ±5% 1 WATT
R56	159407	47Ω 2 WATT
S3	189967	SWITCH, HEAD POSITION INDICATOR
S4	191413	SWITCH, AMPLIFIER POWER
S5	189972	SWITCH, PROJECTOR CONTROL
T2	190872	POWER TRANSFORMER
R59	153447	200Ω
R63	823764	22Ω

FIGURE 68 SCHEMATIC DIAGRAM

PART NO.	DESCRIPTION	FIG.
	*Lamp - Exciter, ANSI Code BSK, 6V, 1A, T-5 bulb, single contact, medium pre-focused base	12
	*KODAK Projection EKTANAR Lens, 2-inch, f/1.6 - Return to Rochester for repairs	1
	*Lamp - Projection, 750W, 115V, T-12 bulb, C-13D filament, ANSI Code DDB	12
7514	Ball - Carbon steel, 3/16	45
12177	Ball - Carbon steel, 1/8	45
13775	Lens - Condenser, rear	23
25883	Ball - Carbon steel, 3/32	14
26299	Nut - Hex mach screw, 8-32 x 11/32	21
28318	Nut - Hex, 6-32 x 5/16	62
31576	Nut - Hex, 8-32 x 11/32	16
33992	Lock Washer - Int. tooth, No. 10	25
37492	Nut - Hex, 5/16 - 24 x 1/2	17
42533	Nut - Hex mach, 6-32 x 5/16	6
44398	Washer - Recording and playing head assembly attaching screw	36
45322	Nut - Mach, hex, 4-40 x 1/4	31,62
46236	Washer - Take-up arm spacer	17
47317	Lock Washer - Int. tooth, No. 8	16
48023	Washer - Pulley and ratchet spacer	16
48969	Washer - Shutter complete assembly pulldown cam (.010-inch)	42
49402	Lock Washer - Int. tooth, No. 4	62
50088	Setscrew - Hex, socket, cup pt, 1/4-20 x 3/4	19
53768	Setscrew - Hex, socket, cup pt, 8-32 x 1/4	24
55776	Lock Washer - Int. tooth, Type A, No. 6	21
56786	Washer - Support post to projection case	5
57155	Nut - Hex mach screw, 4-40 x 1/4	23
58694	Plunger - Supply spindle	15
58696	Spring - Supply spindle plunger	15
67481	Setscrew - Hex, socket, cup pt, 4-40 x 1/4	35
69682	Lock Washer - Int. tooth, Type A, No. 6	6
70928	Setscrew - 6-32 x 1/4, Rec/Play knob	62
71638	Clamp - Lamp socket	22
74906	Washer - Upper sprocket retainer	59
75847	Washer - Support post to projector case	5
76529	Screw - Cap, hex, socket, 10-32 x 3/8	25
77219	Washer - Supply arm bearing retaining	14
78624	Washer - Shutter complete assembly	42
78671	Resistor - 47K ohms, 1/2W	67
79097	Washer - Framing shaft	44
80753	Lock Washer - Int. tooth, Type A, 3/8	39
80969	Washer - Take-up arm bracket	17
83373	Reflector - Projection lamp	22
86892	Washer - Sound optics bracket screw	31
87777	Screw - Lamp socket	22
88937	Plate - Projector case cover handle, bottom	7
90630	Washer - Damping roller screw	52
92950	Washer - Shutter complete assembly pulldown cam (.005-inch)	42
93844	Washer - Sprocket roller	49
95533	Washer - Plain, 5/32ID x 3/8OD x .049th	63
97826	Ring - Retaining, TRUARC No. 5100-25 or equivalent	60
100109	Setscrew - Hex, socket, cup pt, 5-40 x 1/8	39
101459	Fastener - Mach, min hd, 4-40 x 7/16	22
102963	Screw - Recording and playing head assembly to recording head pin assembly	36

*Listed in Kodak Price Catalog.

PART NO.	DESCRIPTION	FIG.
107026	Screw - Mach, min hd, 4-40 x 3/16	39
107101	Setscrew - Hex, socket, cone pt, 5-50 x 3/16	1
108546	Nut - Flywheel	20
109571	Setscrew - Hex, socket, cone pt, 4-40 x 1/8	28
110005	Rivet - Mechanism drive motor cover grille	11
116266	Rivet - Terminal strip	21
117165	Spring - Condenser lens separator	23
117543	Plate - Pulldown pivot	46
117547	Eccentric - Pulldown pivot plate adjusting	46
117548	Pivot - Framing lever	44
117549	Spacer - Pulldown pivot plate	46
117713	Cup - Damping bearing	52
117725	Worm - Shutter shaft	60
117736	Sound Optics Assembly	33
117750	Bearing - Mechanism housing shutter shaft	61
117762	Spring - Sprocket roller	49
119395	Washer - Switch control lever	27
119816	Resistor, 1K ohms, 1/2W	67
120213	Sleeve - Motor support	19
120243	Shaft - Rewind plate	59
120335	Washer - Lamp socket screw	22
120389	Rivet - Aperture plate guide	56
120391	Guide - Aperture plate	56
120392	Spring - Aperture plate side guide	56
120393	Rivet - Aperture plate side guide	56
120422	Washer - Motor support	19
120438	Link - Pressure roller equalizing	29
120444	Grommet	16
120445	Sleeve - Take-up arm	16
120456	Bearing - Flywheel shaft ball	28
120466	Spring - Sound optics bracket	30
120468	Eccentric - Sound optics bracket	31
120471	Post - Sound optics	33
120475	Spring - Sound optics mount	32
120476	Nut - Sound optics adjusting	33
120486	Spring - Sprocket guard	51
120501	Capacitor - 0.1mfd, 600V dc	19
120505	Resistor, 3.3K ohms, 1/2W	67
120512	Resistor - 1.5M ohms, 1/2W	67
120642	Washer - Sprocket roller	49
120672	Clip - Supply spindle reel	15
120674	Bearing - Shutter shaft	60
120986	Washer - Flywheel shaft ball bearing spacer	28
121259	Setscrew - Hex, socket, cup pt, 4-40 x 1/8	36
121507	Sprocket Roller Plate Assembly	49
121510	Condenser Mount Assembly	22
121517	Pressure Roller Arm Assembly	29
122233	Washer - Supply arm	13
122666	Screw - Mach, pan hd, 4-40 x 3/8	31
122686	Screw - Wood, 1/2-inch, round hd, No. 8	2
122706	Screw - Mach, pan hd, 8-32 x 3/8	16
122713	Screw - Mach, pan hd, 6-32 x 1/2	1
122714	Screw - Mach, flat hd, 1-72 x 1/4	1
122717	Screw - Mach, pan hd, 4-40 x 3/16	10
122718	Screw - Mach, pan hd, 6-32 x 5/8	48
122720	Screw - Mach, pan hd, 4-40 x 5/16	31
122721	Screw - Mach, pan hd, 6-32 x 5/16	48
122730	Screw - Mach, pan hd, 4-40 x 5/8	22
122767	Screw - Mach, pan hd, 10-32 x 1	5

PART NO.	DESCRIPTION	FIG.
122778	Screw - Mach, pan hd, 6-32 x 1	10,62
122788	Screw - Mach, pan hd, 8-32 x 5/8	19
122791	Screw - Tap, Type AB, pan hd, No. 10 x 3/4	5
122808	Screw - Mach, pan hd, 4-40 x 1/8	47
122814	Screw - Mach, pan hd, 2-56 x 3/16	33
123363	Washer - Flywheel nut spacer	20
123639	Spring - Projector case handle post	7
123663	Screw - Mach, min hd, 0-80 x 1/8	11
123674	Screw - Bind. hd, 4-40 x 5/16	62
123679	Screw - Mach, oval hd, 8-32 x 3/4	3
123851	Belt - Film rewind	1
123856	Washer - Supply arm	13
123857	Washer - Supply arm spring	13
123869	Support - Lower loop	47
123885	Spring - Rewind shaft lever detent	58
123898	Spacer - Fan housing	21
123970	Screw - Mach, pan hd, 6-32 x 1 3/4	21
124128	Lock Washer - Int. tooth, 3/8	13
124214	Washer - Flywheel nut spacer, spring	20
124404	Sleeve - Support post	5
124606	Damping Arm Assembly	52
124832	Screw - Mach, min hd, 2-56 x 3/16	38
125104	Spring - Pulldown up and down	45
125348	Washer - Mechanism drive motor cover grille rivet	11
125349	Washer - Film guide roller snubber rivet	10
125789	Ball - Nylon, 3/16	47
125854	Gromment	5
125913	Insert - Pulldown up and down spring	45
126241	Block - Magnetic head mounting	36
126248	Cam - Record head mounting	35
126250	Spring - Magnetic head assembly	29
126251	Pivot - Erase head assembly	37
126266	Spring - Erase plate and bearing assembly	37
126268	Plug - Magnetic head friction	36
126269	Spring - Recording head mounting	36
126284	Pawl - Take-up spindle	16
126319	Gear - Reverse drive	57
126321	Gear and Sprocket Drive Assembly	57
126326	Pulley - Rewind drive	59
126332	Chain - Flywheel	28
126396	Resistor, 270K ohms, 1/2W	67
126397	Resistor - 1.5K ohms, 1/2W	67
126664	Fuseholder	62
126674	Bracket - Speaker cable	2
126749	Erase Plate and Bearing Assembly	37
126751	Plate - Sprocket end	48
126752	Sprocket - Hub	48
126841	Collar - Upper sprocket hub	48
126842	Stud - Rewind plate	59
126846	Shoe - Film support	34
126847	Screw - Film support shoe	34
127184	Stud - Sprocket drive	48
127868	Spring - In and out	43
128527	Ring - Retaining, TRUARC No. 5133-18 or equivalent	41
128713	Washer - Shutter complete assembly	42
128967	Rivet - Case hinge assembly	1
129404	Roller - Pressure	29
129413	Spring - Pressure pad	55
129414	Post - Pressure pad hinge	54

PART NO.	DESCRIPTION	FIG.
129415	Spring - Gate mounting	54
129457	Spring - Projection lens retaining	47
129458	Catch - Film gate	47
129461	Spring - Loop former arm assembly	30
129464	Rivet - Loop restorer	30
129465	Handle - Loop restoring roller	29
129757	Ring - Retaining, TRUARC No. 5133-9 or equivalent	58
129870	Screw - Mach, pan hd, 2-56 x 5/64	55
130179	Loop Former Arm and Shaft Assembly	30
130340	Pin - Rewind pulley	14
131075	Ring - Retaining TRUARC No. 5133-12	26
131241	Plate - Elevating mechanism	8
131263	Washer - Elevating mechanism spring	8
131268	Washer - Elevating pinion	8
131283	Screw - Tap, Type F, pan hd, 6-32 x 3/8	4,63
131369	Actuator - Reverse take-up clutch	57
131395	Pulley - Motor	24
131433	Screw - Mach, bind, hd, 6-32 x 3/16	19
131545	Setscrew - Azimuth adjusting	33
131546	Spring - Pressure roller link	29
131558	Recording Head Pin Assembly	36
131563	Reverse Take-Up Clutch and Busing Assembly	41
131564	Reverse Take-Up Bracket and Stud Assembly	41
131569	Retracting Assembly	34
131643	Setscrew - Hex, socket, oval pt, 4-40 x 1/4	35
132036	Sound Optics Bracket Assembly	33
132171	Shutter Assembly	42
132172	Shutter Blade and Studs Assembly, Inner	42
132173	Shutter Blades and Studs Assembly, Outer	42
133282	Safety Arm and Hub Assembly	29
134124	Shutter Complete Assembly	42
137056	Socket - Record and erase head	35
137362	Ring - Retaining, TRUARC No. 5133-12 or equivalent	49
138142	Baffle - Aperture plate	54
138144	Aperture Plate Assembly	54
138151	Staple - Microphone cord strap	2
138229	Washer - Mechanism mounting bracket	4
138252	Ring - Retaining, TRUARC No. 5103-25 or equivalent	28
138254	Ring - Retaining, TRUARC No. X5133-31 or equivalent	8
138688	Grommet	1
139481	Pad - Pulldown pivot, small	45
140110	Washer - Take-up release lever spacer	16
140836	Resistor, 1.5K ohms, 1/2W	67
141285	Pin - Supply spindle	15
142849	Washer - Lamp socket screw	22
143177	Pivot - Supply arm	13
143179	Screw - Lamphouse cover lock	1
143303	Resistor - 560K ohms, 1/2W	67
144638	Ring - Retaining, TRUARC No. 5133-15 or equivalent	44
145169	Lamp Chimney Assembly	22
145170	Lamp Socket and Insulator Assembly	22
145264	Pulldown Assembly	45
146578	Screw - Tap, Type B, pan hd, No. 2 x 1/8	10
146581	Washer - Belt shifting lever roller and spring retaining	26
146816	Screw - Mach, pan hd, 8-32 x 3/8	21
147658	Loudspeaker	2
147756	Resistor, 1.8K ohms, 1/2W	67

PART NO.	DESCRIPTION	FIG.
147781	Screw - Mach, pan hd, 8-32 x 5/8	24
147832	Jack - Speaker	62
149578	Cam - In and out	42
149738	Washer - Rewind plate shaft	59
149937	Washer - Mike jack	62
150124	Fastener - Mach, pan hd, with lock washer, int. tooth, 4-40 x 3/16	29
150125	Fastener - Mach, pan hd, with lock washer, int. tooth, 4-40 x 5/16	22,62
150501	Spacer - Motor mounting bracket	19
151434	Resistor - 3.9K ohms, 1/2W	67
151702	Anchor - Loop former arm assembly spring	30
151913	Screw - Tap, Type AB, pan hd, No. 8 x 5/8	2
151951	Fastener - Mach, pan hd, with lock washer, int. tooth, 6-32 x 3/16	43
151952	Fastener - Mach, pan hd, with lock washer, int. tooth, 6-32 x 3/8	21
152753	Resistor - 9.5K ohms, 1/2W	67
153360	Roller - Belt shifting lever	26
153447	Resistor - 200 ohms, 1/2W	62,67
153475	Clamp - Capacitor	63
154712	Capcitor - .002mfp, 50V dc	67
154865	Resistor - R54, 9.1K ohms, 1/2W	63.67
154866	Resistor - 5.6K ohms, 1/2W	67
154868	Resistor - 500 ohms, 10%, 1/2W	21
154894	Jack - Microphone	62
155047	Screw - Mach, oval hd, 6-32 x 5/8	4
155055	Bracket - Elevating	8
155056	Plate - Elevating spacer	8
155058	Rack - Elevating mechanism	8
155059	Insert - Elevating knob	8
155065	Bearing - Elevating mechanism	8
155093	Clamp - Capacitor	62
155239	Washer - Capacitor clamp	62
155270	Flywheel Assembly	20
155274	Hub - Upper sprocket	48
155278	Flywheel Shaft and Sound Drum Assembly	28
155282	Ratchet - Flywheel	28
155285	Spacer - Flywheel	20
155590	Breadking Spring and Button Assembly	29
155815	Hub - Lower sprocket	50
156258	Bearing - Flywheel	40
156850	Nut - Control switch cam yoke pivot screw	27
157636	Cover - Exciter lamp release handle	12
157866	Fastener - Mach, pan hd, with lock washer, int. tooth, 2-56 x 3/16	54
158002	Setscrew - Hex, socket, cup pt, 4-40 x 3/32	48
158416	Fastener - Mach, pan hd, with lock washer, int. tooth, 6-32 x 1/2	25
158638	Spring - Condenser lens retaining	23
159164	Clamp - Power cord	4
159407	Resistor - 47 ohms, 2W	63,67
159411	Capacitor - 50pf	67
159416	Capacitor - 1500mfd, 50V dc, Elect.	63,67
159429	Socket - Phono input, solar cell input, auxiliary output	62
159431	Washer - Shoulder phono input, auxiliary output, solar cell input	62
159433	Washer - Shoulder, amplifier controls	62

PART NO.	DESCRIPTION	FIG.
159434	Washer - Speaker jack.	62
159465	Fastener - Mach, pan hd, with lock washer, int. tooth, 8-32 x 1	22
159512	Grille - Loudspeaker.	1
159513	Bracket - Mechanism mounting to case, top.	6
159516	Latch - Case	3
159521	Post - Projector case cover handle	7
159522	Pin - Projector case handle	6
159523	Plate - Projector case handle, top	6
159547	Yoke - Control switch cam	27
159548	Screw - Control switch cam yoke pivot	27
159563	Spring - Belt shifting lever actuating	26
159571	Idler - Take-up belt	59
159574	Lever - Framing	44
159576	Shaft - Take-up belt idler.	59
159577	Ring - Retaining, TRUARC No. 5100-21 or equivalent	16
159579	Fastener - Mach, pan hd, with lock washer, int. tooth, 6-32 x 1/4	19
159581	Lever - Rewind	58
159582	Shaft - Rewind lever link	58
159583	Spacer - Upper sprocket plate.	48
159587	Roller - Film guide and idler	10
159588	Shaft - Film guide roller, right	10
159595	Support - Upper loop	47
159605	Arm - Idler roller bearing	53
159607	Pin - Idler arm pivot.	53
159611	Spring - Upper sprocket guard detent	49
159633	Resistor - 25 ohms, 25W	21
159634	Capacitor - 1300mfd, 35V dc.	21
159667	Plate - Take-up reel arm tension adjusting	17
159670	Spacer - Lamphouse cover assembly	9
159947	Ring - Retaining, TRUARC No. 5133-18 or equivalent	16
160552	Spacer - Take-up arm bracket	17
160555	Spring - Take-up arm release lever.	16
160557	Resistor - 2.4K ohms, 1/2W	67
160597	Lower Sprocket Shaft Assembly.	50
160671	Resistor - 160K ohms, 1/2W.	67
160716	Take-Up Arm Spindle Assembly	18
160724	Control Switch Bracket Assembly	27
160761	Flywheel Shaft Sprocket and Pawl Assembly	28
161589	Grille - Case ventilation	4
161749	Shaft - Idler roller	53
161752	Washer - Take-up arm pivot spacer.	17
161793	Pivot - Take-up reel arm.	17
161810	Rewind Plate and Guide Assembly	58
161824	Resistor - 51K ohms, 1/2W	67
161907	Spring - Film guide roller shaft	10
161925	Spring - Framing shaft	44
162261	Fastener - Mach, pan hd, with lock washer, int. tooth, 8-32 x 3/8	22
162312	Spacer - Exciter lamp cover.	10
162403	Spring - Pulldown retaining	45
162677	Light Leak - Projector case	4
162750	Bearing - Mechanism housing assembly, upper	61
162751	Bearing - Mechanism housing assembly, lower	61
162756	Upper Sprocket Drive Shaft and Gear Assembly	59
162764	Pinion - Elevating mechanism.	8
162815	Lever - Switch control.	27
162914	Grille - Projector case for (bottom).	5

PART NO.	DESCRIPTION	FIG.
162998	Spring - Idler arm	53
163267	Terminal strip	21
163536	Washer - Elevating mechanism	8
163546	Washer - Rewind shaft lever detent spring fastener	58
163815	Post - Fanhouse support	19
164127	Screw - Mach, oval hd, 8-32 x 1	3
164128	Washer - Case screw finishing	3
164232	Washer - Pulldown pivot plate spring	46
164309	Shaft - Pressure roller	29
164310	Cam - Exciter lamp release	32
164368	Photocell Mount Cable Assembly	38
164369	Plug - Photocell cable	38
164494	Exciter Lamp Contact Cover Assembly	32
164757	Capacitor - .001mfd, 50V dc	67
164789	Spider - Reverse	57
164790	Gear - Reverse drive	57
165173	Supply Arm Spindle Assembly	15
166260	Spindle Plate and Pivot Assembly	16
166264	Upper Sprocket Plate Assembly	49
166899	Pivot - Belt shifting lever	26
168031	Resistor - 5.1K ohms	67
168032	Resistor - 6.8K ohms, 1/2W	67
168035	Resistor - 12K ohms	67
168037	Resistor - 20K ohms, 1/2W	67
168039	Resistor - 30K ohms, 1/2W	67
168066	Resistor - 39K ohms, 1/2W	67
168096	Capacitor - 10mfd, 25V dc, Elect.	67
168115	Nut - 3/8-32, Controls	62
168181	Resistor - R55, 10 ohms, 1W	63,67
168729	Washer - Loop restorer pivot	30
169626	Take-Up Pulley and Ratchet Assembly	16
170807	Post - Projector case handle	6
171026	Nut - Shutter complete assembly	42
171759	Shutter Weight Assembly	42
172250	Lever - Take-Up arm release	16
172252	Pin - Take-up arm	17
172254	Spring - Take-up arm	17
172287	Spacer - Control switch bracket	25
172561	Cam and Pinion Assembly	27
172991	Support - Mechaniam	22
173292	Resistor - 75 ohms, 1/2W	67
173294	Resistor - 1 ohm, 1W	67
173296	Capacitor - 10mfd, 15V dc, Elect.	67
173297	Capacitor - 100mfd, 10V dc, Elect.	67
173300	Capacitor - .01mfd, 50V dc	63,67
173302	Capacitor - 10mfd, 15V dc, Elect.	67
173303	Capacitor - .022mfd, 50V dc	67
173307	Capacitor - 500pf, 50V dc	67
173308	Capacitor - 220pf	67
173313	Meter - VU	62
173475	Washer - Projector case foot	5
174892	Resistor - 82 ohms, 1/2W	67
174930	Elevation Knob and Insert Assembly	8
175263	Pulley - Film supply arm	14
175269	Pad - Pulldown pivot, large	45
175860	Resistor - 27 ohms, 2W	67
175895	Resistor - 68K ohms, 1/2W	67
177215	Case Hinge Assembly	1
177274	Washer - Spacer, spring	16

PART NO.	DESCRIPTION	FIG.
177992	Washer - Motor fastener	24
178976	Belt - Shutter drive	19
179131	Spring - Upper sprocket drive	48
179340	Capacitor - 5pf	67
180032	Washer - Phono input, solar cell input, auxiliary output	62
180981	Handle - Projector case	6
181004	Mechanism Housing Assembly	61
181009	Take-Up Arm Bracket and Pivot Assembly	17
181010	Take-Up Arm, Pin, and Bearing Assembly	17
181011	Plate - Take-up arm	17
181013	Film Supply Arm Assembly	13
181014	Supply Arm and Bushing Assembly	14
181037	Rectifier - Terminal strip	21
181054	Knob - Threading	60
181055	Lower Sprocket Plate Assembly	51
181057	Roller - Sprocket	49
181058	Knob - Control lever	1
181149	Guide - Lower film	62
181162	Plate - Supply arm	13
181164	Roller - Loop restoring	29
181165	Belt - Film take-up	1
181552	Framing Knob and Shaft Assembly	44
181878	Plate - Fan housing	24
191893	Aperture Plate and Pad Assembly	54
181894	Pressure Pad Assembly	54
182043	Cam - Pulldown	42
182810	Strip - Light leak	10
183615	Snubber - Film guide roller	10
184118	Spring - Shutter weight return	42
185051	Capacitor - .22mfd, 50V dc	63,67
185171	Shaft - Shutter	60
185172	Top - Lamphouse cover assembly	9
185244	Fastener - Mach, pan hd, with lock washer, int. tooth, 4-40 x 3/8	46
185605	Foot - Elevating bracket	8
186554	Capacitor - .1mfd, 50V dc	67
186992	Washer - Amplifier controls	62
186993	Washer - Insulating, Q8 and Q9	62
187476	Baffle - Pulldown slot	55
189266	Nut - Magnetic head assembly adjusting	34
189961	Cover - Mechanism drive motor	11
189972	Switch - Control	27
189974	Switch - Record/Play, S1	67
190382	Potentiometer - 5K ohms	67
190861	Amplifier and Exciter Lamp Power Supply Assembly	21
190867	Grille - Mechanism drive motor cover	11
190870	Cam - Erase head	39
190871	Plate - Threading diagram	11
190872	Transformer - Power	21
190873	Potentiometer - 500K ohms	67
190874	Relay - Motor start	19
190875	Potentiometer - 1M ohms	67
190876	Potentiometer - 2K ohms	67
190879	Potentiometer - 1M ohms, Lin	67
190921	Knob - Record/Play switch	62
190924	Erase Head Assembly	37
190927	Shield - S2	62
190298	Knob - Amplifier controls	62

PART NO.	DESCRIPTION	FIG.
190929	Sound Head Bracket Assembly	40
190931	Housing - Fan	19
190934	Fan - Paddle wheel	24
190935	Recording and Playing Head Assembly	36
190936	Plate - Lamphouse cover assembly	9
190940	Medallion - Kodak	1
190941	Shaft - Film guide roller, left	10
190942	Nut - Magnetic head switch cable and plug assembly	39
190945	Capacitor - 1300mfd, 35V dc, Elect.	67
190949	Capacitor - .0015mfd, 50V dc	67
190950	Capacitor - .0039mfd, 50V dc	67
190951	Circuit Board Assembly - Amplifier	63,67
190952	Amplifier Support Plate Assembly	64
190953	Bracket - Microphone	2
190955	Switch - Input selector, S2	62
191299	Potentiometer - 500K ohms	67
191401	Capacitor - .0047mfd, 30V dc	67
191402	Capacitor - 30 mfd, 25V dc, Elect.	67
191403	Capacitor - 100mfd, 25V dc, Elect.	67
191404	Capacitor - 2mfd, Elect.	67
191412	Indicator - Erase/Record	62
191413	Switch - Amplifier power	62
191417	Lamphouse Cover Assembly	9
191418	Exciter Lamp Cover Assembly	10
191423	Magnetic Head Assembly	34
191424	Record Plate and Bearing Assembly	35
191425	Magnetic Head Mounting Plate Assembly	39
191426	Mechanism Drive Cover Assembly	11
192084	Microphone	2
192086	Speaker Cable and Plug Assembly	2
192759	Belt Shifting Lever Assembly	26
192868	Bracket - Mechanism mounting to case, side	4
192869	Case Assembly	3
192878	Foot - Projector case	5
193144	Strap - Microphone cord	2
193687	Magnetic Head Switch Cable and Plug Assembly	39
193689	Plate - Amplifier	62
193690	Fuse - 1/2A	62
194011	Blower Wheel and Hub Assembly	24
195609	Spring - Spider tension adjusting	57
195620	Label - Case schematic	4
195622	Plate - Projector control panel	10
195638	Screw - Tap, Type F, pan hd, 2-56 x 1/2	9
196329	Spring - Damping roller	52
196332	Link - Rewind lever	58
196406	Upper Sprocket Shaft Assembly	48
196896	Bracket - Motor mounting	19
197025	Motor Assembly	24
197502	Spring - Magnetic head assembly adjusting	34
197902	Transistor - Q8 and Q9	62
197907	Insulator - Transistor, Q8 and Q9	62
823764	Resistor - 22 ohms, 1/2W	67
828667	Lens - Condenser, front	23
850239	Washer - Lock, ext. tooth, No. 4	62
851299	Screw - Mach, pan hd, 6-32 x 3/16	13
851683	Screw - Tap, Type AB, pan hd, No. 6 x 3/8	2
851816	Washer - Take-up release lever spacer	16
852562	Setscrew - Hex, socket, cup pt, 8-32 x 3/16	27
861447	Washer - Elevating mechanism	8
868663	Resistor - 100K ohms, 1/2W	67

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