Film-Tech

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INSTRUCTIONS

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RCA 400 PORTO-ARC 16MM PROJECTOR

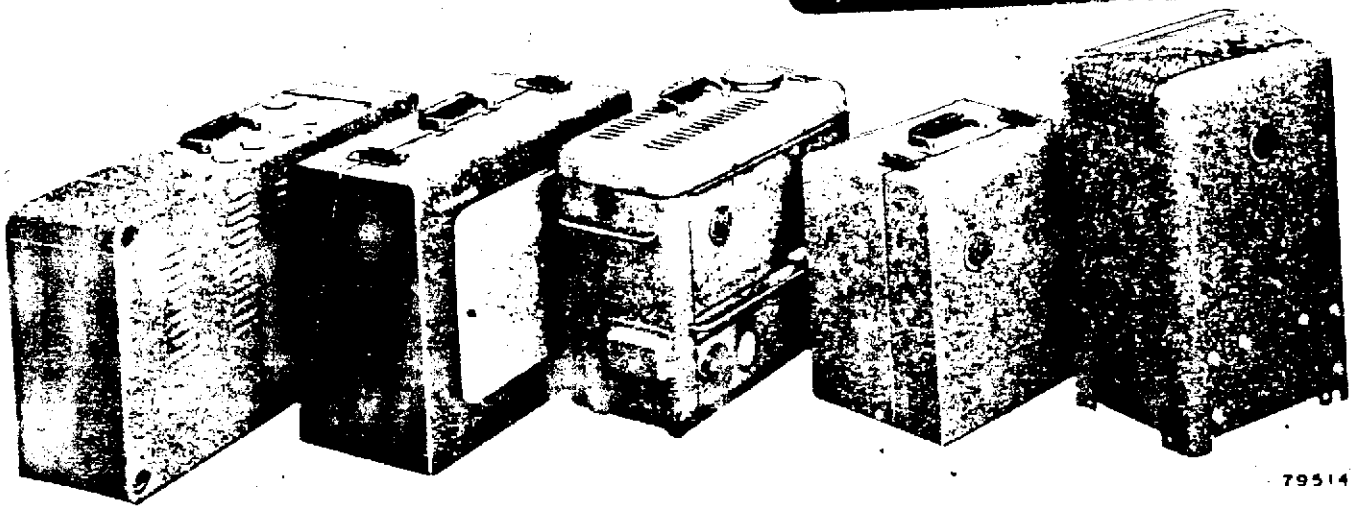

Figure 1 — RCA 400 Porto-Arc 16 mm Projector Equipment

CINE' PRODUCTS SUPPLY Corp.
Gibbsboro Kresson Road
Gibbsboro, New Jersey 08026
Telephone: (609) 784-2300

IMPORTANT: Read these instructions carefully before installing and operating the equipment. This equipment must be operated from an a-c power source of the frequency and voltage specified on the nameplate. If there is doubt concerning the power available, consult the electric-power company.

LIST OF ILLUSTRATIONS

TECHNICAL DATA

NOTE: The instructions contained in this manual also apply to the 50-cycle equipment.

Power Required

105 to 125 volts, 15 amperes
60 cycles (MI-1315, MI-1315-A, MI-1315-B)
50 cycles (MI-1315-F, MI-1315-AF, MI-1315-BF)

Projection Lens

Speed f/1.8
Focal Length: 2½ inches
Coated on all air to glass surfaces

Sound Lamp

¾ ampere, 4-volt prefocused
S-8 double contact
BGB/BGK

Tube Complement

2 RCA 6J7
2 RCA 6L6G
2 RCA 6SL7GT
1 RCA 6V6GT
1 RCA 5U4GB
1 RCA 921 PHOTOTUBE

Amplifier Fuse

2 amperes, Type 3AG, Slo-Blo

Amplifier Output

25 watts

WARNING

Do not operate the equipment on any power frequency other than that specified on nameplate.

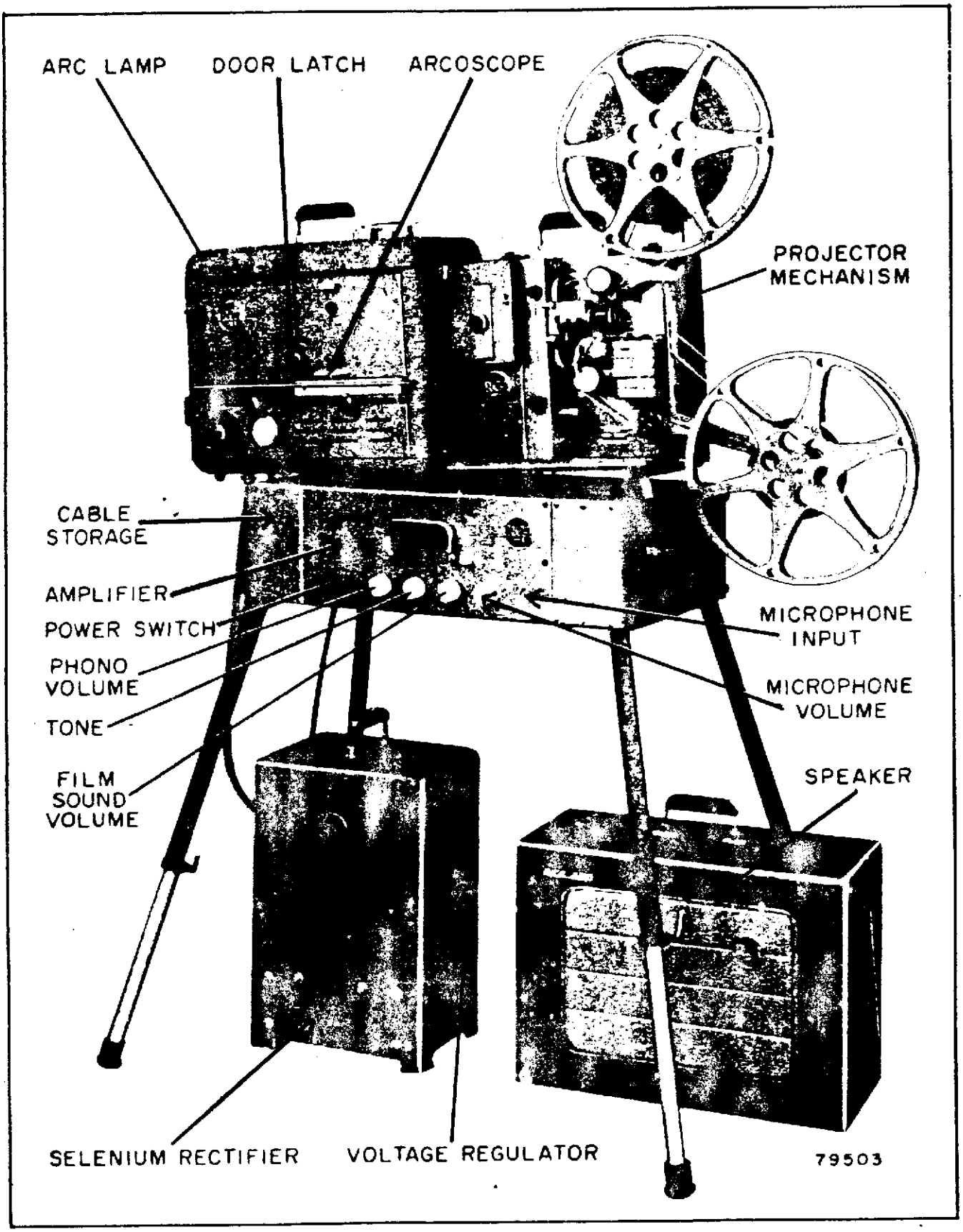

Figure 2 — Equipment Assembled for Operation

DESCRIPTION

Application

The RCA Model 400 Porto-Arc 16mm Motion Picture Equipment is portable deluxe equipment designed for high quality presentation of 16mm sound and silent motion films. It can be set up for operation in any suitable location where power of the required frequency, voltage and current capacity is available — see nameplate on equipment.

This equipment can be used with a microphone or a phonograph for public address either simultaneously with silent pictures or independently of projection. It is also designed to give excellent quality reproduction of full color motion pictures.

Components

The equipment consists of the following five basic units in matching cases or housings:

1. Projector Mechanism (Part 1 of MI-1315, 1315-A, 1315-AF, 1315-B or 1315-BF)

2. Pedestal-Amplifier Assembly (Part 2 of MI-1315, 1315-A, 1315-AF, 1315-B or 1315-BF)

3. Arc Lamp (Part 3 of MI-1315, 1315-A, 1315-AF, 1315-B or 1315-BF)

4. Rectifier (MI-1325, MI-1325-A, MI-1325-B, 30 ampere; or MI-1324, 10 ampere, as ordered)

5. Loudspeaker (MI-1312-A, MI-1312-B or MI-1312-C — one or more when ordered separately)

The Projector Mechanism is equipped with a semi-automatic combination dowser and fire shutter which closes automatically when the film speed of the projector falls for any reason to 14 frames per second, thus preventing accidental film damage. It also includes a condenser lens and a heat filter mounted in a pull-out holder which is locked in place by a small knob. The heat filter is a separate unit and can be removed from the holder by sliding it out of the guide rails. A blower for cooling the condenser lens and film gate assembly is included and is controlled by the projector motor switch. The MI-1315, MI-1315-A and MI-1315-B Mechanisms are designed for 60-cycle operation and the MI-1315-F, MI-1315-AF and MI-1315-BF for 50-cycle operation.

The Pedestal Assembly (combination amplifier carrying case and projector supporting pedestal) has separate compartments to contain its demountable legs and the inter-connecting cables. It also incorporates a tilting mechanism in the front end, which is operated by a fold-in crank. This tilting mechanism allows the picture to be exactly adjusted to the proper position on the screen over a range of about five degrees. In some cases, of course, an "up" projection angle is required and in others a "down" projection angle; these requirements are met by the adjustable length legs which are provided, and they also allow the height of the projector optical axis to be adjusted to suit existing projection room port holes. The same Pedestal Assembly serves for both 50 and 60 cycle equipment.

The amplifier is designed to provide audio power output of 25 watts with film sound, microphone or phonograph input. It can be used to drive a single MI-1312-A, MI-1312-B, MI-1312-C or MI-35014 Loudspeaker, or a number of these P.M. type speakers connected to present an impedance of 4, 8 or 16 ohms to the corresponding amplifier output connections. Connections for impedances of 164 ohms ("70 volt lines") and 500 ohms are also available.

Mounted on the amplifier panel, from left to right, are the following controls and input connectors: Amplifier Power Switch, Phono Volume, Tone Control, Film Sound Volume, Microphone Volume, and Microphone Input, see figure 2. The phonograph input circuit is a high-impedance one, designed to accommodate the crystal-pickup output circuits of standard record players. As supplied, the microphone input circuit is likewise high-impedance, but the amplifier design includes a chassis socket into which an MI-12399 Transformer may be plugged to provide a balanced 250 ohm low-impedance circuit suitable for long microphone lines, say from the auditorium stage.

The Arc Lamp is designed to operate with either the standard Pearlex carbon trim (carbons) which are designed to burn at 30 amperes with a D.C. potential drop of 28-volts across the arc, or with a newly-designed, low current carbon trim which burns at 10 amperes and 50 volts arc drop. The 30 ampere trim with heat filter in place should deliver to the screen approximately 1300 lumens of light. The 10 ampere trim without the heat filter in place (not necessary) should deliver approximately 750 lumens, which is over twice that available from the ordinary incandescent lamp 16mm projector.

For maximum operator safety an interlock switch actuated by the arc lamp door disconnects the arc rectifier from the power supply circuit as the door is opened.

An "arcoscope" having two calibrated lines scribed on a white screen for correct positioning of the burning carbons with respect to the lamp optical system is provided on the outside of the arc lamp door. Windows having filter glasses suitable for direct observation of the arc and carbon positions are also provided in the door. To provide for the differences in carbon

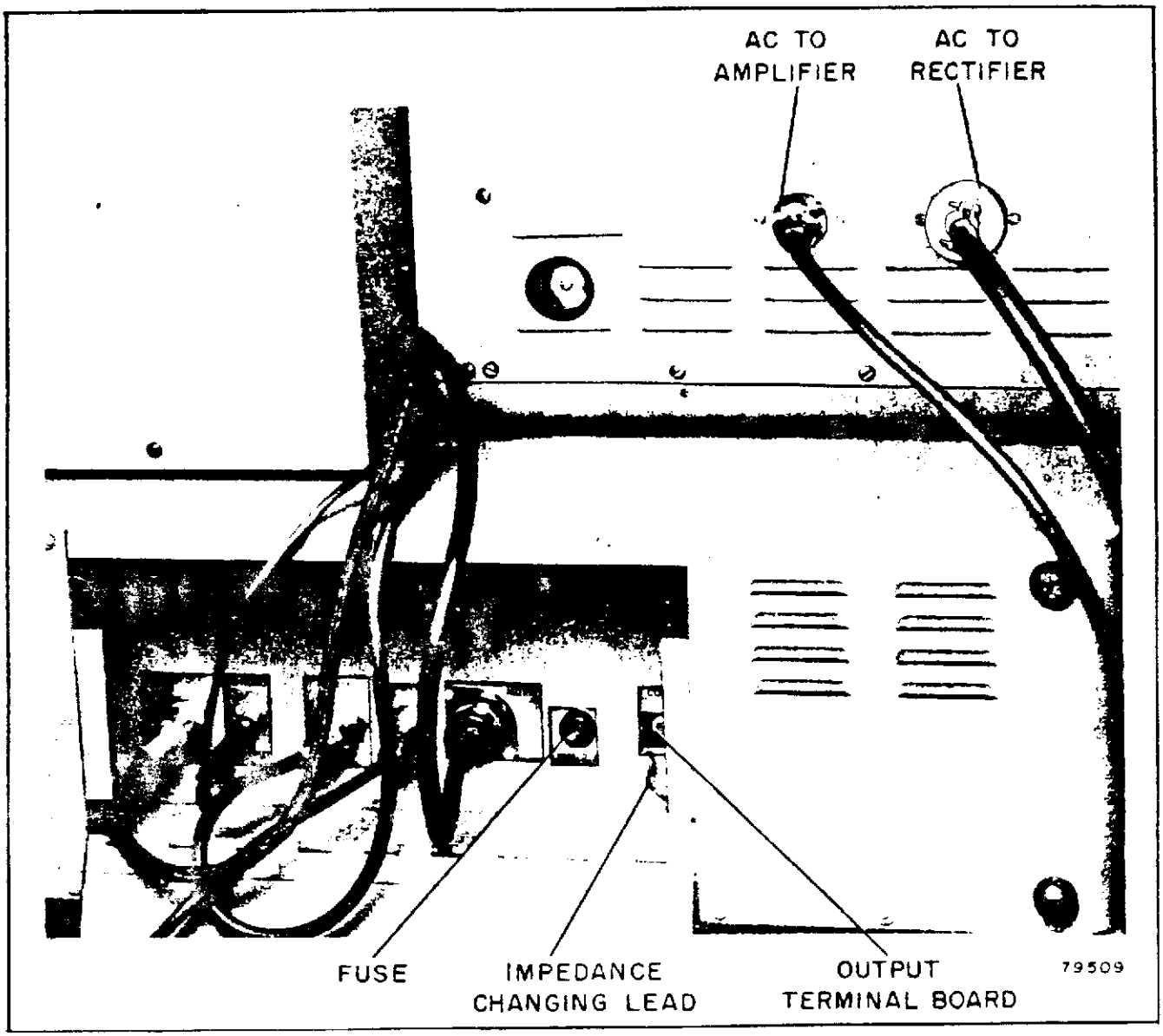

Figure 3 — View of Nonoperating Side of Amplifier with Cables Connected

feed rates between the 30 and 10 ampere carbon trims, a speed changing device is included at the rear of the arc lamp. The carbon feed mechanism ceases feeding when the carbon stubs burn down to approximately two inches in length, and the feeding mechanism does not start until the arc is struck, thus preventing accidental damage to the carbon holders.

An elliptical reflector approximately seven and one-half inches in diameter is mounted on a vertical baffle within the arc lamp by a three-point, spring-seated suspension. The center of the mirror is almost three inches in back of the arc to reduce fogging tendencies from arc gases. Two control knobs extending to the back of the arc lamp from the reflector's spring-mounted frame provide tilt and training adjustments for uniform illumination of the projector mechanism aperture.

The Arc Rectifiers, MI-1324, MI-1325, MI-1325-A, and MI-1325-B are used to convert alternating current from the power line to direct current required for proper operation of the arc. The MI-1325 Rectifier uses two 15 ampere tubes to supply 30-ampere output. The MI-1325-A and MI-1325-B, 30-Ampere Rectifiers, are selenium type full wave rectifiers, the MI-1324, 10-Ampere Rectifier, uses two 6 ampere tubes. All rectifiers are provided with primary tap switches to accommodate varying line voltage and load conditions.

MI-1312-A, 1312-B or 1312-C Speaker Carrying Case includes a powerful 10" cone speaker of the permanent magnet type with a voice coil impedance of six ohms. The MI-35014 Auxiliary Speaker Carrying Case includes a P.M. speaker with 16 ohms voice coil impedance.

ASSEMBLING AND CONNECTING EQUIPMENT

Setting Up

Assemble and connect the equipment in the following manner:

1. Turn the latches with a coin and open the door in the rear end of the amplifier case; remove the legs from the storage compartment.

Screw the legs all the way into the sockets provided for them on the bottom of the amplifier case, which with legs attached, comprises the arc lamp and projector supporting pedestal. Make certain that the legs are seated firmly in their sockets, and adjust the lengths of the legs to obtain the correct projection angle and the desired machine height. Rotate the clamping collars so the leg clamping levers are turned inward, and not protruding outward from the legs in a hazardous manner. Tighten the leg clamps securely by hand so there will be no danger of the legs collapsing as the additional weight of the projector and lamp are added.

2. Unfold the elevating crank on the front of the amplifier case and turn it clockwise until the elevating pins protrude approximately one-half (1/2) inch above the top surface of the housing. This will facilitate locating the projector mechanism in proper engagement with the pins. Remove the front cover from the projector mechanism and set it in place so that the brackets on its lower front surface engage the elevating pins. Open the door in the amplifier carrying case, on the nonoperating side or on the side opposite the amplifier control panel, by turning the two locks with a coin; connect the plugs of the three connection cables from the projector mechanism to their mating receptacles within this compartment, see figure 3. The plugs and receptacles are aranged so that they cannot be incorrectly connected. The screw-type holding rings on the two shielded cable connectors should be screwed on with reasonable firmness to insure good electrical connection of the cable shields.

3. Assemble the arc lamp to the projector mechanism in the following manner: crank the elevating pins downward so that the brackets at the front of the projector mechanism rests on the top of the amplifier case. Set the arc lamp on the amplifier case to the rear of the projector mechanism so the pins in the nickel-plated bracket at its lower front edge drop into the corresponding holes in the rear edge of the projector mechanism base. Crank up the elevating mechanism to bring the long cowl-type fastening pin just above the projector picture gate into alignment with the corresponding socket in the front of the arc lamp housing. Engage the pin in the socket and turn the pin's handle one-half turn clockwise to firmly lock the lamp and mechanism together.

4. Withdraw the connecting cables from the pedestal-amplifier's rear storage compartment. They have been provided with suitable plugs to prevent incorrect connections. The longest cable having a twistlock female plug in one end and a parallel blade plug on the other is the main 117 volts ac power supply cable to the equipment. This should be connected by #12 wire or larger extension cable (or permanently installed wiring) to a circuit of the building wiring capable of supplying at least 15 amperes at 117 volts, 60 cycle, or 50 cycle. Consult the nameplate on the projector to determine the correct frequency. Fuses or breakers to protect the circuit must be of at least 15 ampere rating, slo-blow or timelag type. Refer to figures 4 and 5.

There are two sockets on the under side of the arc lamp at the rear end. Insert the female plug of the 117 volts ac power cable in its mating socket at the left (viewed from the rear end of the arc lamp). The large diameter cable having twist-lock plugs at each end is used to carry direct current from the rectifier to the arc lamp. Connect its female plug to the right hand socket underneath the arc lamp, and connect the male plug at the opposite end of the cable to its corresponding socket on the rectifier. The small diameter cable with plugs at each end is used to carry alternating current from the arc lamp to the rectifier. See figure 3. Connect the male plug on this cable to the socket on the nonoperating side of the arc lamp, and connect the female plug to its mating socket on the rectifier. To protect the operator, the alternating current for the rectifier is passed through door-operated mercury switches within the arc lamp so that the current is interrupted and the rectifier ceases to supply direct current as soon as the arc lamp door is opened. Refer to figure 4. Insert the parallel blade plug, which is attached to the permanently connected short cable coming from the amplifier, in the mating socket on the nonoperating side of the arc lamp.

5. The door on the nonoperating side of the pedestal-amplifier case provides access to the amplifier's output jack and terminal board, see figure 3. The sound output jack and the impedance changing screw terminals are in parallel to accommodate either permanent or portable speaker connections.

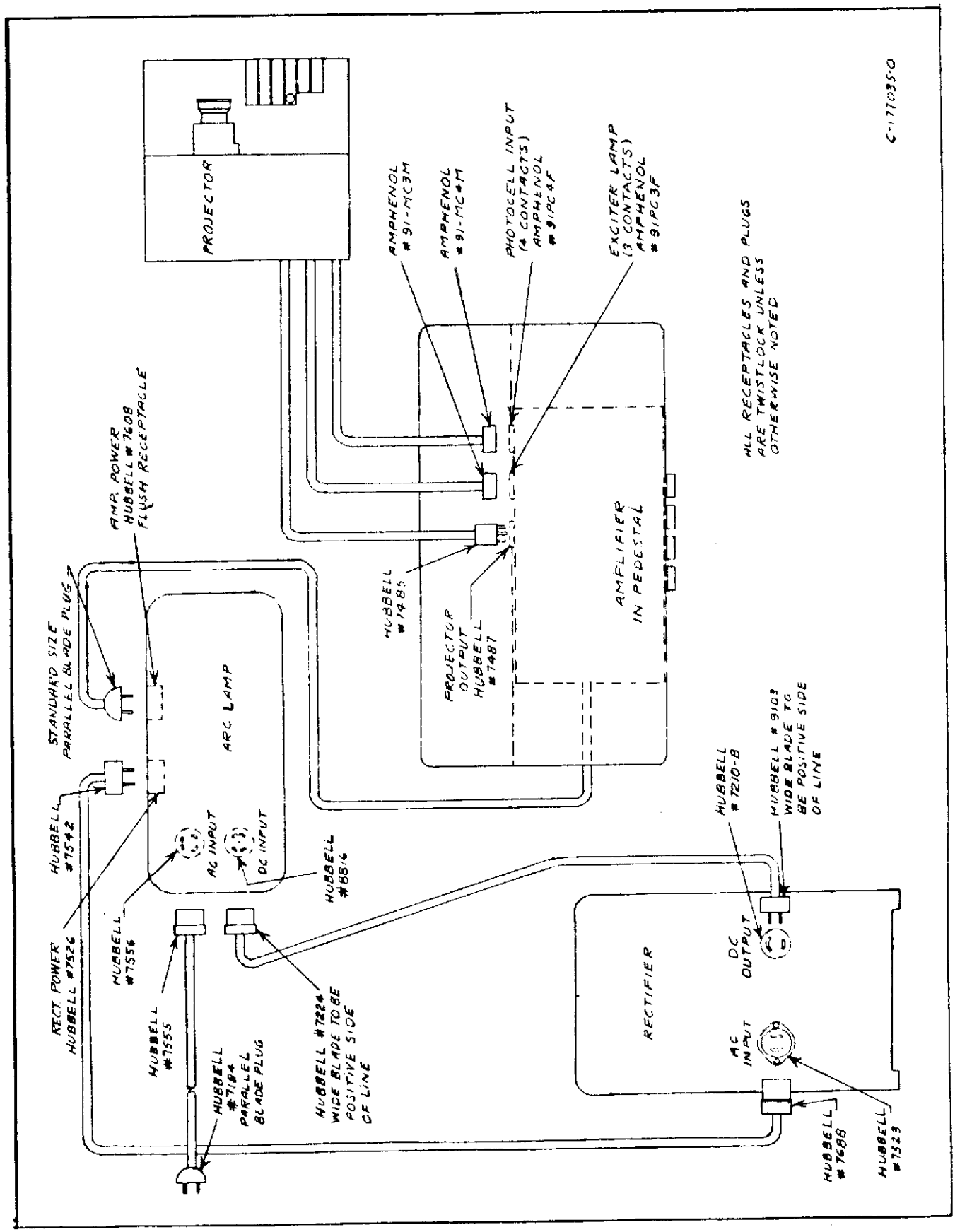

Figure 4 — Interconnection Diagram

One end of each of the amplifier's output transformer secondaries (low and high impedance) is grounded and is also connected to the jack frame as well as to the "COM" terminal of the impedance changing terminal board, see figure 16. Three taps on the lower impedance secondary are connected to the next three terminals (left to right) on the impedance changing terminal board, providing output impedances of 4, 8 and 15 ohms. The higher impedance secondary provides a 500 ohm output circuit suitable for connection to certain types of stage loudspeaker equipment, and it is tapped at 164 ohms to provide a nominal "70 volt line" for feeding modern distributed speaker systems. The flexible lead associated with the impedance changing terminal board is used to select the desired output circuit, see figure 3.

For operation of a single MI-1312-A, -B or -C Speaker use the 8-ohm output, or use the same tap for four of the same speakers connected in series-parallel. Use the 15-ohm tap for two MI-1312-A, -B or -C Speakers connected in series, or a single MI-35014 an excellent combination for portable operation since several hundred feet of regular #16 two-conductor speaker cable can be used at this impedance without encountering excessive cable power losses. Permanently installed circuits between projection rooms and stages are normally run with at least #14 wire having relatively small losses; when these circuits are available, the amplifier output impedance may be selected to most nearly agree with the connected impedance of the stage loudspeaker system. Avoid the combination of low impedance speaker loads and long, small-conductor cables leading to them. Even though such loads may work well enough connected to the amplifier's lowest output impedance circuit when the cable lengths are short the results via a few hundred feet of flexible small conductor speaker cable may be poor due to high cable losses.

Remove the front cover of the projector. Remove the accessories contained in the cover and place them nearby the projector. Then carry the speaker to the projection screen and place it on a chair or other suitable elevated support. Place the speaker at approximately ear level height, and pointed at the center of the audience.

CAUTION: Do not place anything on top of the rectifier. Ventilation openings must not be obstructed.

Run the speaker cable in the most convenient manner, preferably around the edge of the room, where it will be out of the way of the audience. See section titled "*Projection Practice.*"

Mounting Reel Arms

Attach the reel arms to the projector and put the spring belts on their pulleys in the following manner:

Fasten the reel arms, see figure 7, in place with the thumbscrews and pull out the spring belts and put them over the pulleys on the arms. Make sure the belts are not twisted.

ARC LAMP OPERATION

Installing Carbons

Refer to figures 2 and 5. Open the lamp house door by turning the latching knob on the door a quarter turn to the left, and lifting the door up until the stop rests against the lamp house, in which position it will remain until pulled down. Make certain that the circuit breaker switch on the rear end of the lamp below the feed change cover is in its OFF position, and that the control lever for the projector mechanism's combination dowser and fire shutter is all the way in and latched downward. The knob on this control is horizontal and located just to the rear of the regular framing knob on the mechanism, see figure 6.

Two control knobs, used to change the position of the carbon holders, are mounted in slots in the lamp housing just below the door. Turn the right hand knob clockwise so that the positive carbon holder is moved as far as it will go towards the front of the lamp. Turn the left hand knob counterclockwise to move the negative carbon holder completely to the rear of the lamp. Remove one pair of carbons from their container and insert the larger of the two carbons into the positive carbon holder at the front of the lamp. (The carbons are marked positive and negative.) The carbon should fit snugly in the holder, but if it does not do so, adjust the tension screw to properly space the carbon holder jaws. Insert the small carbon in the negative carbon holder at the back of the lamp, and if necessary adjust its tension screw, near the front of the holder, for a snug fit. The proper tension adjustment is one which will just allow a hot carbon stub to be easily pulled from its holder using pliers. Excessive tension will cause carbon breakage and stripping of tension screw threads. Insufficient tension may cause arc instability due to poor contact between jaws and carbons, and ultimately, burning of the jaws.

With the carbons in place, turn the two control knobs to position the tips of the carbons within one-quarter (¼") inch of each other, so that the gap between them is approximately centered between the guides which support the carbons near their tips. Refer to figure 5.

6

CAUTION: Never turn the ARC POWER switch to "ON" without first checking carbons. If they are accidentally in contact, line fuses may blow.

If the arc is struck with the gap near one guide or the other, the guide may be destroyed. With the carbons properly positioned the lamp is ready for striking or starting the arc. Turn the ARC POWER, or circuit breaker, switch on the lamp to ON and close the door of the lamp, which will close the switch of the 10 ampere rectifier supplying power to the primary of the transformer and blower of the 30 ampere rectifier. The carbon feed motor will not advance the carbons until the arc is actually struck, since the lamp circuits include a relay which prevents the motor from operating until arc current is actually being drawn. The rectifier may be left operating indefinitely with the lamp house door closed, with no danger of the carbons feeding together and blowing line fuses.

To strike the arc, turn the left hand or negative carbon control knob clockwise to bring the negative carbon momentarily into contact with the tip of the positive carbon, but do not use force to jam the carbons together. Immediately the carbon tips touch, reverse the negative travel to separate the two carbon tips about one-quarter (¼") inch. If this operation is performed too slowly, the arc will draw excessive current, and the circuit breaker will cut out. (This feature was built into the equipment to prevent blowing the line fuse.) In the event this occurs, reset the circuit breaker and again strike the arc after the carbon tips have cooled for about 30 seconds. As a rule there will be a small amount of sputtering until the tips of the carbon reach operating temperature. After the arc is burning steadily, observe the images of the carbon tips on the small white arcoscope screen on the lamp house door, see figure 2. By manipulating the carbon position control knob carefully, bring the image of the positive carbon tip in line with the left hand scribed line on the arcoscope, and bring the image of the negative carbon tip in line with the right hand scribed line. These operations must be performed simultaneously to avoid drawing the carbon tips so far apart that the arc is broken.

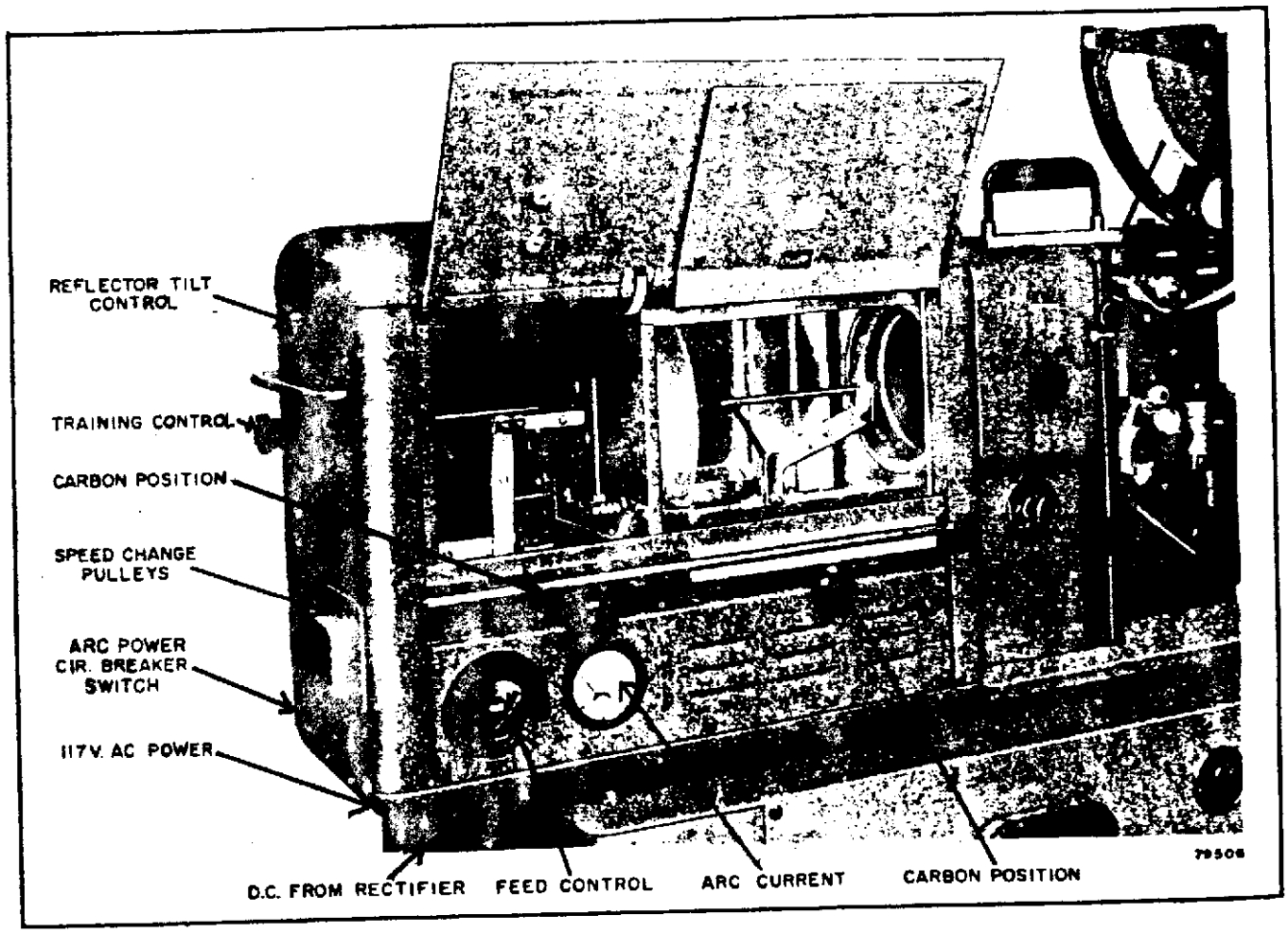

Figure 5 — Operating Side of Arc Lamp

Arc Current Adjustments

With the arc gap adjusted to the proper operating length as noted, the arc current ammeter just to the right of the feed motor control should indicate approximately 30 amperes for the 30 ampere Pearlex carbon trim and approximately 10 amperes for the low-current carbon trim mentioned. If the current reading is high, the voltage being delivered by the rectifier is also high and should be reduced. This voltage is controlled by the tap switch on the side of the rectifier. The voltage is increased by turning the tap switch control knob clockwise and decreased by turning it counterclockwise. For the best contact life the tap switch should not be operated with the arc burning, except where it becomes necessary to change the setting during the show. The arc may be extinguished before changing the switch setting by merely momentarily opening the arc lamp door.

If the arc current is low when the arc gap is adjusted to the indicated length, or if the arc cannot be maintained as the carbon tips are separated this distance, the rectifier output voltage is too low, and its tap switch setting should be increased one step at a time. Reasonable degrees of low AC line voltage can be compensated in this manner. Very high required switch settings on the rectifier are an indication of inadequate power supply to the equipment, and the condition should be remedied since it may also affect amplifier and drive motor performance. Such conditions may result from the use of long, small-conductor power supply circuits to the projector from the building electrical distribution panel, or may be due to the use of plugs and connectors of inadequate rating to carry the required current resulting in excessive heating and voltage drop. It also may be due to a poor receptacle causing a high resistance connection. All such items used should have a minimum rating of 15 amperes. Do not confuse the AC line current values with the *DC arc* currents indicated by the lamp house ammeter.

The actual objective of the arc current adjustments outlined is to establish both the rated current through the arc and the rated DC voltage drop across it. These values must be correct for the carbon trim being used if the rated light output and carbon burning rates are to be realized. The arc voltage drop is a function of both the arc current and the spacing between the burning carbon tips (the "arc gap"). To simplify field adjustments, the correct gap length for the rated drop at the rated current is determined by measurement during arc lamp testing at the factory, and is indicated by the scribed lines on the arcoscope screen. With this factor fixed, it becomes possible to establish correct burning conditions merely by adjusting the rectifier output to produce the rated arc current at this spacing. As will be explained in more detail later, having the image of the positive carbon tip aligned with its scribed line also establishes the burning arc at the right position with respect to the lamp optical elements for proper illumination of the projector aperture. Before making the feed adjustments outlined in the following section, allow the arc to burn a sufficient length of time to form a good crater on the end of the positive carbon.

Carbon Feed Adjustments

As soon as the arc is struck a current-operated internal relay starts the DC carbon feed motor, which moves the carbon holders toward each other by a geared speed reducer, a variable ratio, spring belt pulley combination, and longitudinal feed screws. The average speed of the feed motor is set by the rheostat, see figure 5, at the rear end of the lamp's control panel; the motor is so compounded and provided with an auxiliary series arc current winding as to act as a stabilizer for the burning arc. For example, if the arc gap tends to increase in length for some reason, the motor speeds up and brings the carbon tips closer together until the average conditions are restored, and vice versa. Burning rate variations due to line voltage changes within the control range, and to non-uniform carbon characteristics are thus compensated to a considerable degree.

In general, the positive carbon is consumed at a faster rate than the negative, particularly at the higher currents. The pair of double-grooved pulleys under the small cover at the rear of the arc lamp housing compensates for this varying ratio. For 30 ampere operation the spring belt must be in the pulley grooves nearest the housing; for 10 ampere operation the belt is moved to the rear grooves. Normally the machines are shipped with the belt in the 30 ampere operating position but the point should be checked prior to making feed rate adjustments.

The approximate setting for the feed control rheostat using the "Pearlex" 30 ampere carbon trim is with the control knob arrow horizontal and pointing forward. The corresponding setting for the 10 ampere, low-current trim is with the arrow horizontal and pointing to the rear. The actual setting required in any given case must be determined by observation of the carbon feeding action over a period of some minutes. If the images of both carbon tips tend to draw apart from their respective scribed lines on the arcoscope screen, increase the average feed rate by turning the control knob slightly clockwise. Conversely, if they tend to draw together, with consequent increase in arc current, slightly decrease the

feed rate. With proper setting of the rheostat and reasonably steady line voltage, it should be possible to burn an entire carbon trim with no more than occasional checks on the arc status.

The carbon feed control system tends to stabilize the arc current and the arc gap *dimensions* as noted, and so long as the voltage delivered by the rectifier remains constant, it obviously also tends to maintain the arc in the correct *position* with respect to the lamp optical system. The relative burning rates of the positive and negative carbons are affected not only by the arc current but also by the arc voltage drop, so any considerable change in line and rectifier output voltages will cause the burning arc to drift away from its correct position even though the proper gap dimensions and current are being maintained by the feed control system.

This situation is easily corrected by manually adjusting the burning carbon tips to their correct positions as observed on the arcoscope screen, and then checking the arc current ammeter reading. If the reading is above normal, drop the rectifier tap switch setting one point; if it is sub-normal, increase the switch setting one point. In either case, watch the feed and control action for several minutes before re-checking the current and making any needed further adjustments. As previously stated, such adjustments should not be necessary unless the prevailing line voltage is notably unstable, and provided the initial adjustments were carefully made as outlined after the equipment was in operation long enough to reach stable operating temperatures.

As stated under "DESCRIPTION," the design of the carbon feed mechanisms is such that the feeding action ceases when carbon stubs burn down to about 2 inches in length, thus protecting the guides and holders. Remaining burning time may be estimated from the burning time indicator located above the knob on the front panel of the arc lamp. Short lengths may be saved and used for short reels in accordance with theatre practice.

A considerable amount of heat is dissipated within the lamp house and its internal parts become hot, particularly when operating with the 30-ampere carbon trim. Care should be used in touching any of these parts after the lamp has been in operation, and pliers should be used in removing carbon stubs from the holders.

Optical Adjustments

The remaining arc lamp adjustments invlove having the projector mechanism in operation without film and with the projected light beam properly aligned and focused on a screen.

As previously mentioned, the operating control for the projector mechanism's combination dowser and fire shutter is the small horizontal knob to the left of the framing knob. The knob is attached to a notched arm or lever. Lifting the knob up and pulling it outward opens the combination dowser and fire shutter. It will not stay open, however, unless the projector mechanism is running and up to normal film operating speed, and it will not open when the projector is started until the arm is manually unlatched and pulled out by the knob. This allows the projector to be started and the film leader and any other unwanted material at the beginning of the film to pass down through the projector before the picture is projected on the screen. Stopping the machine causes the fire shutter to close automatically and to lock in the closed position.

Strike the arc lamp, and after it is operating steadily, start the projector motor by throwing the PROJECTOR switch on, see figure 7. Turn the SPEED SELECTOR upward to SILENT, or downward to SOUND, as required. Unlatch the dowser-fire shutter and align and focus the aperture outline on the screen.

Loosen the lens lock. Focus by moving the projection lens back and forth in the picture gate for rough adjustment and by rotating it for fine adjustment until the outline of the lighted area on the screen is well defined. Tighten the lens lock.

Adjust the distance between the projector and the screen until the width of the lighted area is slightly greater than the width of the white portion of the screen, and then center the light vertically with the tilting control.

NOTE: When the picture is slightly larger than the white portion of the screen the edges of the picture will be clean cut.

Unless the projector is set up to project at least a 15 to 20 ft. wide picture, considerable flicker will be evident on the screen with no film in the projector gate. This is so because the projectors are intended only for use in projecting such large pictures, and hence normally incorporate two-blade shutters for maximum light transmission. Flicker perceptibility is well known to be more or less directly proportional to the reflected light intensity, and inversely proportional to the flicker rate. Even though arc projectors deliver far more light than incandescent lamp projectors, they are normally used with such large screens that the resulting reflected light intensities are low enough to permit the advantageous use of the two-blade shutter. If arc projection light quality is desired

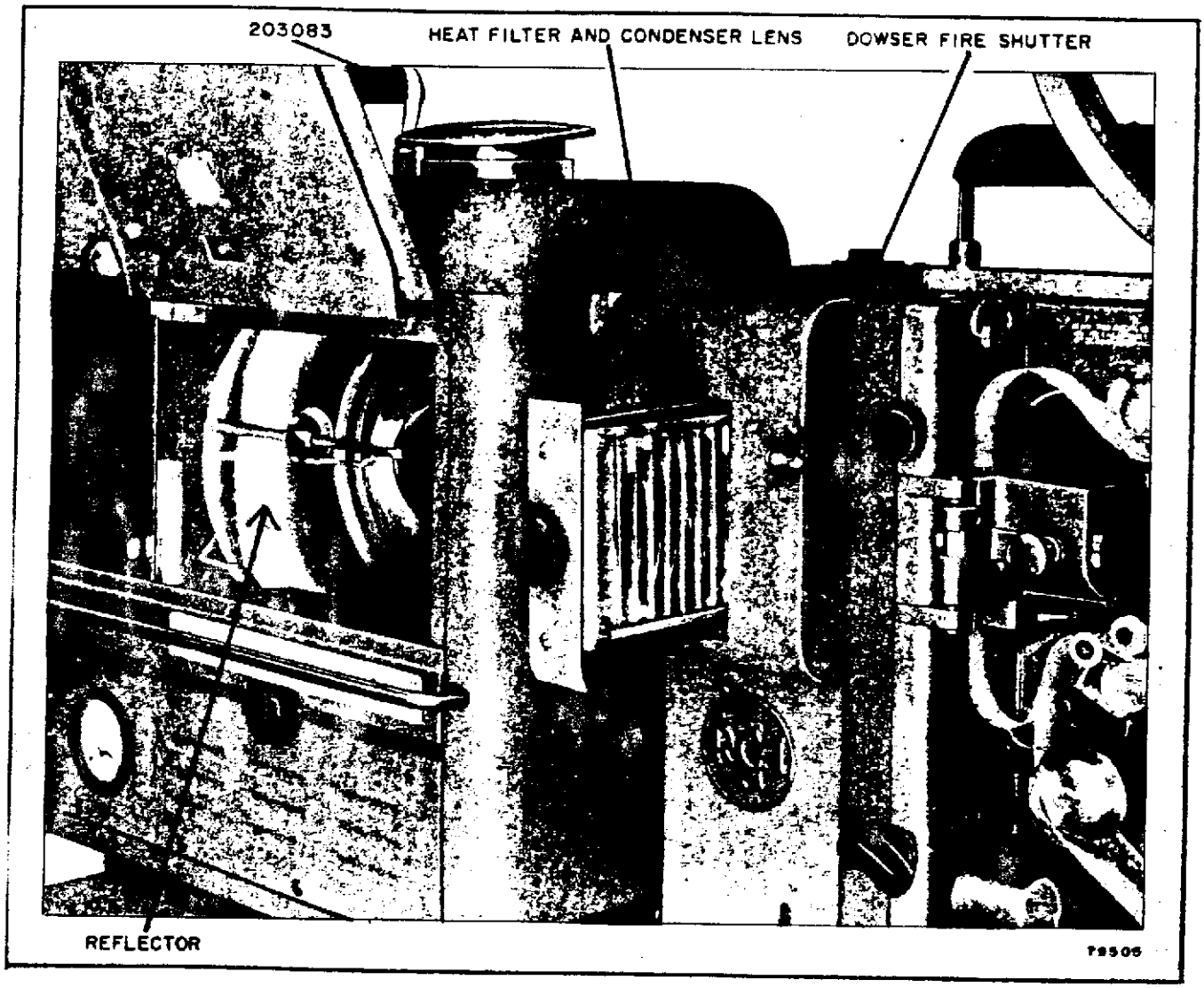

Figure 6 — View of Condenser Lens and Heat Filter

on small screens, or if 16 frame "silent" pictures are to be run in any quantity, it is a simple job to substitute a three-blade shutter for the two-blade shutter originally supplied.

Assuming the image of the positive carbon tip to be properly aligned with its scribed position line on the arcoscope screen, and assuming that the lamp's reflector tilting and training adjustments have not been disturbed since final factory testing, the aperture image on the screen should be brightly and evenly illuminated. The corners and edges of the image should be at least 75 to 80 percent as bright as the center, and no brownish or bluish color casts should be evident in these areas.

If the observed image does not meet these specifications, first check the reflector adjustments, refer to figure 5. Turn the tilt control knob (top of rear surface of lamp housing) to equalize the top and bottom brilliance of the image. Turn the training control knob (below the tilt control knob) to equalize the right and left sides of the image. With the reflector thus properly aligned with the projector aperture, again check the color quality and brilliance distribution of the screen image, first making certain that the positive carbon tip image on the arcoscope screen is exactly on its scribed line.

Any failure of the aperture screen image to meet the specified performance characteristics under such conditions is an indication that some component of the projector's optical system is out of alignment. Make certain that the reflector is properly seated in its bracket and that no parts appear to be damaged or misplaced, then try displacing the positive carbon tip

image on the arcoscope screen first one way and then the other from the scribed line position, at the same time observing the aperture image on the screen. It may be possible in this manner to find a position which produces satisfactory screen image quality. If such a position is found, scribe a new reference line on the arcoscope screen in pencil; measure the distance between the original positive and negative lines carefully, and then scribe in pencil a new negative reference line the same distance from the pencil positive line.

It should be noted that the position of the positive carbon tip with respect to the mirror which produces best color quality and the 75-80% side-to-center distribution is *not* the position for maximum image center brightness. Most of the light comes from the extremely hot crater in the tip of the positive carbon. By bringing the hottest spot to focus exactly at the film plane the screen image center is brightest, but the total light output falls and the picture quality is poor due to the resulting large differences in brilliance between the center "hot spot" and the picture edges.

Condenser Lens and Heat Filter

The pull-out holder for the arc lamp's condensing lens, which also holds the heat filter is located in the projector mechanism case, see figure 6. The pullout holder is locked in place by an internal latch operated by a small knob; turning this knob one-half turn counterclockwise releases the latch so the assembly may be pulled out for inspection and cleaning. The heat filter assembly slides out of its guide rails in the holder.

The *beat filter* is never required when operating the arc lamp with its 10 ampere carbon trim. It may be required, however, when operating at 30 amperes if the prints being run are black and white and are relatively dense so that a considerable portion of the heat energy in the light beam is stopped and absorbed by the film. The heat filter is seldom required with color films which are relatively transparent to the infra-red (heat) energy in the beam. The necessity for using the filter may be determined by inspection of the film as it leaves the lower sprocket. If there is no sign of buckling or embossing and if the film does not feel excessively warm to the touch, there may be no need to use the heat filter. The filter reduces the overall light transmission by a factor of approximately 30% and obviously it is desirable to use it only when it is necessary. It reduces the heat at the picture aperture, however, by a factor of almost 50%.

PROJECTOR OPERATION

Threading

Refer to figure 7 and thread the projector in the following manner:

1. Place an empty reel on the lower reel arm and a reel of film on the upper.

2. Unwind the film until the picture or title frames are reached and examine the film to see whether it is ready for threading. To do this, consider yourself in the position of the arc lamp and look through the film toward a light. With the end of the film downward, the pictures or titles should be upside down and reversed, and the sprocket holes on sound film should be toward your right. If these conditions are met, the film is ready for threading.

3. Make sure the REWIND-OPERATE lever is in the OPERATE position.

4. Hold the film about four feet or more from the end and press down on the upper sprocket shoe with the right-hand thumb.

5. Slide the film under the upper sprocket. Make sure that the sprocket teeth engage the sprocket holes. Release the sprocket shoe.

6. Open the picture gate — by pulling the lens lock — and place the film on the aperture plate, between the guide rails and the side shoe. Form the upper loop of film above the aperture plate so that the film follows the white guide line on the projector frame. Close the picture gate with your thumbs, while holding the film in position.

7. Form the lower loop of film below the picture gate as indicated by the white guide line and finger stop.

8. Run the film over the guide roller, under the rubber pressure roller, clockwise around the sound drum, and over the tension roller.

9. Thread the film to the left of and under the lower sprocket.

10. Next run the film under the snubber roller to the lower reel.

11. Insert the end of the film in the slot in the hub of the lower reel, or attach it to the hub with a piece of adhesive tape.

12. Rotate the reel clockwise by hand to take up film slack. Lift the reel slightly to equalize belt tension. This will prevent the reel from rolling backwards when it is released.

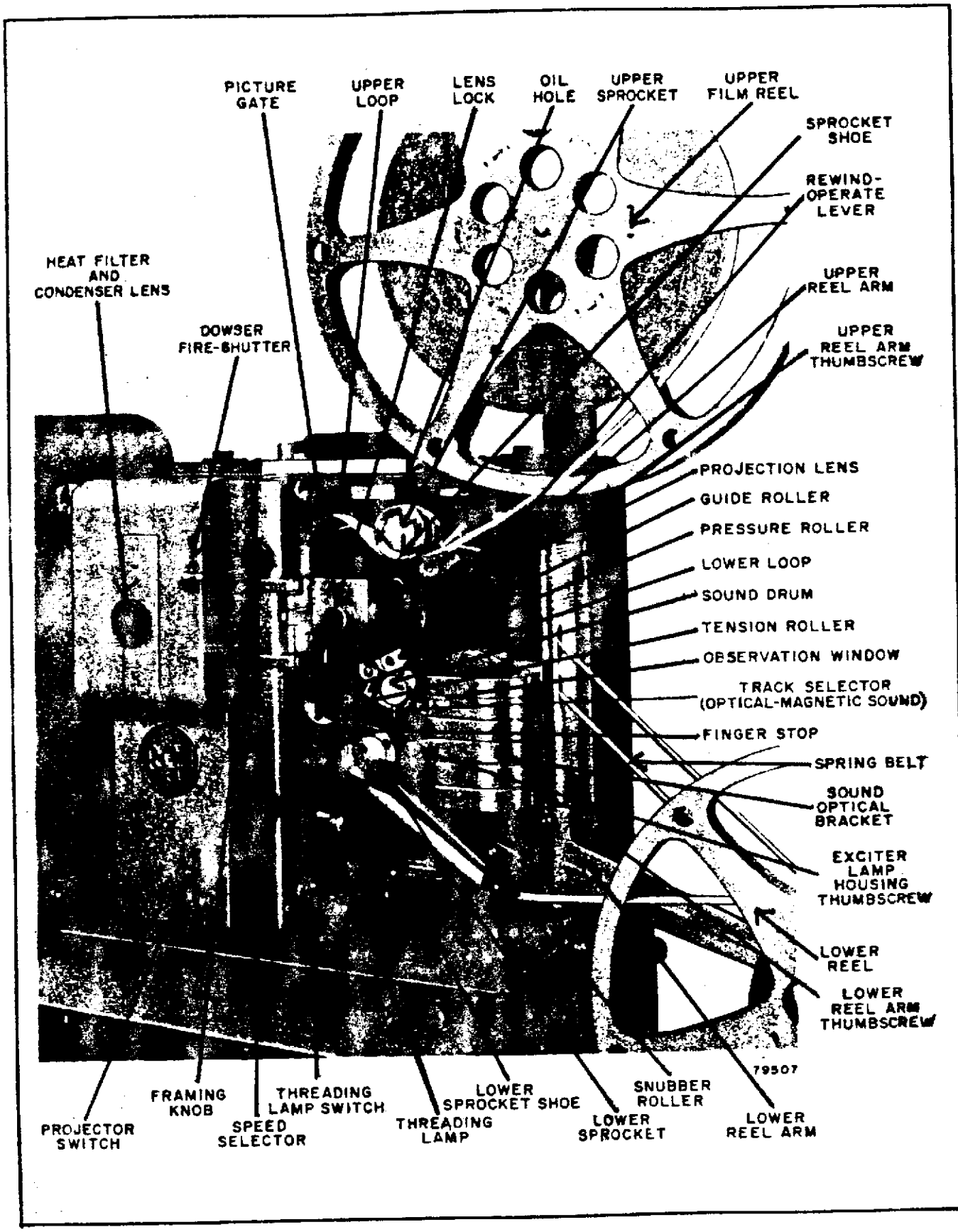

Figure 7 — Operating View of Projector

Operating an Optical Sound Projector

Sound Pictures

When sound pictures are to be projected proceed as follows:

1. Throw the POWER switch on the amplifier to on, see figure 2.

NOTE: The sound lamp lights within 15-30 seconds after the amplifier power switch has been turned on. It can be observed through the observation window, see figure 7, in its housing.

2. Turn the FILM SOUND VOLUME control to "O," and the TONE control to the midway position, see figure 2.

3. Strike the arc lamp (previously adjusted as instructed under *ARC LAMP OPERATION),* and then throw the PROJECTOR switch on, and the SPEED SELECTOR downward to SOUND.

4. Loosen the lens locking thumbscrew and focus by rotating the projection lens until the picture is clear and distinct. Titles or other printed portions of the picture make excellent subjects on which to focus. Lock the lens barrel in the focused position.

5. Turn the FILM SOUND VOLUME control clockwise until the desired volume is obtained.

6. Frame the picture, if necessary, by turning the FRAMING knob until one complete picture shows on the screen.

7. Adjust the TONE control for the most pleasing effect.

8. When the last picture has appeared on the screen, and before all the film has passed through the projector, extinguish the ARC by throwing the ARC POWER switch to the OFF position.

9. Turn the FILM SOUND VOLUME control to "O" as soon as the sound ceases.

10. Finally, return the PROJECTOR switch to the off position.

NOTE: Occasionally, damaged film may prevent the intermittent pull-down claw from properly engaging the sprocket holes in the film. This may result in the loss of the lower loop. When this happens, the picture on the screen is blurred. The difficulty can be remedied immediately, without stopping the machine, by placing a finger above the film as it emerges from the lower end of the picture gate and quickly pulling down on the film until the finger strikes the finger stop, see figure 7.

The THREADING LAMP can be turned on with the THREADING LAMP switch when light is needed during a show, thus eliminating the necessity for turning on the room lights. The cover of this lamp can be rotated to direct the light where required.

Silent Pictures

Proceed as for showing a sound picture, with the following exceptions:

1. Turn the speed selector upward to SILENT. This decreases the speed of the projector to that appropriate to silent pictures.

2. Leave the POWER switch on the amplifier in the off position. Omit any adjustment of volume or tone, unless the public address feature is to be used.

Public Address and Record Playing

When it is desired to use sound input from a microphone, or a phonograph pickup, a shielded cable and a shielded standard telephone plug will be required for connecting either device. Assemble the cable and plug and connect the cable to the microphone, or to the phonograph pickup. Insert the microphone cable plug in the MICROPHONE JACK on the front of the amplifier, see figure 2. Insert the phonograph cable plug in the PHONO jack, on the nonoperating side of the amplifier, see figure 3. Set the POWER switch on the amplifier in the on position. Adjust the TONE and VOLUME controls to obtain the most pleasing tone and a suitable volume of sound. (Separate controls identified as MICROPHONE VOLUME and PHONO VOLUME are mounted on the amplifier control panel, see figure 2.) Use the appropriate control for the device in use.

NOTE: Plugging into the PHONO JACK automatically cuts off the film sound.

For suitable microphones, phonograph pickups, cables and plugs consult your dealer. The following types of shielded two-conductor plugs, or any plugs similar to them, may be used: Carter #PG-52, Switchcraft #70 or Mallory #75N.

Operating a Magnetic Sound Projector

To operate a projector which has been converted for magnetic sound reproduction, it is only necessary to perform the following operations:

1. Plug the connector at the end of the magnetic sound cable into the PHOTO-CELL jack, on the nonoperating side of the amplifier, see figure 16.

2. Thread the magnetic sound track film in the manner described under *Threading* above.

3. Turn the TRACK SELECTOR to MAGNETIC, see figure 7, and operate the projector in the manner described under *Operating an Optical Sound Projector,* above.

Rewinding

Film should be rewound immediately after projection. Rewinding is done quickly with only the pro-

jector mechanism in operation (carbons not burning), as follows:

1. Bring the end of the film from the lower reel directly to the hub of the upper reel, without twisting the film, and attach it. Give the upper reel a few turns counter clockwise by hand to take up film slack.

2. Turn the REWIND-OPERATE lever to REWIND.

3. Put the PROJECTOR switch in the on position and let the projector run until the film is rewound.

4. Turn the speed selector downwards toward SOUND.

When two or more reels are to be shown, it may be desirable to postpone rewinding until all the reels have been shown, since this shortens the delay between successive reels. As a result, the question may arise as to whether or not a reel has been rewound. This may easily be determined by examining the film as explained in step 2 of the section titled *Threading*. If the film is not in the position specified there, it requires rewinding.

Packing Up after the Show

When the show is over, in order to pack up proceed as follows:

1. Disconnect the equipment from the 117 V.A.C. power service. Disconnect all cables and replace (all but the speaker and projector cables) in the storage compartment in the end of the amplifier case.

2. A small tray is mounted under the arc to catch copper drippings from the carbons. Empty the tray and clean the interior of the lamp house. Remove the chimney from the lamp house and wash the white dust off it by holding it under a cold water faucet. Close the lamp house door.

3. Turn the handle of the cowl-type fastening pin, connecting arc lamp to projector, one-half (½) turn counter clockwise to release the pin. Remove pin from socket on arc lamp. Crank down the projector elevator.

4. Disengage the arc lamp from the projector mechanism, by raising the arc lamp and lifting the pins in the bracket on the front of the lamp out of the holes in the projector base. Remove the lamp from the amplifier.

5. Remove the reels and the reel arms from the projector mechanism and replace the reel arms in the projector cover, see figure 8.

6. Bring the three cables attached to the projector around to the operating side of the projector (four

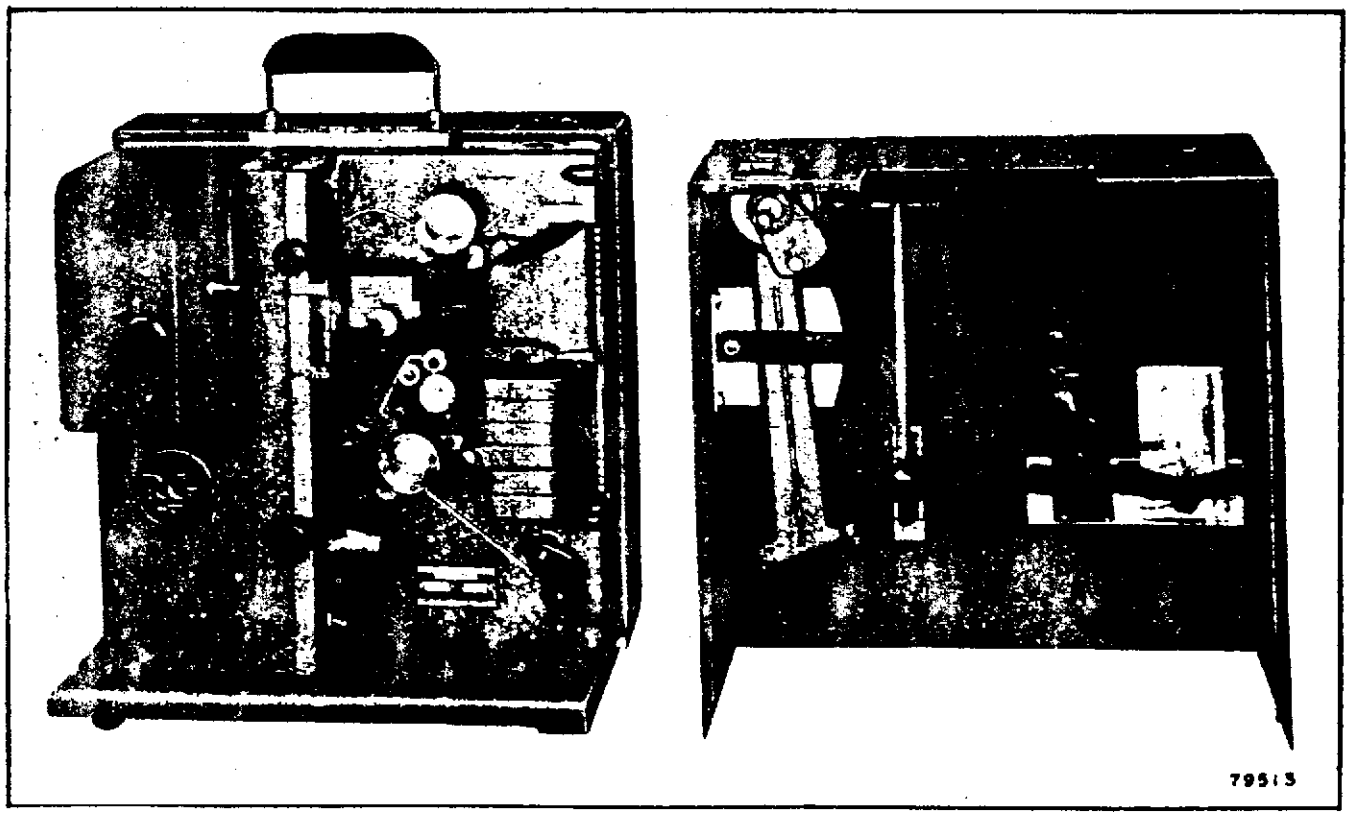

Figure 8 — View of Projector Packed Away

on a magnetic sound projector), coil them up, and push them into the space below the lower sprocket, between the threading lamp and snubber roller.

7. Push the spring belts back into the projector case, by holding one side of the belt stationary and pushing in the other side. Replace the cover on the projector.

8. Roll up the speaker cable and replace it in the speaker case. Close the case.

9. Fold up the elevator crank on the amplifier. Release the leg clamping collars and unscrew the legs from the amplifier. Replace the legs in the storage compartment, after telescoping them.

PROJECTION PRACTICE

Choice of Focal Length of Lens

The focal length of the lens supplied with the RCA Model 400 Arc Projectors is 2½ inches. This is a value which meets average arc projection conditions. However, in some instances, lenses of different focal lengths may be required. For example, it may be required to project a picture of given size from different distances. Table 1 below gives the relationship between picture size and projection distance for lenses of six different focal lengths. Standard lenses and anamorphic lenses may be obtained from authorized RCA Audio-Visual Equipment dealers and distributors.

TABLE I PROJECTION DATA

Projection Distance Feet	Picture Width				
	2" lens	2½" lens	3" lens	3½" lens	4" lens
10	1'10"	1'7¼"	1'4½"	1'½"	0'11"
15	2'9"	2'5"	2'1"	1'7"	1'4½"
20	3'8"	3'½"	2'9"	2'1"	1'10"
25	4'7"	4'0"	3'5½"	2'7½"	2'3½"
30	5'6"	4'10"	4'2"	3'2"	2'9"
35	6'5"	5'7½"	4'10"	3'8"	4'2½"
40	7'4"	6'5"	5'6"	4'2"	3'8"
50	9'2"	8'0"	6'11"	5'3"	4'7"
60	11'0"	9'8"	8'4"	6'3½"	5'6"
70	12'10"	11'3"	9'8"	7'4"	6'5"
80	14'8"	12'10"	11'0"	8'4"	7'4"
90	16'6"	14'6"	12'6"	9'7"	8'3"
100	18'4"	16'0"	13'10"	10'6"	9'2"
115	21'10"	18'4"	16'0"	12'1"	10'6"
130	....	20'10"	18'0"	13'7"	11'11"
145	....	....	20'0"	15'3"	13'3"
160	....	....	22'0"	16'9"	14'8"
175	....	....	....	18'4"	16'0"

NOTE: Picture height is ¾ of picture width, except when Anamorphic lenses or special apertures are used.

TABLE II 16MM LENSES

* RELATIVE LIGHT TRANSMISSION PERCENTAGES

Focal Length	Speed	Percent
½"	f 2.4	44.5%
⅝"	f 2.0	64%
1"	f 2.0	64%
1½"	f 1.6	100%
2"	f 1.6	100% Reference
2½"	f 1.8	79%
3"	f 2.0	64%
3½"	f 2.5	41%
4"	f 2.8	32.6%

Choice of Screens

A white matte screen should be used whenever a sufficiently bright picture can be obtained, for it presents a more uniform brightness to the entire audience. A beaded screen appears brighter than a matte screen along the line from the center of the screen to the projector, but its brightness falls off rapidly as the observer moves away from this line.

Securing Cables

In order to avoid interruptions and disturbances of sound and picture during a show, the power and speaker cables should be secured so that they cannot

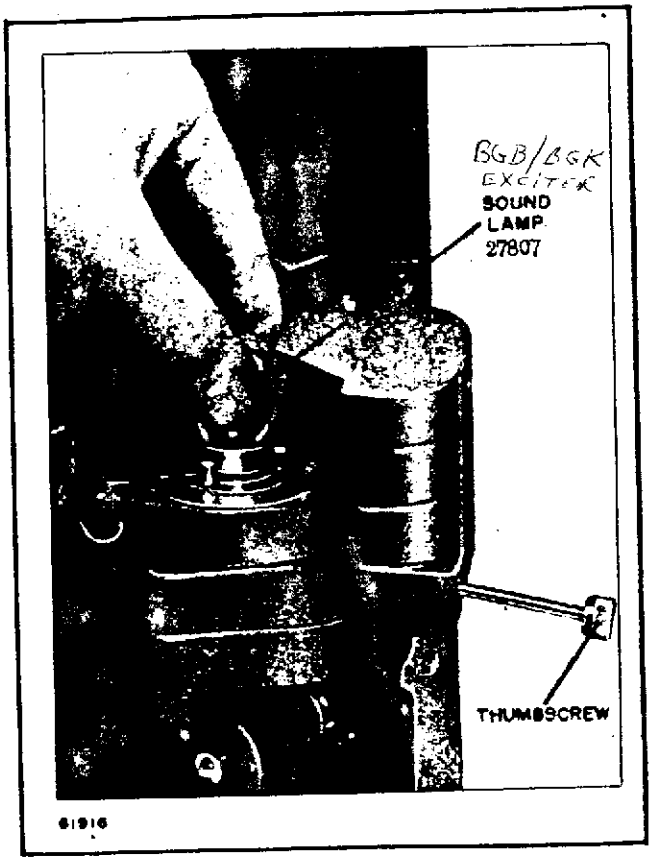

Figure 9 — Replacement of Sound Lamp

REPLACING BELTS

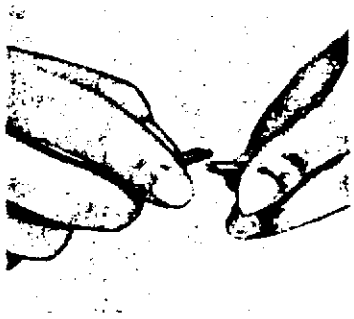

FIG. A

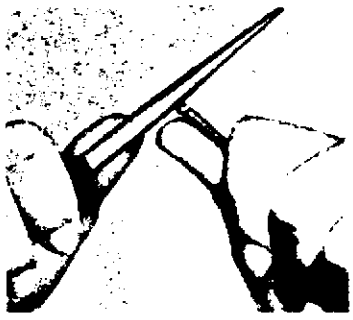

FIG. B

TO IDENTIFY UPPER AND LOWER BELTS REMEMBER "LOWER IS LONGER."

1. TO REPLACE UPPER SPRING BELT PLACE REWIND LEVER IN OPERATE POSITION. TO REPLACE LOWER SPRING BELT PLACE REWIND LEVER IN REWIND POSITION.
2. INSERT ONE END OF SPRING BELT INTO APPROPRIATE SLOT IN SHIELD SO THAT END OF SPRING BELT ENTERS SPACE BETWEEN PULLEY GUARD AND THE PULLEY GROOVE.
3. PUSH SPRING BELT SO THAT IT TRAVELS AROUND PULLEY AND OUT OF SLOT IN SHIELD.
4. TAKE ONE END OF SPRING BELT IN EACH HAND. POSITION LOOP ENDS SO THAT GAP AT ONE END IS AGAINST CLOSED LOOP AT OPPOSITE END. SEE FIG. A. THEN FORCE THEM TOGETHER UNTIL THEY ARE COUPLED.
5. IF GAP IS TOO LARGE AND SPRING BELTS CAN BE COUPLED WITHOUT USE OF FORCE, GAP SHOULD BE CLOSED SO THAT ENDS DO NOT UNCOUPLE DURING HANDLING FOR STORAGE.
6. CLOSE GAP BY GRASPING FLAT PORTION OF LOOP FIRMLY WITH A PAIR OF PLIERS AS SHOWN IN FIG. B, AND APPLYING PRESSURE WITH THUMB UNTIL GAP IS SUFFICIENTLY CLOSED.
7. IF GAP IS TOO SMALL AND IT IS NOT POSSIBLE TO COUPLE ENDS BY HAND, GRASP FLAT PORTION OF LOOP AS IN STEP 6, BUT REVERSE POSITION OF THUMB AND APPLY AN OPENING FORCE.

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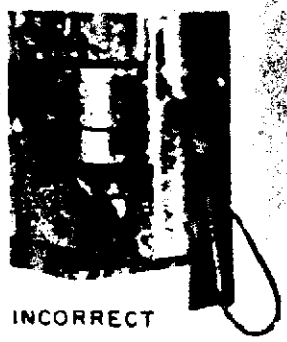
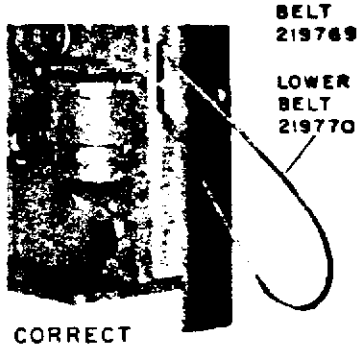


INCORRECT



CORRECT

Figure 10 — Replacing Belts

become disconnected accidentally by persons stumbling over them.

Previewing Pictures

An experienced operator will preview films he plans to show in order to acquaint himself with their peculiarities and thus be ready to make changes in volume, tone, and focus whenever they are required.

Care of Film

Film should be handled carefully lest it be scratched, torn or otherwise damaged. Film is easily scratched by winding it too tightly on the reel so that adjacent turns of film grind against each other. Scratches on film are very noticeable on the screen and it is costly and difficult to remove them. Film should be handled by the edges as much as possible, and touching the picture or sound track area should be avoided. Occasionally, film should be inspected for broken sprocket holes and other defects. Necessary repair should be performed promptly.

When film is dirty it should be cleaned by passing it between folds of lint-free cloth moistened with carbon tetrachloride, or some other cleaner suggested by the dealer. Consult the dealer regarding a humidor for storing film when it is not in use.

Running Time

The running time of reels of given length for 16mm film depends on whether the film is sound or silent, because sound film runs 24 frames per second and silent film only 16 frames. Exact knowledge of the running time of various films will help the operator in planning a show. Table III below gives the running time in minutes of 16mm films of various footages.

TABLE III

RUNNING TIME OF 16MM FILM

Footage	Time in Minutes	
	Sound	Silent
400 ft.	11	14.8
600 ft.	17	22.2
800 ft.	22	29.6
1000 ft.	28	37.
1200 ft.	33	44.4
1400 ft.	39	51.8
1600 ft.	44	59.2
1800 ft.	50	66.6
2000 ft.	56	74.

MAINTENANCE OF ARC LAMP

Chimney, Tray and Housing

The removable chimney on the top of the lamp house serves two functions. It properly ventilates the interior of the arc housing and it also acts as a collector for the white dust which results from the burning of the Pearlex carbons. This dust should be washed off the chimney by holding it under a cold water faucet. Other than this, the chimney and the rest of the arc lamp require very little maintenance. The tray located under the arc to catch copper drippings should be emptied after each showing and the interior of the arc lamp housing should be kept clean at all times.

Reflector

The reflector should be carefully wiped off with lens tissue or with a soft dry, clean cloth before each period of operation. At 30 ampere operation some carbon dust will deposit near its upper edge; it should be cleaned off after each reel.

When reflectors begin to show disentegration of the silver coating, pitting, or a grayish color, loss in projected light will have become excessive, and they

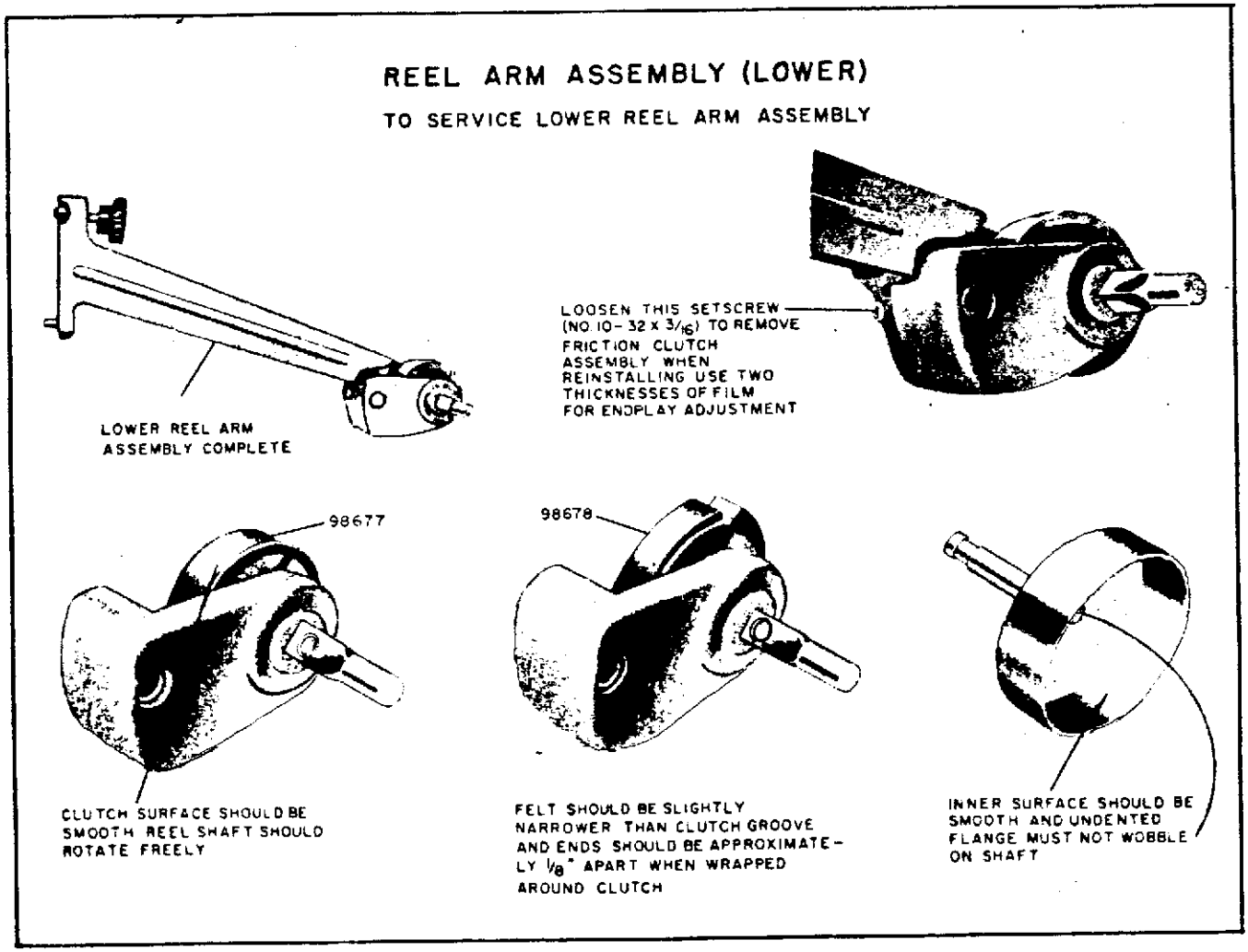


Figure 11 — Lower Reel Arm Assembly

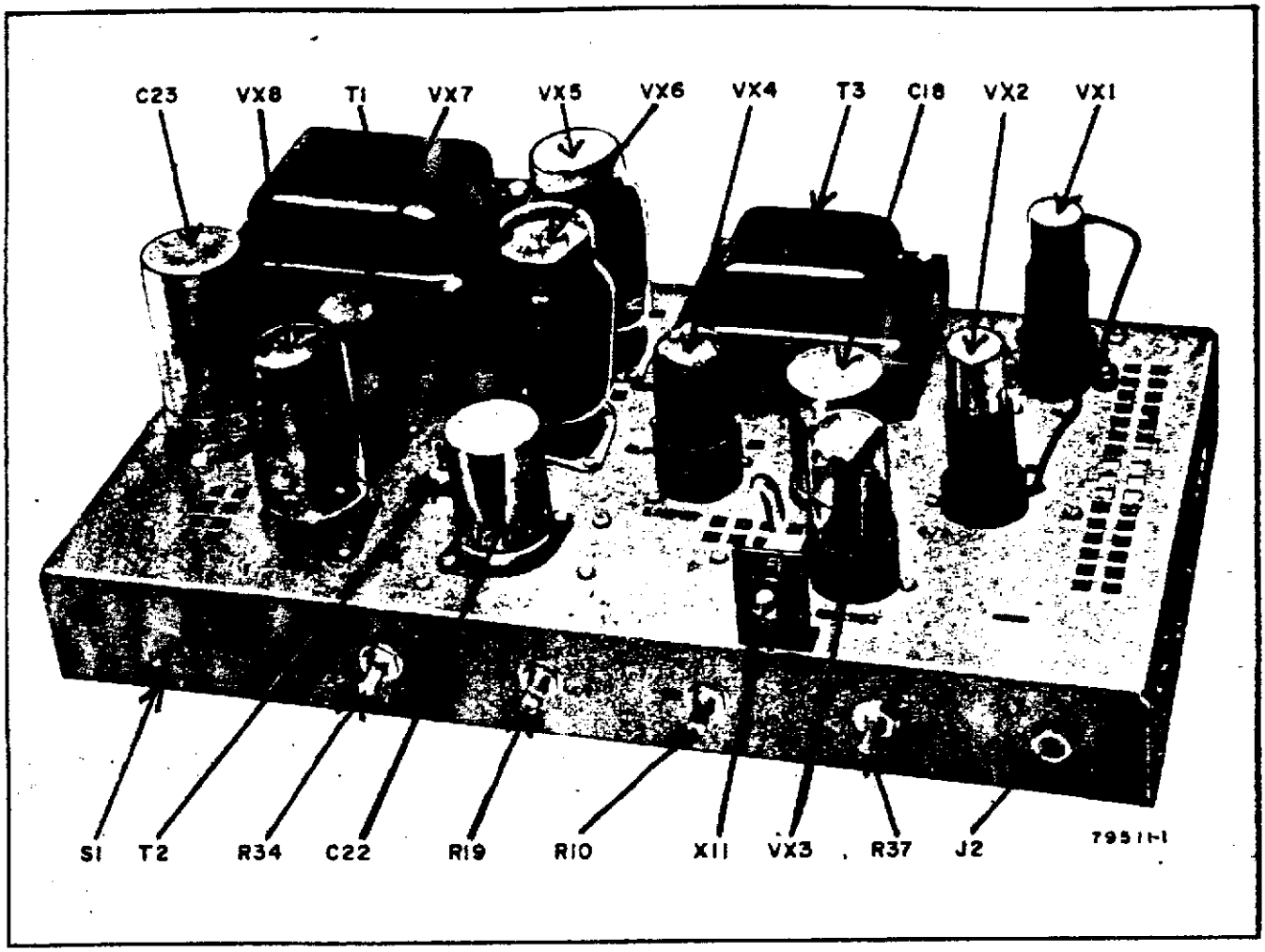


Figure 12 — Top View of Amplifier — Location of Parts

should be replaced. Replacing of the reflector sometimes requires realignment and remarking of the arcoscope.

MAINTENANCE OF PROJECTOR MECHANISM

Lubrication

It is important that the projector mechanism be properly lubricated. Refer to the *LUBRICATION CHART*.

Cleaning

In order that the equipment will give consistently good performance it must be kept clean. Dust, oil, particles of emulsion, carbon dust, and other dirt should be removed. To clean the equipment proceed as follows:

1. *Cleaning lenses.* Clean all optical surfaces by gently wiping them with lens tissue. *Do not use carbon tetrachloride or alcohol on the lenses.* Use a good lens cleaning fluid, preferably obtained from your dealer. Apply the cleaner to the lens and gently wipe dry with a lens tissue. Discard the tissue and polish with a fresh tissue. With the possible exception of the condensing lens all optical surfaces should be cleaned before use, each time the equipment is to be put into service.

a. *Condensing Lens and Heat Filter.* The condensing lens should be cleaned frequently, but not necessarily each time the equipment is operated. Refer to figure 6. Pull out the lens holder, and — if in use — lift the heat filter up and out of the holder to obtain access to the front of the lens. Clean the heat filter when it is in use. Avoid touching either the condensing lens on the heat filter with anything damp while they are hot.

b. *Projection Lens.* Refer to figure 7. Loosen the lens lock and pull the lens out of the picture gate.

Clean and replace the lens, taking care not to touch the lens surface with the fingers.

c. *Sound Optical Unit (lens tube).* Refer to figures 7 and 9. This unit is mounted in the clamp portion of the SOUND OPTICAL BRACKET. Unscrew the EXCITER LAMP HOUSING THUMBSCREW and swing the assembly outward. Remove the sound lamp (exciter lamp) from its socket. Refer to REPLACEMENTS-SOUND LAMP, below. Clean the exposed front and rear glass elements of the sound optical unit. Do not loosen the clamp or remove the optical unit from its mounting; proper positioning of the unit for optimum sound quality requires tools and test facilities available only in the factory or in qualified repair shops. Replace the exciter lamp after cleaning the optical unit. Remove any finger marks from the lamp surface after replacing the lamp.

d. *Sound Lamp.* Refer to figure 9. Open the sound optical bracket and clean the lamp in place.

2. *Cleaning Mechanical Members.* Film dirt will collect on the aperture plate, the film pressure shoe (which presses the film against the aperture rails), the sprockets, the sound drum pressure roller, and on the sound drum. *Do not use a knife or any other metal instrument, for removing the dirt.* A wooden toothpick or similar tool, may be used to dislodge hardened film emulsion particles.

a. *Aperture Plate.* Open the picture gate and wipe the aperture plate with a soft cloth to remove dirt. Use a toothpick, if necessary, to remove dirt from corners. Clean the two side pressure shoes with the bristle brush supplied with the projector. Clean the film pressure shoe in the same manner as the aperture plate. A small amount of thinner or cleaning fluid may be used to soften caked emulsion for easier removal. After all visible dirt and emulsion have been removed, inspect and feel the film contracting surfaces of both the aperture plate and the film pressure shoe

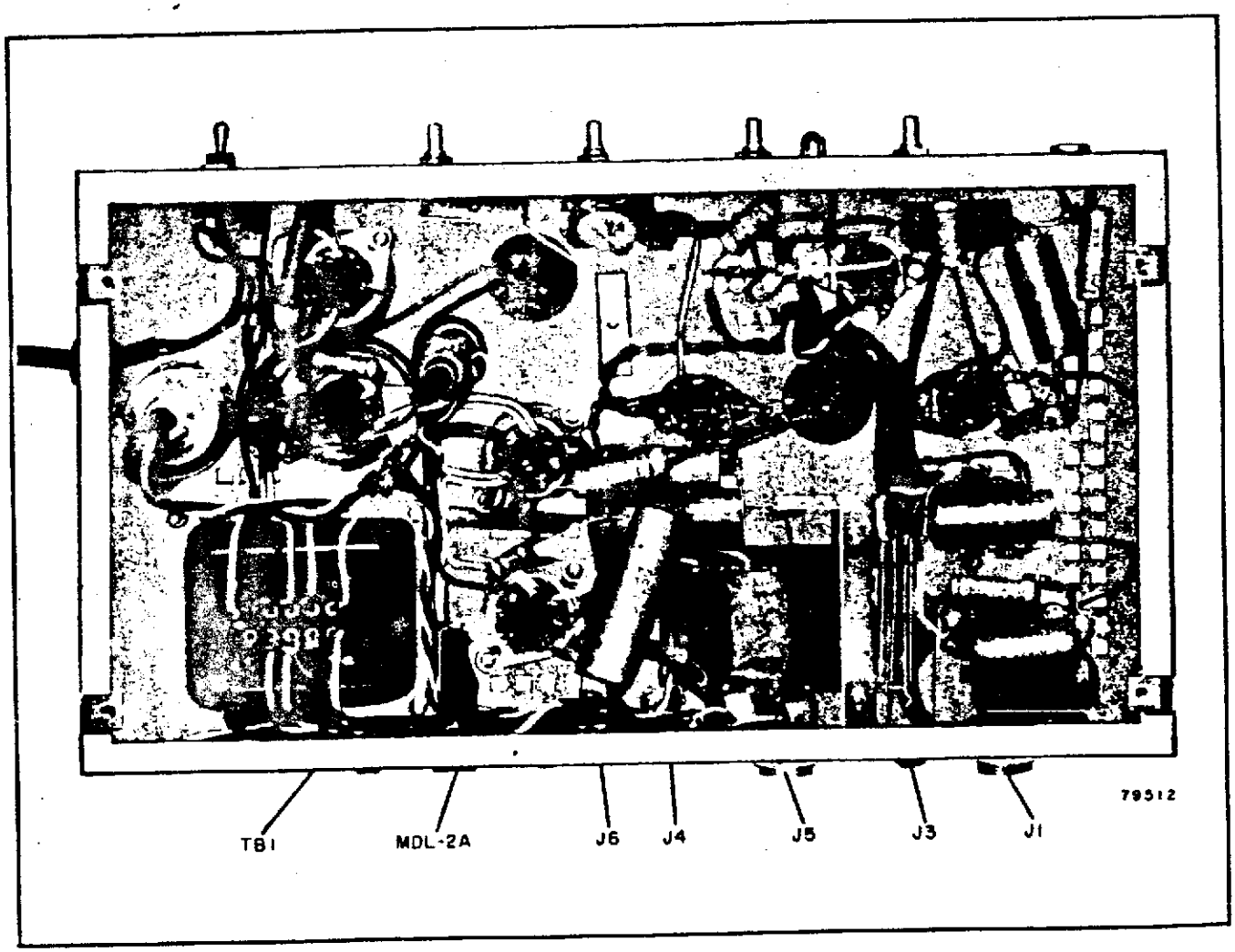


Figure 13 — Bottom View of Amplifier — Location of Parts

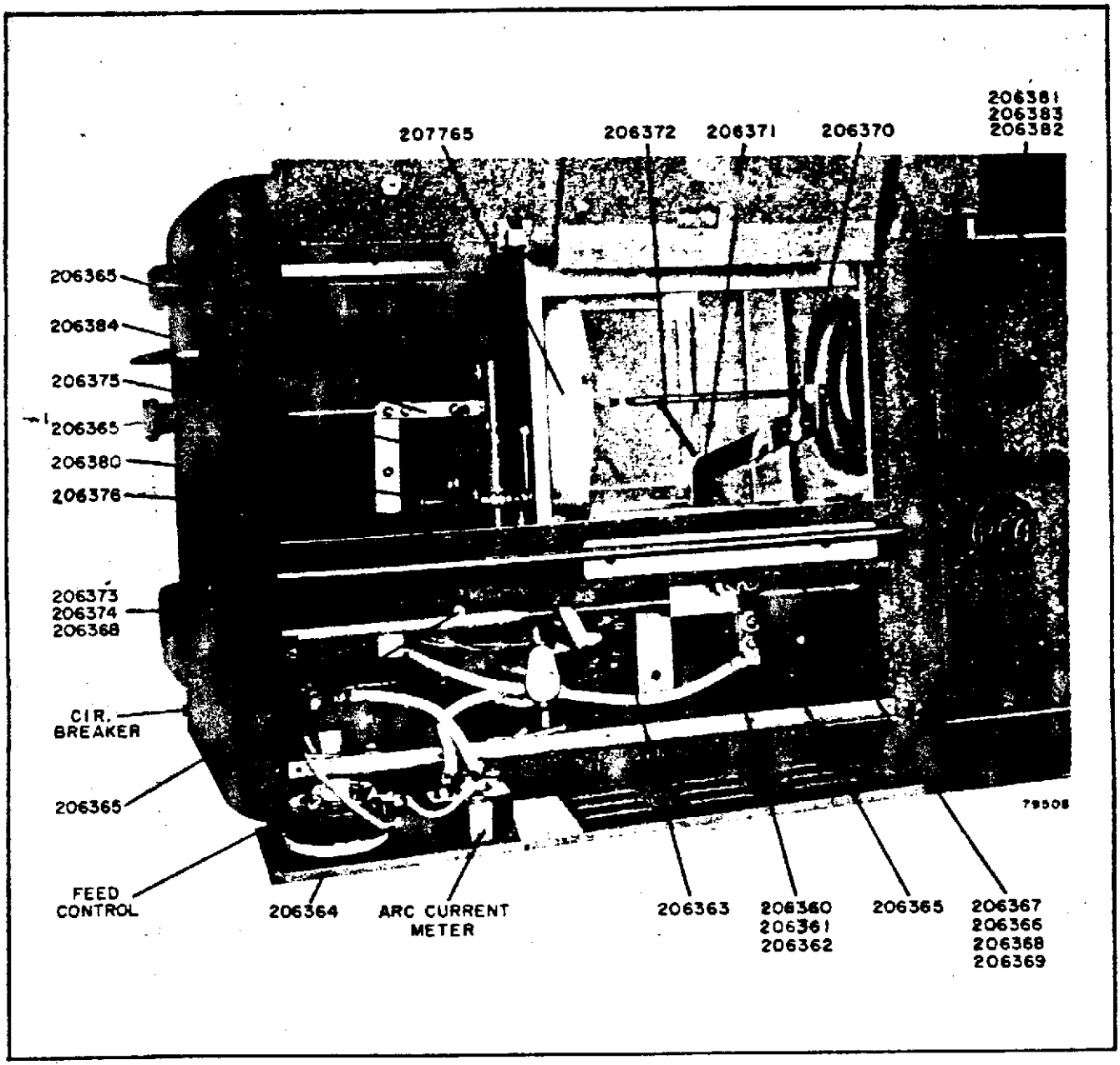


Figure 14 — Interior of Lamp House — Location of Parts

to make sure they are smooth and free from all foreign material, scratches and pits. The presence of scratches or pits may ultimately call for replacement of the part involved, since film emulsion piling up and hardening in such depressions cause film scratching.

b. *Sprockets.* Clean the sprockets with a bristle brush or toothbrush. Be sure that all dirt is removed from the teeth.

c. *Sound Drum Pressure Roller.* Wipe clean with a soft cloth moistened with carbon tetrachloride. Rotate the roller while cleaning.

d. *Sound Drum.* Clean the sound drum in the same manner as the pressure roller. Be sure to clean the back edge of the drum where the film sound tracks overhang. Wrap a clean cloth around the left forefinger and insert the finger between the guide roller and the tension roller. Hold the cloth against the back edge of the drum and rotate the drum with the right forefinger. Cleaning the back edge of the sound drum from the left side in this manner minimizes the possibility of disturbing the small mirror behind the drum on the right, which reflects the light beam from the sound optical unit into the phototube.

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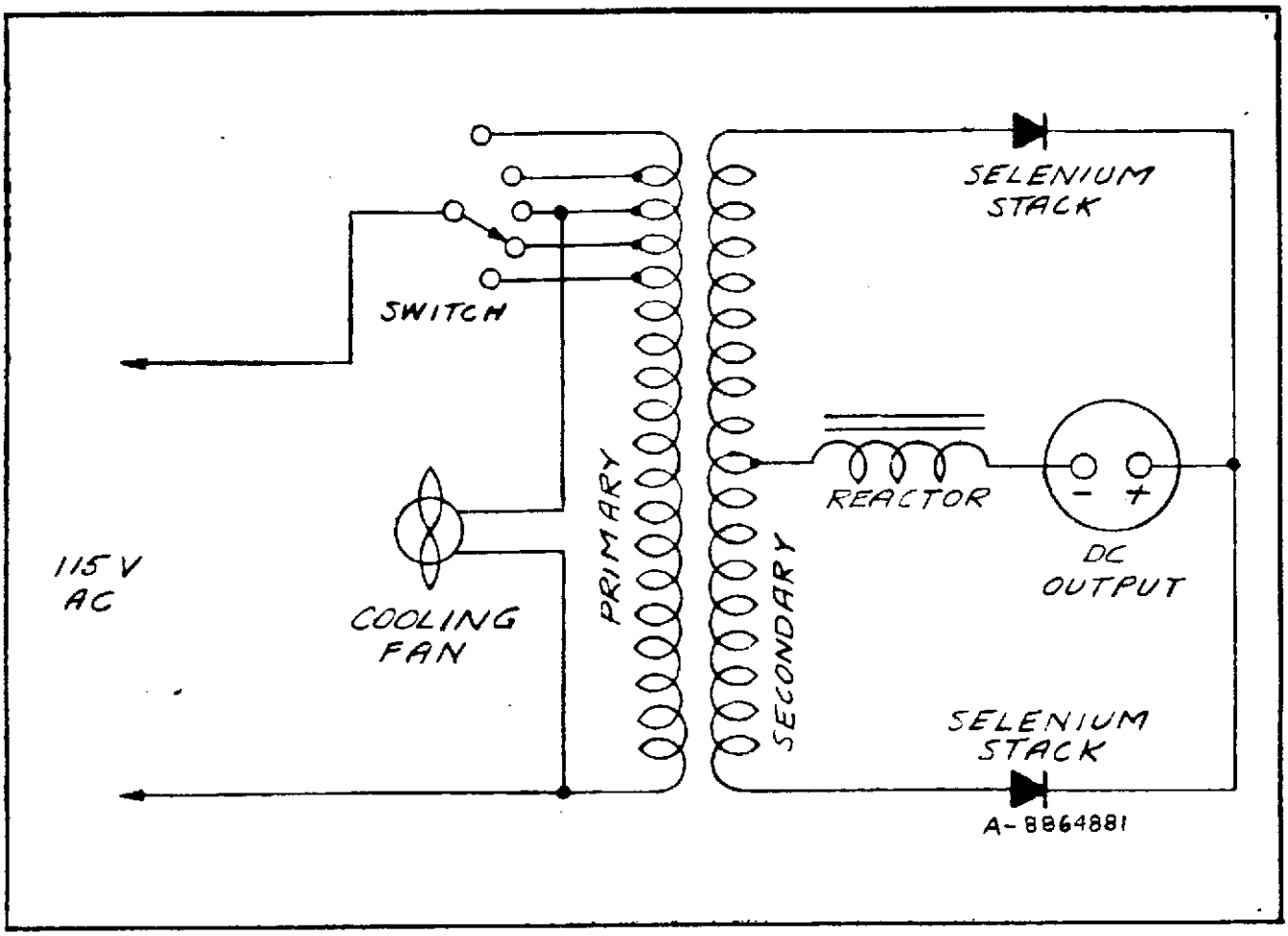


Figure 15 — Schematic Diagram of Selenium Rectifier

Replacements

1. *Sound Lamp.* The sound lamp is the most likely component to require replacement during a show. Spare lamps should be kept conveniently at hand. Open the sound optical bracket, see figure 9. Grasp the sound lamp with the left hand as shown, lift it slightly and turn it counter clockwise to disengage the socket pins. To install the new lamp, line up the notch in its flange with the small hole in the socket plate, and drop the flange over the socket pins. Push it down against the socket base and turn the lamp clockwise until it snaps into place. (Clean finger marks.)

2. *Fuse.* The fuse is mounted on the nonoperating side of the amplifier, see figure 3. When replacing a blown fuse, make sure that the replacement fuse is of the same type and rating (2 ampere, type 3AG), as the one furnished with the amplifier. To use a fuse of higher rating, for replacement purposes, will needlessly endanger the windings of the power transformer. If the fuse burns out repeatedly, check the tubes and amplifier components for the cause.

3. *Belts.* Remove and replace belts according to the instructions in figure 10.

4. *Reel Arm.* Refer to figure 11 for maintenance information on the lower reel arm assembly.

Service and Replacement Parts

If the equipment, due to damage or long use, should require service beyond the scope of the operations outlined in the "MAINTENANCE" section of these instructions, it should be sent or taken to an Authorized RCA Audio-Visual Equipment Dealer or Distributor. In general these RCA representatives maintain complete servicing facilities and adequate stocks of component parts.

The following parts list is included to provide identification when ordering replacement parts. Refer to the REPLACEMENT PARTS ordering instructions in the back of this book for ordering procedure details.

RCA - CARBON ARC

TROUBLE LOCATION AND REMEDY CHART

Description of Trouble	Possible Cause	Remedy
a. Loses lower loop	(1) Dirty aperture plate (2) Defective film	Clean Cut out defective part and splice
b. Picture motion unsteady	(1) Loss of loops	Restore loops
c. Picture indistinct or illumination low	(1) Dirty projection lens (2) Dirty condenser lens	Clean both ends Clean
d. Film being scratched	(1) Film pressure shoe dirty (2) Sound pressure roller dirty (3) Aperture plate dirty	Clean Clean Clean
e. Sound weak; picture normal	(1) Volume control not set properly (2) Defective tube	Adjust Check amplifier tubes
f. No sound; picture normal	(1) Amplifier POWER switch in off position (2) Loudspeaker not connected (3) VOLUME control not set properly (4) Sound lamp burned out (5) Defective tube	Snap switch ON Connect Adjust Replace Replace tube
g. Reproduction noisy	(1) Back edge of sound drum dirty (2) Dirty film (3) BAD TUBE	Clean drum Clean REPLACE TUBE
h. Sound on MIC; no sound from film	(1) Sound lamp burned out (2) Defective phototube	Replace Replace

LUBRICATION CHART

Points of	Type of Lubrication	Lubrication at Time of General Overhaul	Periodic Lubrication
Intermittent Cam	Sta-put heavy oil E.F. Houghton Co. Phila. 370 (Supplied in oil can with projector)	Saturate felts with oil, not to point of dripping. If contact point between felt and cam is worn, replace felt.	Ten drops in oil hole every 500 hrs. or twice a year, whichever comes first
Motor	SAE 30 Motor Oil	Five drops in each hole	Five drops in each hole every 1000 hrs. or once a year, whichever comes first
Guide Roller	SAE 10 Motor Oil	One drop in shaft hole in roller	Clean, then apply only if roller sticks or squeaks
Snubber Roller	Soft lead pencil, micro-fine graphite or Molykote powder	Apply smudge on shafts (must be free of oil)	Clean, then apply only if roller sticks or squeaks
Shoe, side pressure shoe	Soft lead pencil, micro-fine graphite or Molykote powder	Apply smudge on shoe before assembly (must be free of oil)	
Pin, film shoe	SAE 10 Motor Oil	Smudge on each pin	

LUBRICATION CHART (Continued)

Points of	Type of Lubrication	Lubrication at Time of General Overhaul	Periodic Lubrication
Pressure Roller	SAE 10 Motor Oil	One drop in shaft hole in roller	
Oilite bearings such as sprocket shaft, worm shaft, etc.	SAE 30 Medium Motor Oil	A few drops in bearing and on shaft	
Oilite bushings such as intermittent gear, shutter gear, rewind gears, etc.	SAE 30 Medium Motor Oil	A few drops in bushing and on shaft	
All gear teeth, including worm	Light grease, RCA Stock #205148, Esso Castroleum #3 or equivalent	Apply lightly to all teeth	

SERVICE MANUAL

THE RCA MODEL 400

16mm MOTION PICTURE EQUIPMENT

SENIOR

MI-1305-1 . . . . **Projector-Amplifier, Sound and Silent Speed**
MI-1306-1 . . . . **Loudspeaker and Accessories**

JUNIOR

MI-1313 . . . . . **Projector-Amplifier with Loudspeaker and Accessories, Sound and Silent Speed**

SPECIFICATIONS

PROJECTOR

Projection Lamp .....Standard Med. Prefocused, 200 to 1,000 watts
Projection Lens .....RCA, 2-inch, Fl.6 coated
Film Capacity .....2,000 ft., 16mm film
Operating Speed ....24 frames (sound film) and 16 frames (silent film) per sec.

AMPLIFIER

Microphone Gain .....106 db
Power Output .....10 watts at less than 5% distortion
Tubes: 1 RCA-6J7 1 RCA-6J5 1 RCA-6SN7GT
3 RCA-6V6GT 1 RCA-5Y3GT 1 RCA-921

SPEAKERS

Voice Coil Impedance (Senior) .....6.2 ohms
Voice Coil Impedance (Junior) .....3.2 ohms
Field .....Alnico, permanent magnet

POWER REQUIRED (with 1,000-watt lamp)

1,275 watts, 105-125 volts, 50-60 cycles A. C.
To operate on "D. C.", a 150-watt converter is required for the amplifier.

WEIGHT

Projector-Amplifier in Case, MI-1305-1 .....39 lbs.
Loudspeaker in Case, MI-1306-1 .....27 lbs.
Projector-Amplifier and Loudspeaker in Case, MI-1313 .....47 lbs.

DIMENSIONS

Projector-Amplifier Case, MI-1305-1 ....15⅝" long x 15¼" high x 9" deep
Loudspeaker Case, MI-1306-1 .....19¾" long x 16½" high x 9¼" deep
Projector Amplifier and Loudspeaker Case, MI-1313.....
15⅝" long x 15¼" high x 11½" deep

Price $1.00 Per Copy

RADIO CORPORATION OF AMERICA

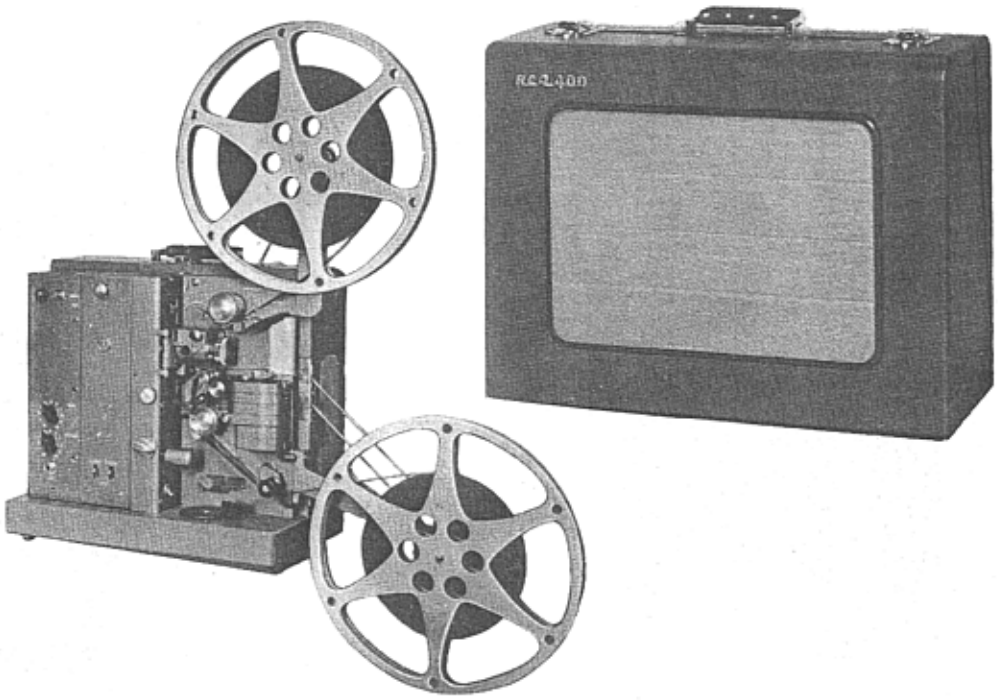
Engineering Products Department **Camden, N. J.**

Printed in U. S. A.
499

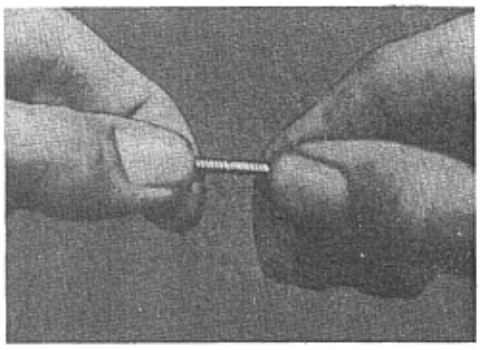
SERVICE MANUAL # IB-2926

INDEX

RCA MODEL 400

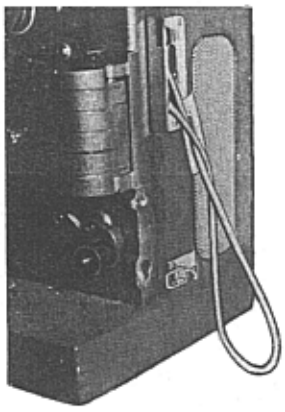


REMOVING BELTS



STRETCH SPLICE OUT AND UNSCREW

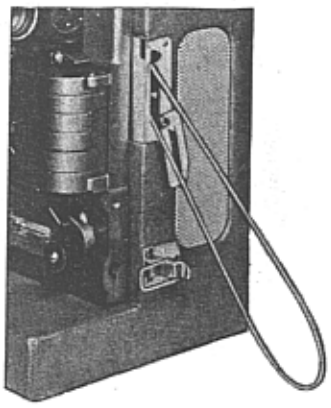
REPLACING BELTS



INCORRECT

1. COUNT NUMBER OF TURNS NECESSARY TO SCREW BELT ENDS TOGETHER.
2. UNSCREW.
3. GIVE BELT ENDS SAME NUMBER OF TWISTS IN REVERSE DIRECTION.
4. SCREW ENDS TOGETHER. THIS PREVENTS BELT TWISTING AND UNSCREWING OF BELTS DURING OPERATION.

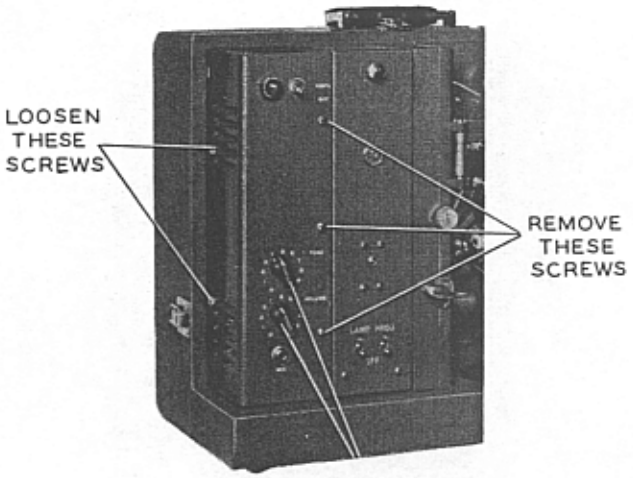
TO IDENTIFY UPPER AND LOWER BELTS, REMEMBER, "LOWER IS LONGER"



CORRECT

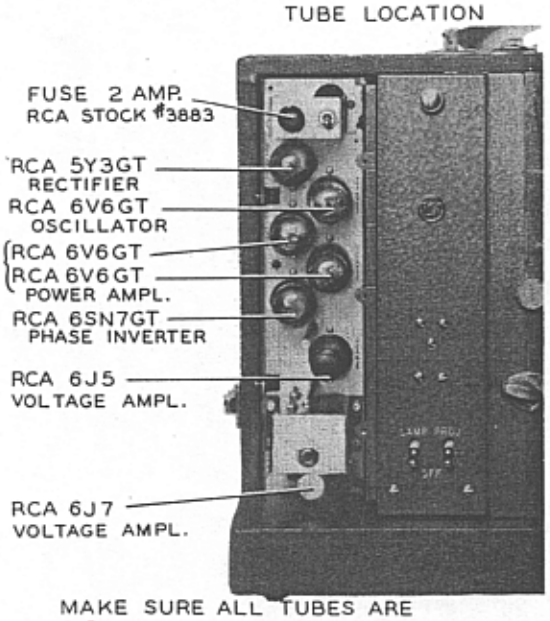
RCA 400 AMPLIFIER

TO INSPECT AMPLIFIER TUBES



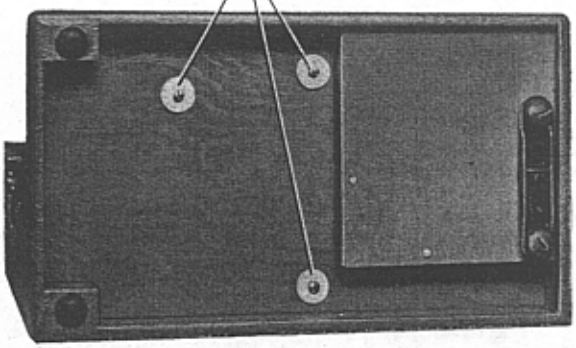
LOOSEN THESE SET SCREWS AND REMOVE KNOBS, REMOVE COVER.

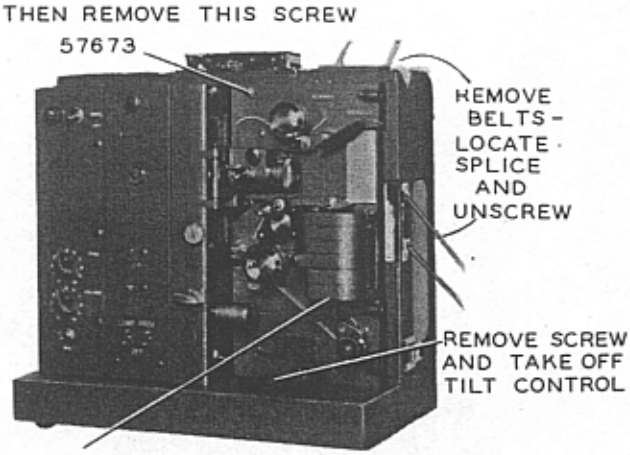
TUBE LOCATION



MAKE SURE ALL TUBES ARE FIRMLY SEATED.

TO REMOVE PROJECTOR AMPLIFIER FROM CARRYING CASE



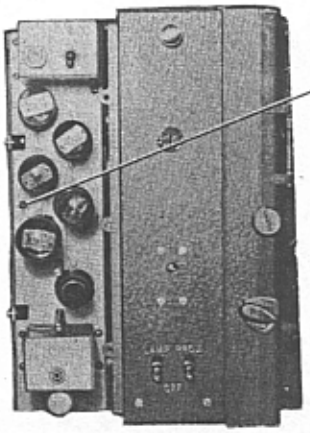


GRASP EXCITER LAMP HOUSING WITH RIGHT HAND AND WITH LEFT HAND AT LEFT SIDE OF AMPLIFIER, PULL PROJECTOR FORWARD OUT OF CASE.

FOR DESCRIPTION OF AMPLIFIER COMPONENTS SEE SCHEMATIC DIAGRAM PAGE 40 AND PARTS LIST.

RCA 400 AMPLIFIER

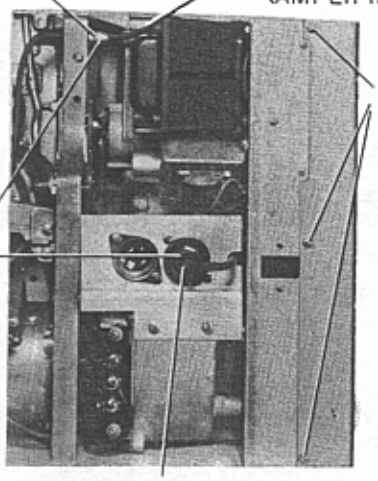
TO SERVICE AMPLIFIER



REMOVE THIS #6 SCREW AND EXTERNAL LOCKWASHER

J-3 (AMPLIFIER LIST)

57642 CABLE AND CONNECTOR (AMPLIFIER LIST)



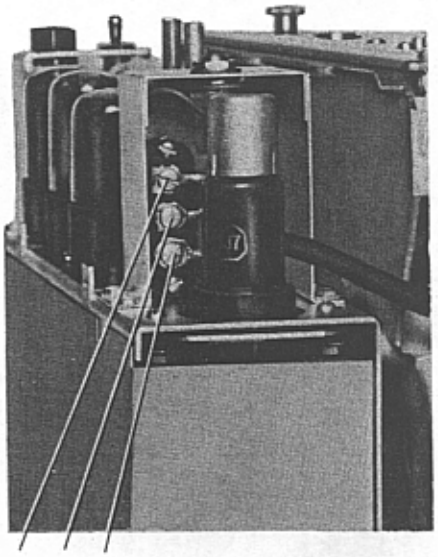
REMOVE THESE THREE SCREWS AND EXTERNAL LOCKWASHERS. REMOVE BACK COVER.

PULL OUT THESE TWO PLUGS

J-4 (AMPLIFIER LIST)

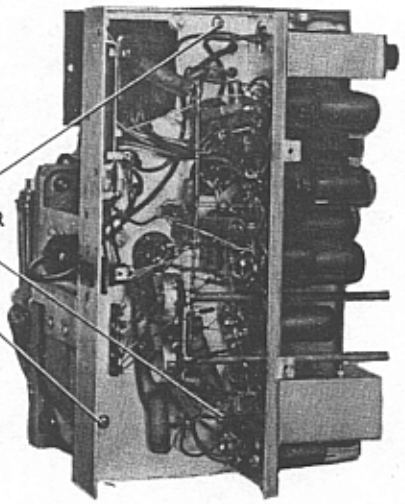
TO REMOVE AMPLIFIER FROM MAIN FRAME

BOTTOM VIEW OF AMPLIFIER



R S B

LOOSEN THESE THREE SCREWS AND REMOVE SPADE TERMINALS. TAG LEADS.



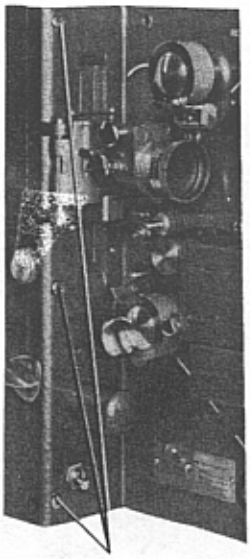
REMOVE THESE THREE SCREWS & LIFT AMPLIFIER FROM MAIN FRAME

FOR DESCRIPTION OF AMPLIFIER COMPONENTS SEE SCHEMATIC DIAGRAM PAGE 40 AND PARTS LIST.

LAMPHOUSE AND DOOR ASSEMBLY

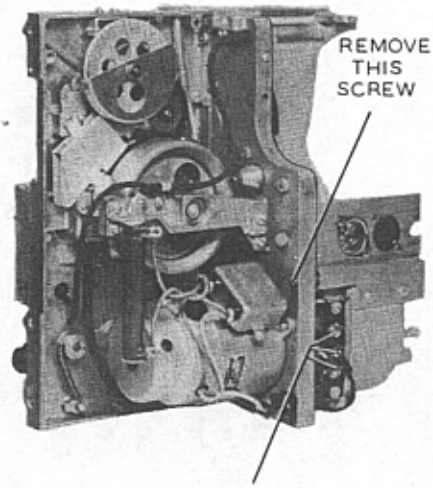
TO REMOVE LAMPHOUSE

1.



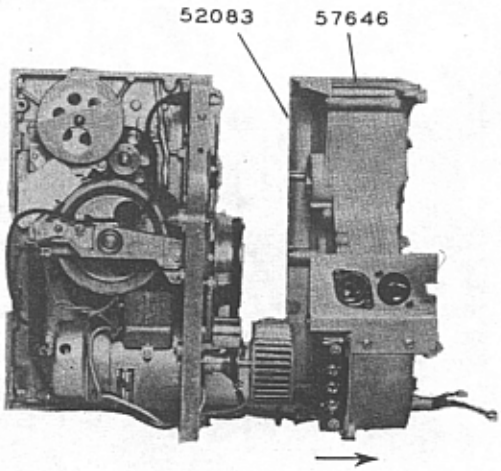
REMOVE THESE 3 SCREWS

2.



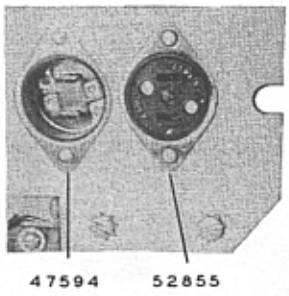
LOOSEN THESE 3 SCREWS AND REMOVE SPADE TERMINALS. TAG LEADS

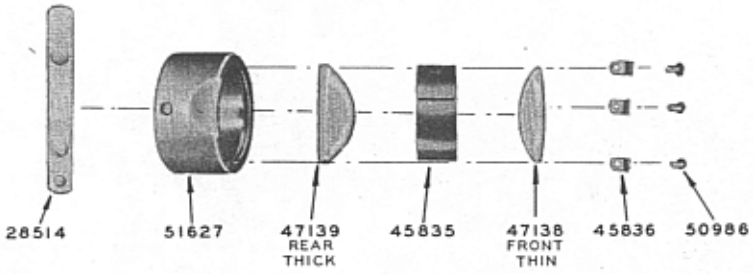
3.

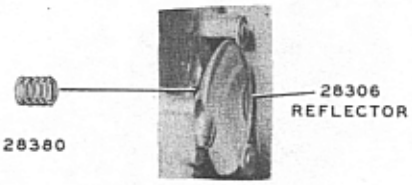


SLIDE LAMPHOUSE OFF TO RIGHT BEING CAREFUL NOT TO LET BLOWER ROTOR BIND IN HOUSING. BLOWER ROTOR MAY BE DAMAGED IF NOT CAREFULLY REMOVED.

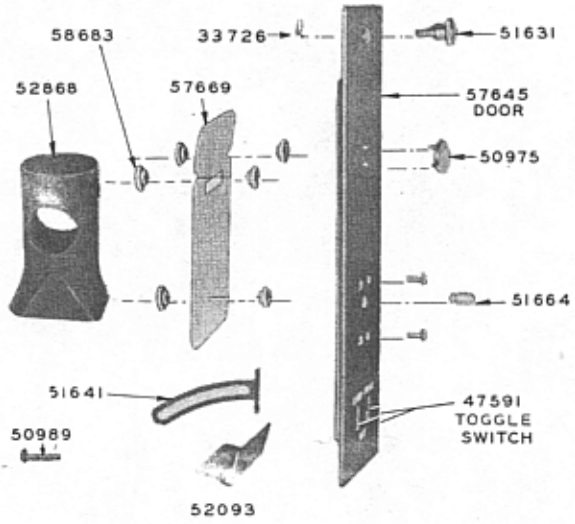
LAMP HOUSE AND DOOR ASSEMBLY



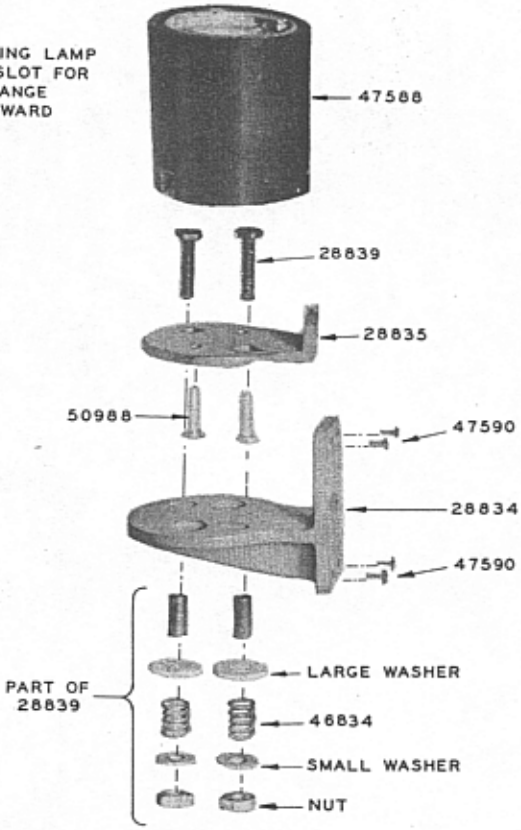




SOCKET ASSEMBLED
BOTTOM VIEW

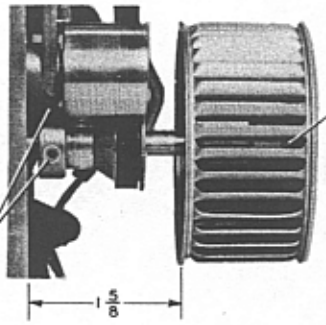


WHEN INSTALLING LAMP SOCKET, THE SLOT FOR WIDE LAMP FLANGE SHOULD BE TOWARD FRONT.



MOTOR AND MOUNTING ASSEMBLY

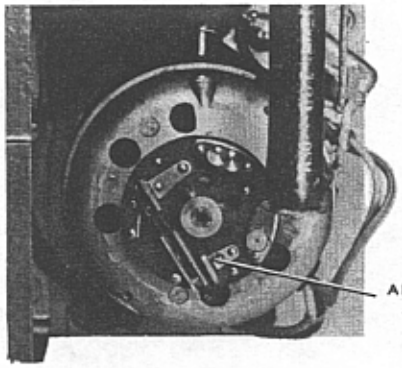
TO REMOVE BLOWER ROTOR AND MOTOR DRIVE PULLEY



LOOSEN THIS ALLEN SET SCREW AND PULL ROTOR OFF SHAFT. WHEN RE-INSTALLING, ALIGN SET SCREW WITH FLAT SURFACE ON SHAFT AND LOCATE ROTOR TO DIMENSION SHOWN.

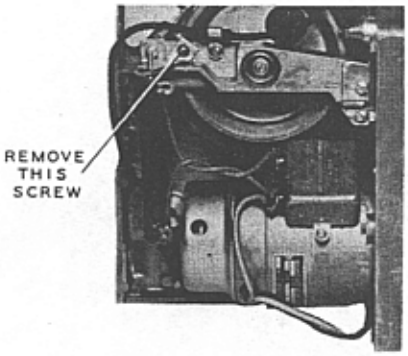
SLIP DRIVE BELT OFF PULLEY AND FLY-WHEEL. LOOSEN TWO ALLEN SETSCREWS AND REMOVE PULLEY FROM SHAFT. WHEN REASSEMBLING ALIGN SETSCREWS WITH TWO FLAT SURFACES ON SHAFT. ALIGN THE TWO PULLEY BELT DRIVE SURFACES WITH THOSE OF LARGE PULLEY FLY WHEEL IMMEDIATELY ABOVE. WHEN REINSTALLING DRIVE BELT, PLACE RUBBER SIDE OF BELT AGAINST PULLEY.

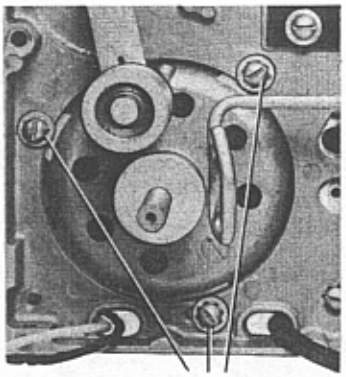
TO ADJUST MOTOR SPEED



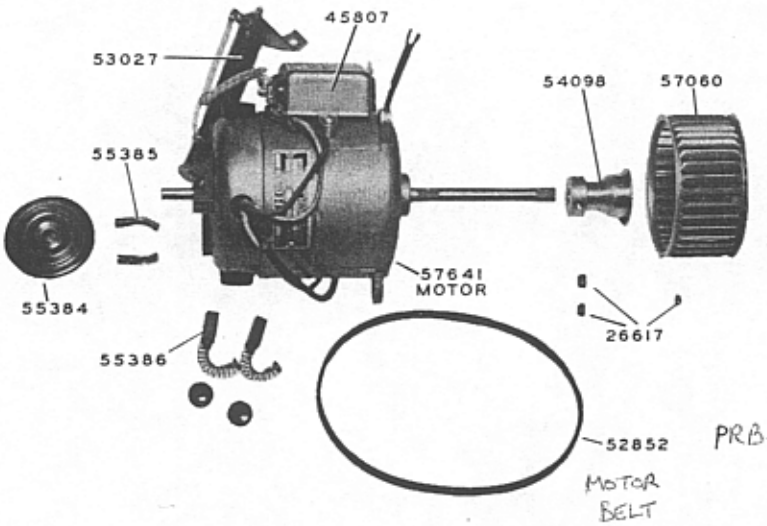
REMOVE GOVERNOR COVER. TURN THE SETSCREW TO RIGHT TO INCREASE SPEED. TURN IT TO LEFT TO DECREASE SPEED. CHECK SPEED BY PLACING FINGER ON TOP OF UPPER FILM SPROCKET BODY AND COUNTING NUMBER OF TIMES SETSCREW HOLE REVOLVES IN ONE MINUTE. CORRECT SPEED IS 90 R.P.M. WITH SPEED SELECTOR IN "SOUND" POSITION.

TO DISCONNECT MOTOR



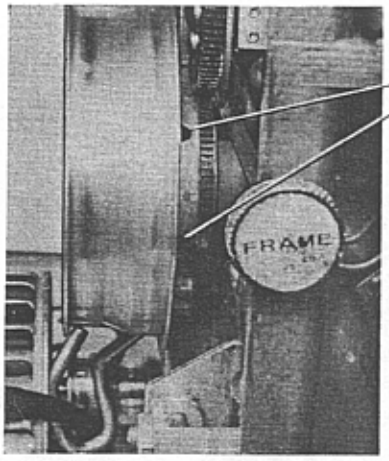


REMOVE THESE SCREWS AND REMOVE MOTOR FROM FRAME



PRB# FRF 14.5
FLAT RUBBER FABRIC

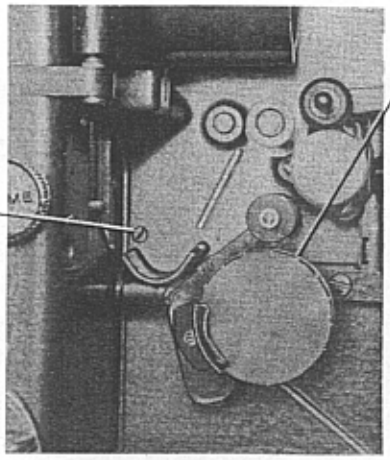
DRIVE SHAFT AND PULLEY (LARGE) ASSEMBLY



TO REMOVE LARGE DRIVE PULLEY, LOOSEN ALLEN SCREWS ABOUT 3 TURNS.

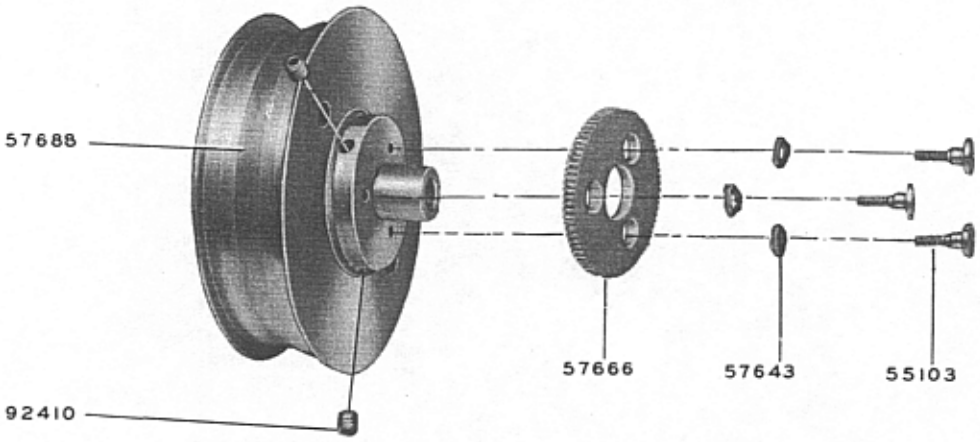
58837 RETAINING SCREW FOR DRIVE SHAFT BEARING

BE CAREFUL NOT TO MISPLACE 1/16 THRUST WASHER

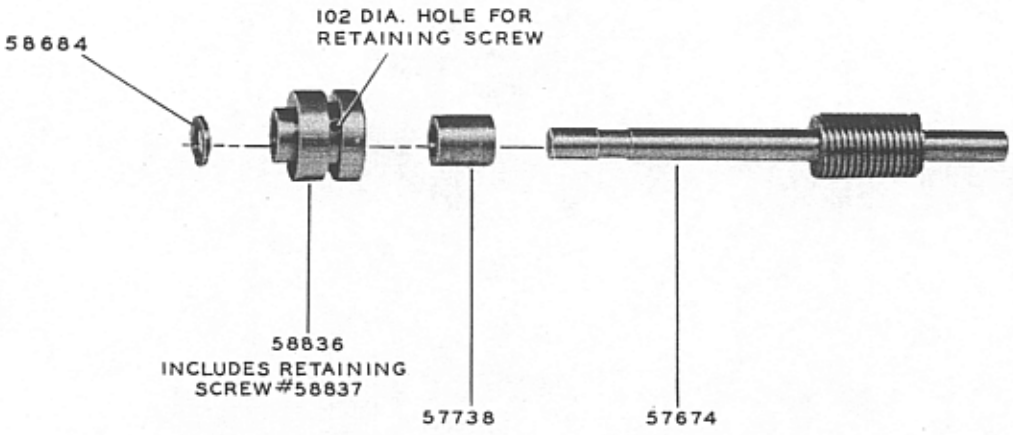


TO REINSTALL PULLEY, HOLD LOWER SPROCKET IN EXTREME COUNTER-CLOCKWISE POSITION TO TAKE UP END PLAY IN PULLEY SHAFT. AFTER REINSTALLING PULLEY THERE SHOULD BE .003 END PLAY AFTER SET-SCREWS ARE TIGHTENED. USE A THICKNESS GAUGE

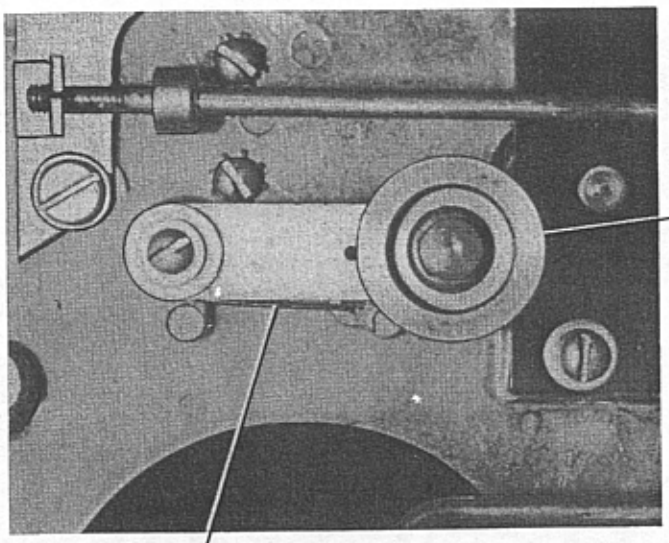
BE SURE TO REPLACE 1/16 THRUST WASHER



WORM GEAR ASSEMBLY

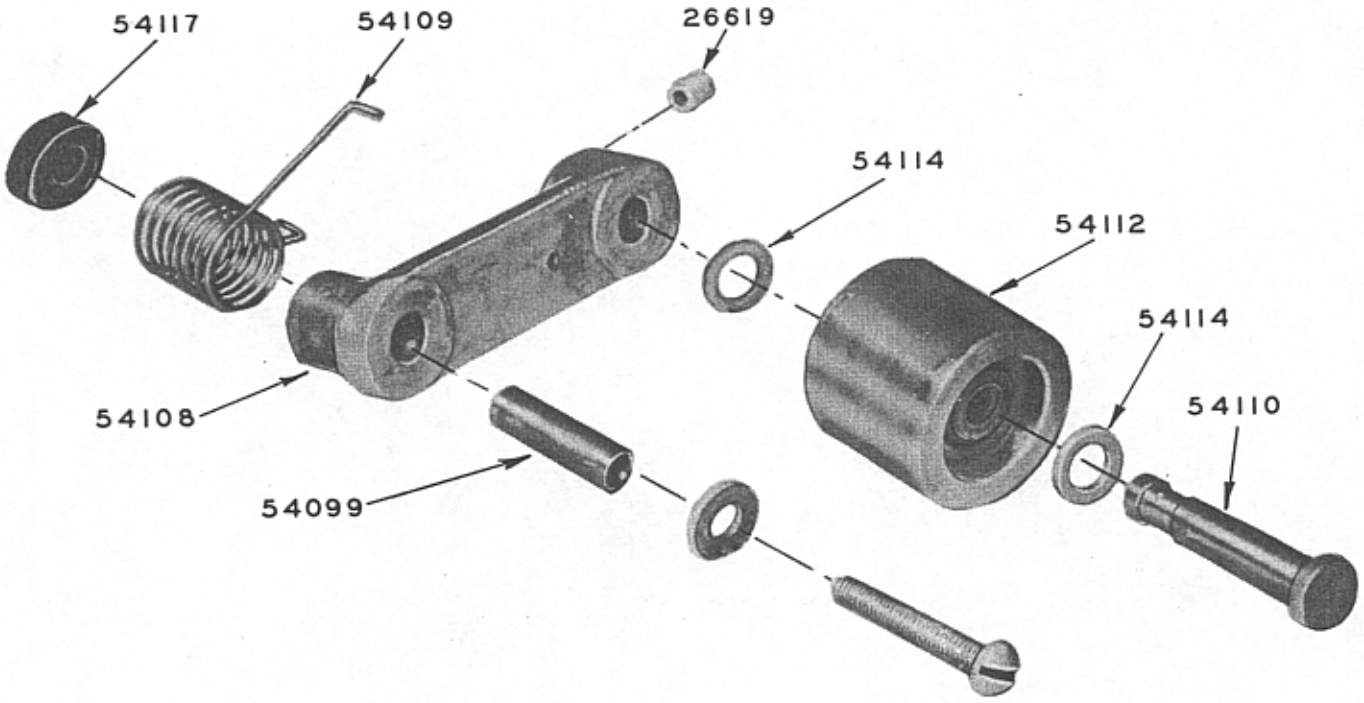


DRIVE BELT IDLER ROLLER ASSEMBLY



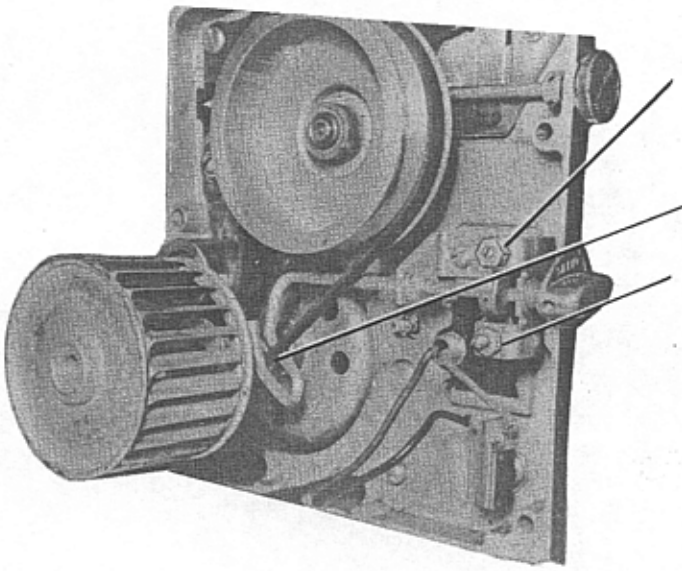
HOLD END-PLAY OF ROLLER TO MINIMUM.

CORRECT POSITION OF IDLER ROLLER, BELT REMOVED. IF INCORRECT, ADJUST BY BENDING THIS SPRING.

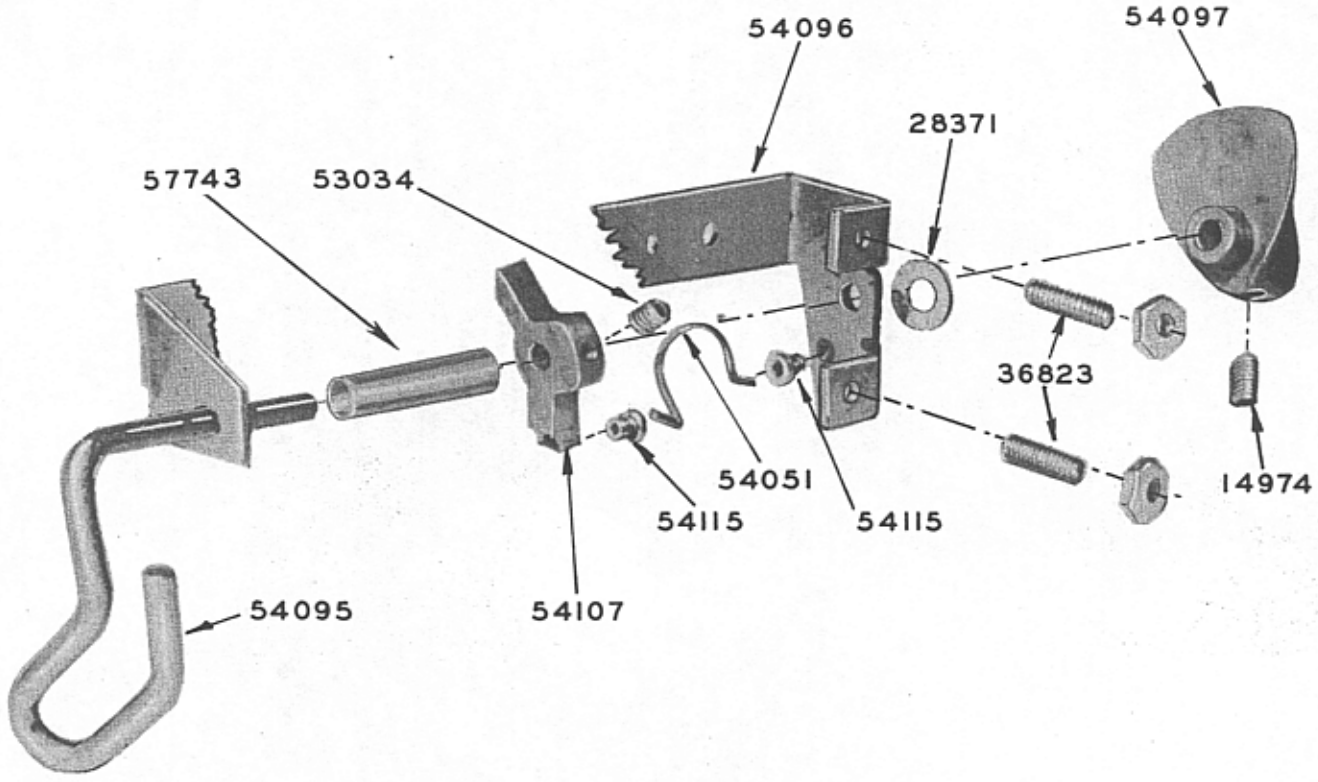


BELT SHIFTER ASSEMBLY
(SPEED CHANGER)

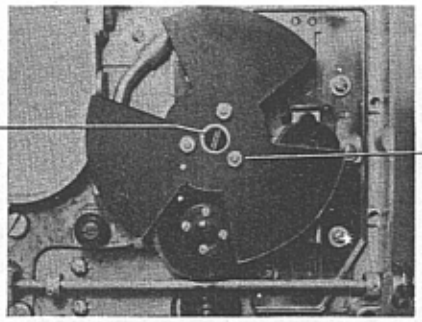
TO ADJUST BELT SHIFTER



1. WITH SPEED CONTROL UP IN <u>SILENT</u> POSITION, LOOSEN THIS NUT AND ADJUST SCREW TO RIGHT OR LEFT UNTIL BELT DOES NOT RUB EITHER SIDE OF BELT SHIFTER ARM. TIGHTEN LOCK-NUT.
2. MOVE SPEED CONTROL DOWN TO <u>SOUND</u> SPEED POSITION AND REPEAT ABOVE ADJUSTMENT OF LOWER SET SCREW.



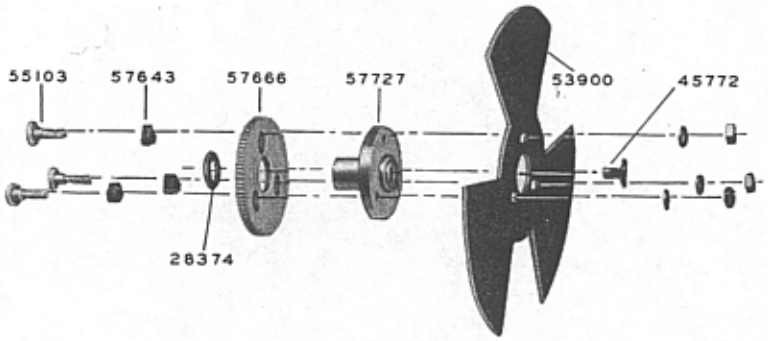
SHUTTER ASSEMBLY



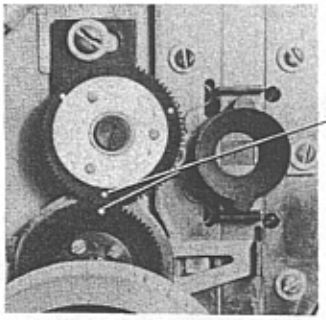
TO REMOVE SHUTTER ASSEMBLY, TAKE OUT THIS SCREW

TO DISASSEMBLE SHUTTER ASSEMBLY:

1. REMOVE SHUTTER ASSEMBLY.
2. REMOVE THE 3 NUTS AND WASHERS
3. UNSCREW SCREWS AT BACK.



INSTALLING SHUTTER ASSEMBLY



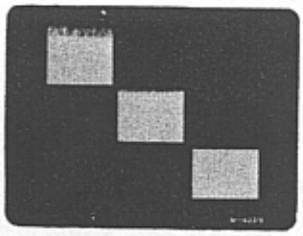
1. LINE UP MARK ON CAM GEAR WITH ANY ONE OF THREE HOLES IN SHUTTER GEAR.
2. INSTALL SHUTTER BLADE, LINING UP PIN HOLE IN SHUTTER BLADE OVER ANY ONE OF THREE HOLES IN SHUTTER GEAR.

ADJUSTING SHUTTER

WHITE STREAKS OF LIGHT ABOVE OR BELOW WHITE OBJECTS ON BLACK BACKGROUND ARE GENERALLY REFERRED TO AS "TRAVEL GHOST." A FIVE FOOT LOOP OF TITLE FILM WITH TRANSPARENT LETTERS ON A BLACK BACKGROUND MAKES A HANDY TEST FILM FOR CHECKING "TRAVEL GHOST."

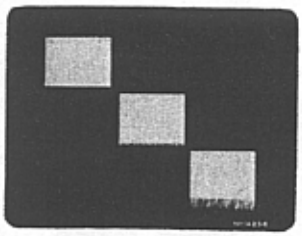
PROJECT TITLE ON SCREEN AND FOCUS SHARPLY

SHUTTER SLOW



IF TITLE STREAKS UPWARD, LOOSEN 3 NUTS HOLDING SHUTTER AND MOVE SHUTTER SLIGHTLY CLOCKWISE

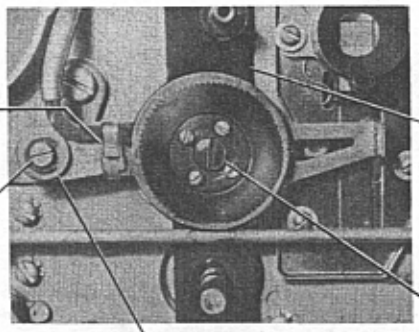
SHUTTER FAST



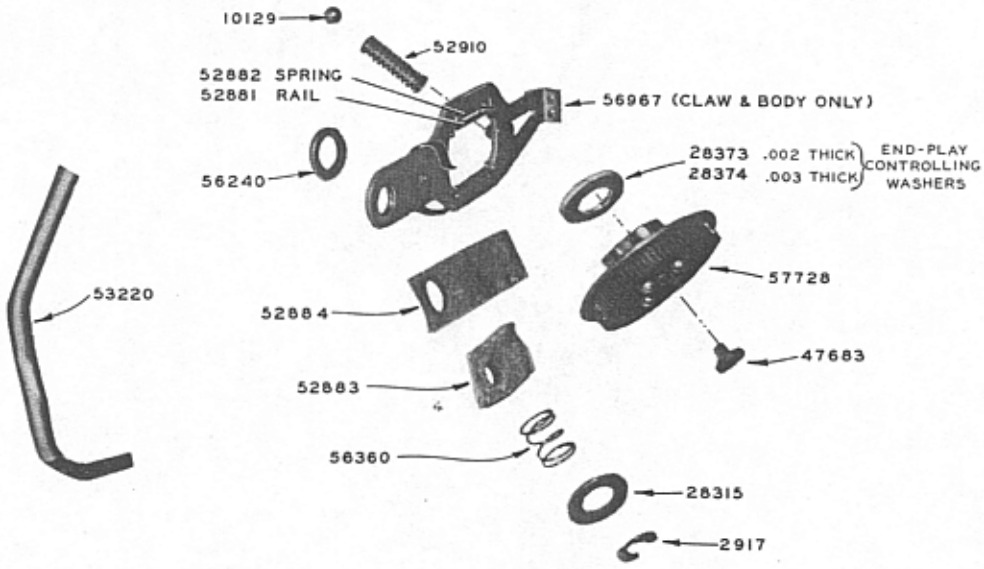
IF TITLE STREAKS DOWNWARD, MOVE SHUTTER SLIGHTLY COUNTER-CLOCKWISE. WHEN CORRECTLY ADJUSTED, ANY TENDENCY TO "TRAVEL GHOST" SHOULD BE EVENLY BALANCED TOP AND BOTTOM.

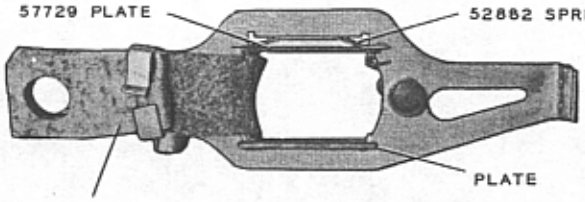
INTERMITTENT MECHANISM CLAW ASSEMBLY

TO REMOVE INTERMITTENT MECHANISM

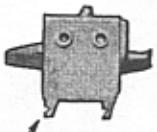


1. SPREAD THIS BAND AND REMOVE WICK
2. REMOVE "C" WASHER, FLAT WASHER AND SPRING. (DO NOT TURN SLOTTED ECCENTRIC PIN.) (DURING REASSEMBLY MAKE SURE #56360 SPRING PASSES FREELY THROUGH FELT PADS AND THAT END OF ROUND OIL WICK DOES NOT EXTEND UNDER CAM)
3. REMOVE THIS LEFT-HAND THREADED SCREW BY TURNING CLOCKWISE.
4. PULL OFF CAM GEAR ASSEMBLY. DO NOT LOSE BALL BEARING IN FRAME THAT SEATS CLAW THRUST SPRING.

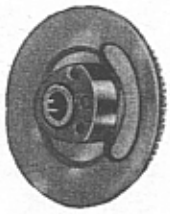




NOTE PROPER ASSEMBLY OF TWO OIL PADS. CAM FOLLOWER PLATES MUST BE PERFECTLY SMOOTH. NOISY OPERATION OF INTERMITTENT WILL RESULT IF RAIL SPRING HAS LOST ITS TENSION. DO NOT ATTEMPT TO BEND TO GIVE MORE TENSION, REPLACE #52882 SPRING.



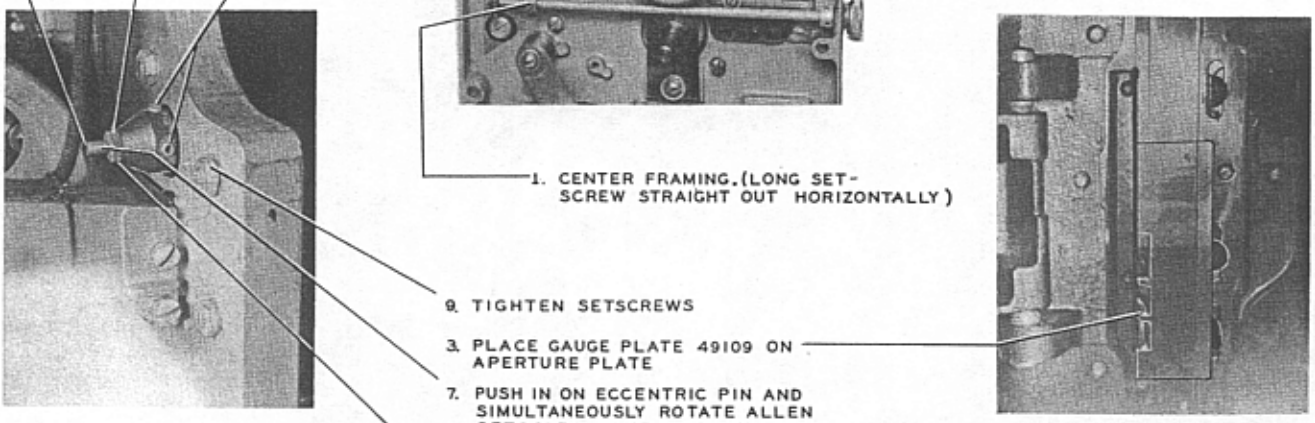
IF CLAW TEETH ARE INDENTED REPLACE # 56967



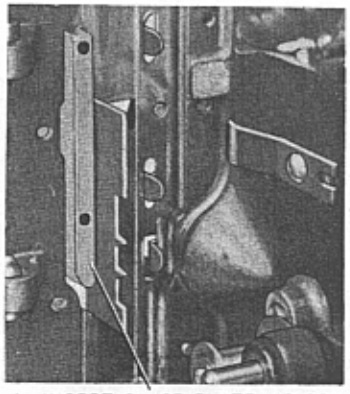
CAM SURFACE MUST BE PERFECTLY SMOOTH.

INTERMITTENT CLAW ASSEMBLY ADJUSTMENTS

ADJUSTING CLAW PROTRUSION THROUGH APERTURE PLATE

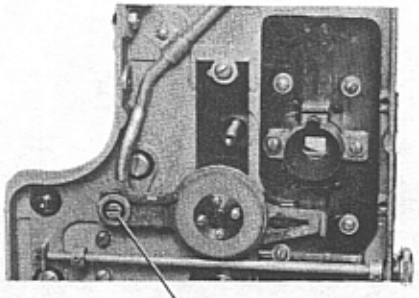


ADJUSTING CLAW LATERAL POSITION IN APERTURE PLATE



1. INSERT GAUGE PLATE 49109 BETWEEN CLAW AND FIXED FILM GUIDE.

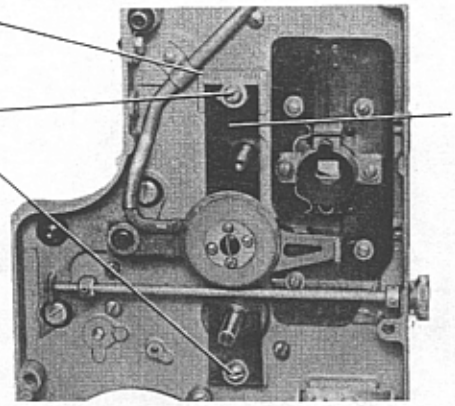
2. REPEAT "CLAW PROTRUSION" ADJUSTMENTS 1, 2, AND 6 (ABOVE).

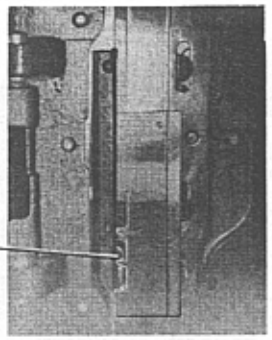


3. TURN ECCENTRIC PIN COUNTER-CLOCKWISE UNTIL CLAW PRESSES FIRMLY AGAINST GAUGE PLATE.
4. TURN ECCENTRIC PIN SCREW SLOWLY CLOCKWISE UNTIL CLAW GAUGE JUST DROPS OUT BY ITS OWN WEIGHT.
5. MAKE SURE THAT ECCENTRIC PIN IS PUSHED IN ALL THE WAY AND TIGHTEN ALLEN SETSCREWS ON BACK.

CLAW TRAVEL ADJUSTMENT

(UP-DOWN EXCURSION IN APERTURE PLATE)





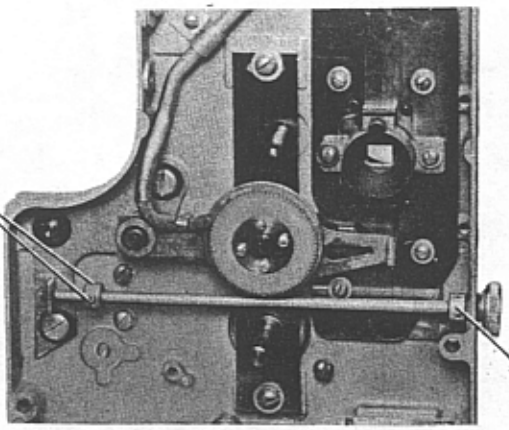
4. SLOWLY ROTATE CAM GEAR COUNTER-CLOCKWISE ONE COMPLETE REVOLUTION. (ONE COMPLETE CLAW EXCURSION).
5. WHEN CLAW COMES THROUGH APERTURE PLATE AT START OF SECOND PULL DOWN IT WILL PUSH GAUGE AWAY FROM APERTURE PLATE. (OBSERVE THIS ACTION CLOSELY.)
6. LOOSEN TOP SCREW AND MOVE TOP OF GEAR PLATE ONE DIVISION TO LEFT. (THIS LENGTHENS CLAW TRAVEL .003 INCH) RETIGHTEN TOP SCREW.
7. REPEAT STEP 4, 5 AND 6 UNTIL CLAW DOES NOT PUSH GAUGE AWAY FROM PLATE. DO NOT MOVE GEAR PLATE MORE THAN ONE DIVISION AT A TIME.
8. TIGHTEN TOP AND BOTTOM SCREWS.
9. CHECK FOR TRAVEL GHOST AND ADJUST SHUTTER AS NECESSARY.

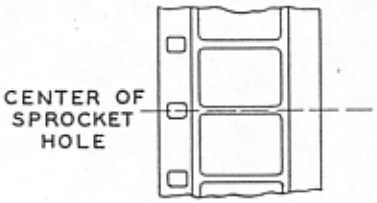
FRAMING DEVICE ASSEMBLY

TO ADJUST FRAMING DEVICE

1. LOOSEN TWO ALLEN SETSCREWS IN COLLAR.

2. WITH THE AID OF A MAGNIFYING GLASS, SELECT A PIECE OF FILM ON WHICH THE TOP AND BOTTOM EDGES OF ADJACENT PICTURES ARE EQUALLY SPACED FROM THE CENTER OF THE SPROCKET HOLE AS SHOWN IN ILLUSTRATION BELOW.



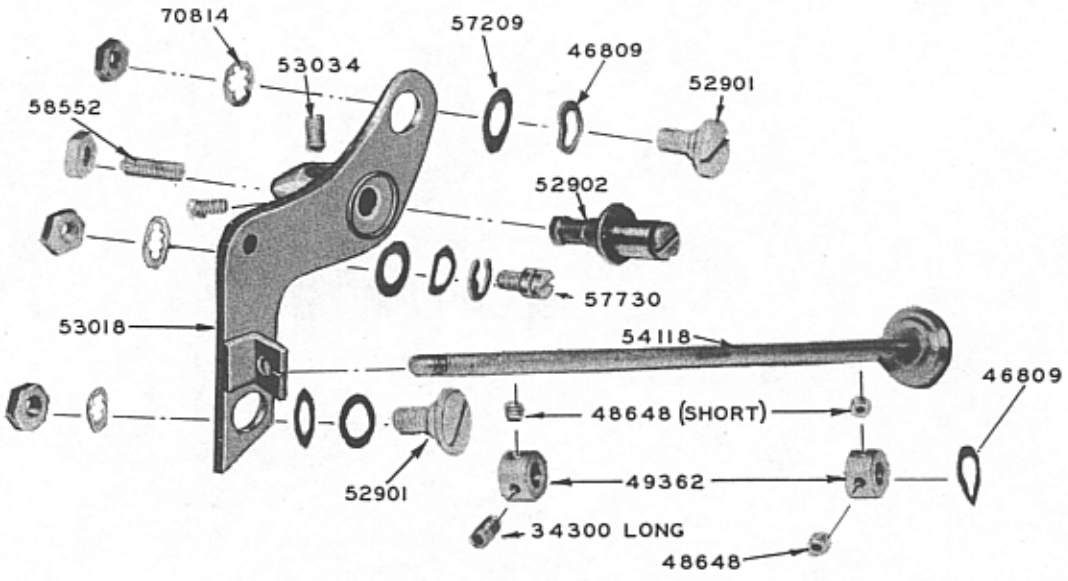


3. PROJECT AND FOCUS PICTURE ON SCREEN.

4. TURN FRAMING KNOB UNTIL PICTURE IS CENTERED ON SCREEN VERTICALLY.

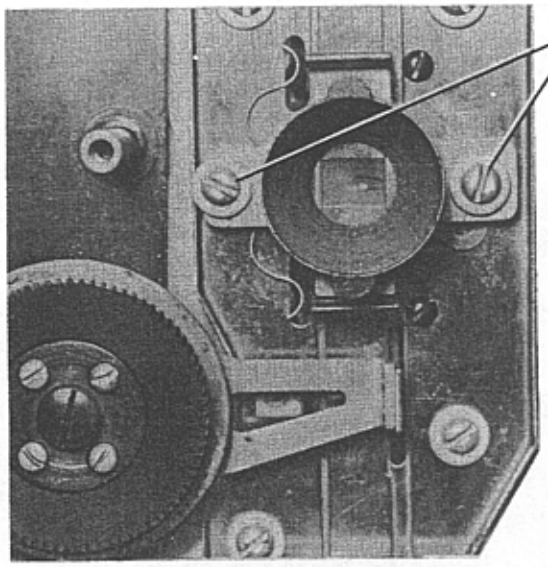
5. ADJUST COLLAR ON SHAFT SO THAT ITS LONG SETSCREW IS EQUIDISTANT (STRAIGHT OUT) FROM STOP ON EITHER SIDE.

6. TIGHTEN BOTH COLLAR SETSCREWS.

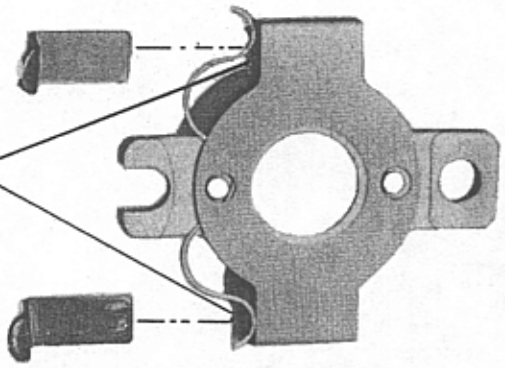


APERTURE PLATE ASSEMBLY

TO REPLACE SIDE PRESSURE SHOES



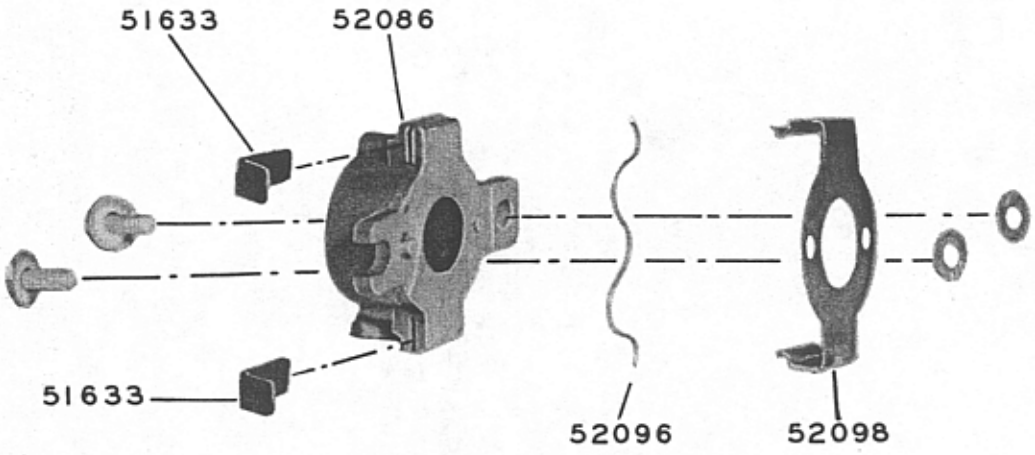
1. REMOVE THESE TWO SCREWS TO REMOVE FLARE ASSEMBLY.



2. SLIP SHOES FROM UNDER SPRING AND OUT OF SLOTS

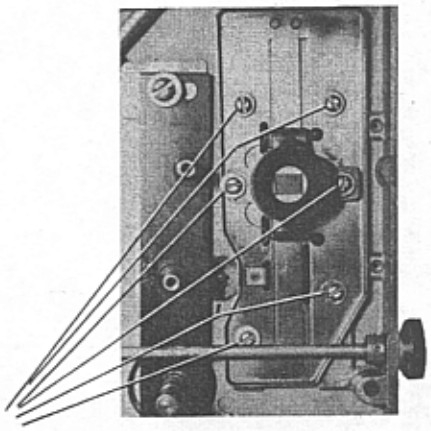
SIDE PRESSURE SHOES SHOULD BE REPLACED IF EVIDENCE OF GROOVING IS APPARENT. MOVEMENT OF NEW SHOES SHOULD BE PERFECTLY FREE IN A HORIZONTAL PLANE, WITH SHOE SPRING EXERTING AN EVEN PRESSURE.

FLARE ASSEMBLY

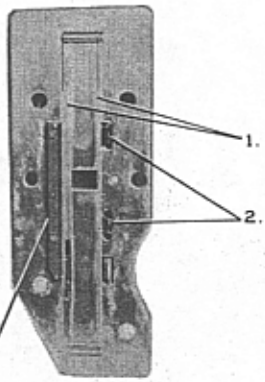


APERTURE PLATE ASSEMBLY

TO REMOVE APERTURE PLATE

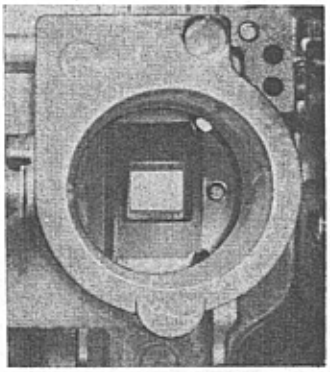


TAKE OUT THESE SIX SCREWS. FRAME CASTING SHOULD BE SCRIBED AROUND OUTLINE OF APERTURE PLATE BEFORE REMOVAL TO FACILITATE RELOCATING IT.



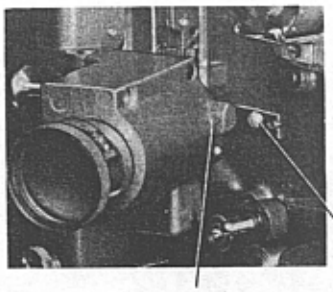
1. INSPECT RAILS FOR EXCESSIVE WEAR.
2. CHECK SIDE SHOES FOR GROOVING AND FREE HORIZONTAL MOVEMENT.

INSPECT FIXED FILM GUIDE FOR GROOVING. IF NECESSARY TO REPLACE, PLACE NEW FIXED GUIDE SNUGLY UP AGAINST FILM RAIL AND PROJECT FILM ON SCREEN. IF SPROCKET HOLES ARE VISIBLE, LOOSEN FIXED GUIDE HOLDING SCREWS AND MOVE GUIDE SLIGHTLY AWAY FROM APERTURE. IF SOUND TRACK IS VISIBLE, MOVE FIXED GUIDE SLIGHTLY TOWARDS APERTURE. MAKE CERTAIN FULL LENGTH OF GUIDE IS PARALLEL TO RAIL BEFORE TIGHTENING HOLDING SCREWS.



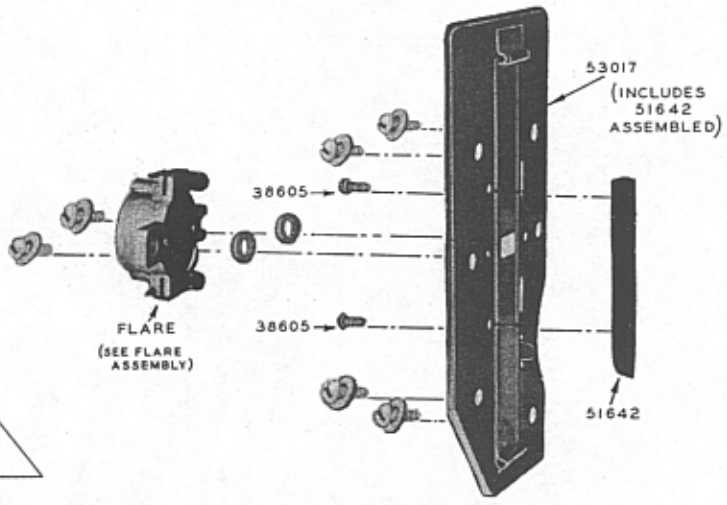
TO REPLACE APERTURE PLATE

PLACE NEW PLATE IN APPROXIMATE CORRECT POSITION AND REPLACE THE SIX HOLDING SCREWS, LEAVING THEM SLIGHTLY LOOSE. CLOSE PICTURE GATE ASSEMBLY AND CAREFULLY CENTER APERTURE IN APERTURE OF FILM SHOE. TIGHTEN THE SIX HOLDING SCREWS. CHECK ALL CLAW ADJUSTMENTS AFTER REPLACING APERTURE PLATE.



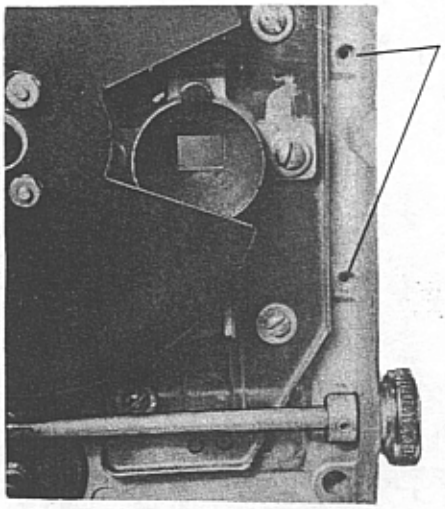
ADJUSTMENT FOR PICTURE SHARPNESS

WITH THE AID OF A GOOD TITLE FILM PROJECTED ON THE SCREEN, ADJUST LENS GATE WITH THIS SETSCREW IN ORDER TO OBTAIN EQUAL PICTURE SHARPNESS ON RIGHT AND LEFT SIDE OF SCREEN. READJUST LOCK SPRING IF NECESSARY TO HOLD GATE SECURELY IN CLOSED POSITION.



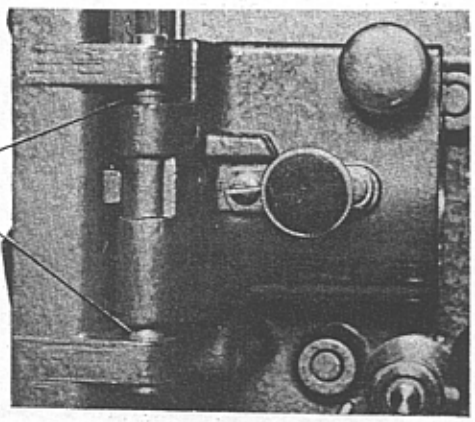
FILM GATE ASSEMBLY

TO REMOVE FILM GATE

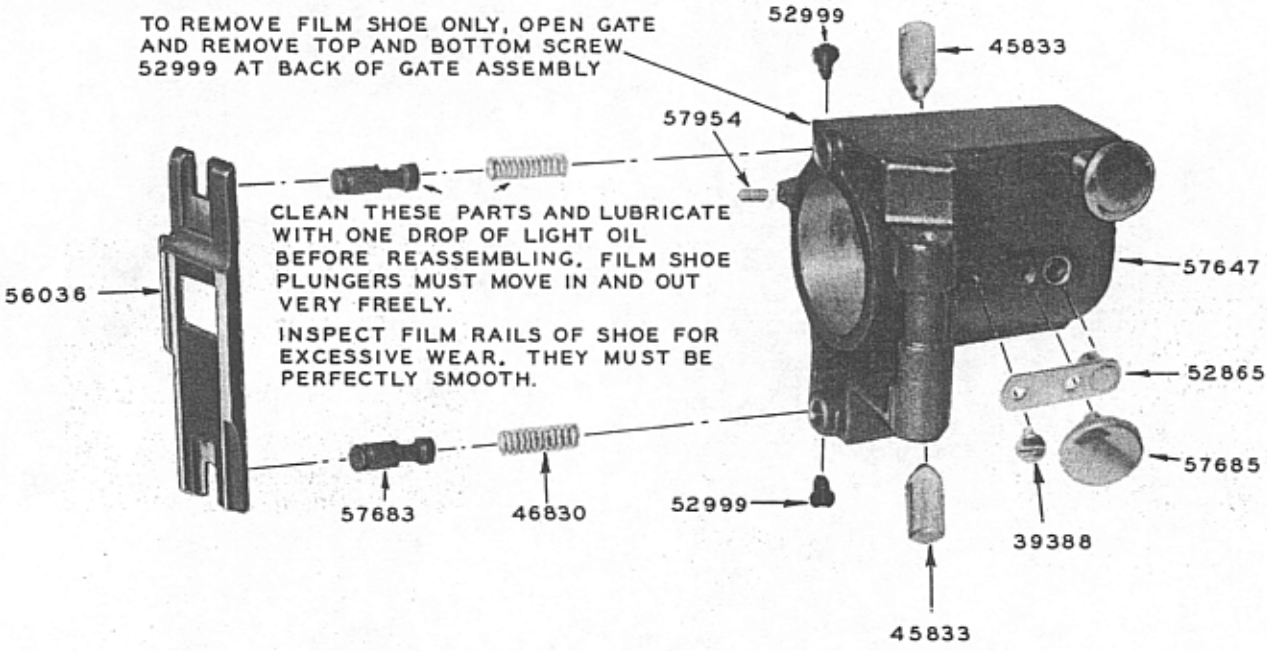


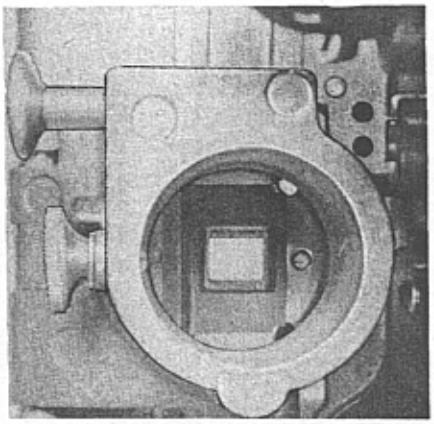
LOOSEN THESE
TWO ALLEN SCREWS

AND REMOVE PINS



TO REMOVE FILM SHOE ONLY, OPEN GATE AND REMOVE TOP AND BOTTOM SCREW 52999 AT BACK OF GATE ASSEMBLY

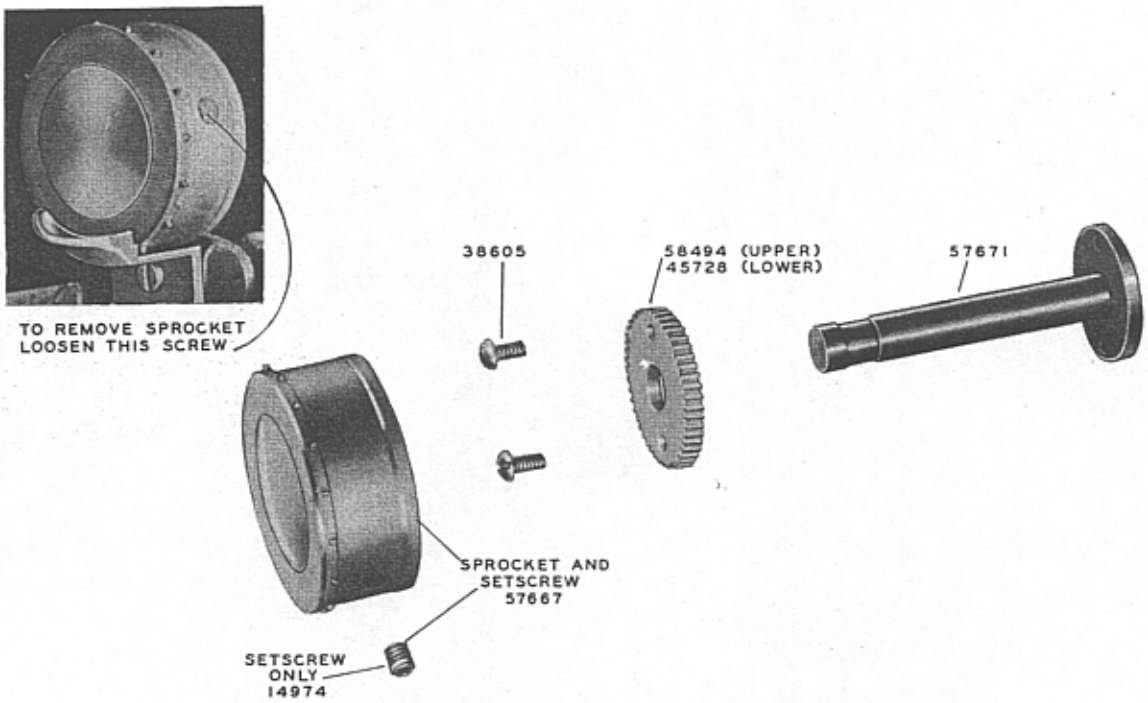




TO RECENTER GATE

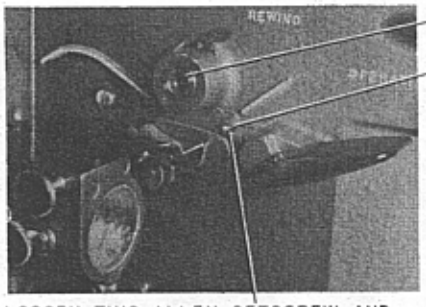
1. REPLACE GATE BETWEEN HOLDING PINS 45833
2. REMOVE LENS AND CLOSE GATE.
3. CAREFULLY SIGHT THROUGH LENS HOLDING BRACKET AND MOVE GATE ASSEMBLY UP OR DOWN TO LINE UP APERTURE OF FILM SHOE WITH APERTURE OF APERTURE PLATE.
4. TIGHTEN PIN-HOLDING ALLEN SETSCREW WHILE SQUEEZING PINS TOGETHER TO AVOID END-PLAY.

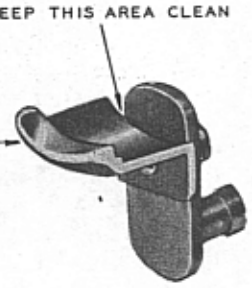
SPROCKET, GEAR, SHAFT AND FLANGE ASSEMBLY
UPPER AND LOWER



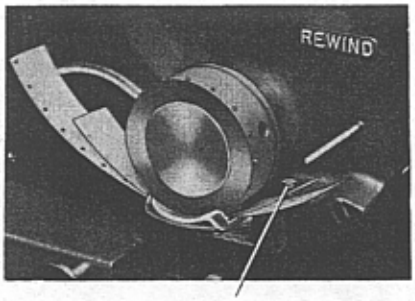
SPROCKET SHOE ASSEMBLY

TO REMOVE SHOE ASSEMBLY

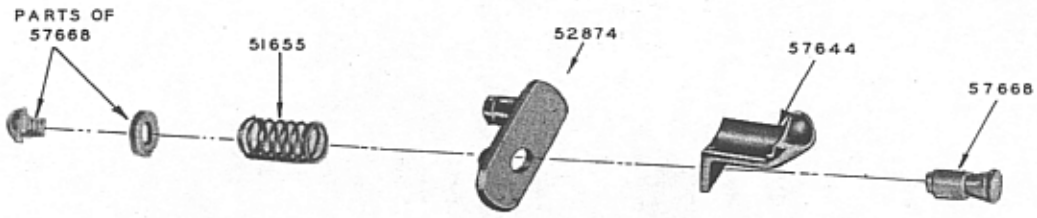




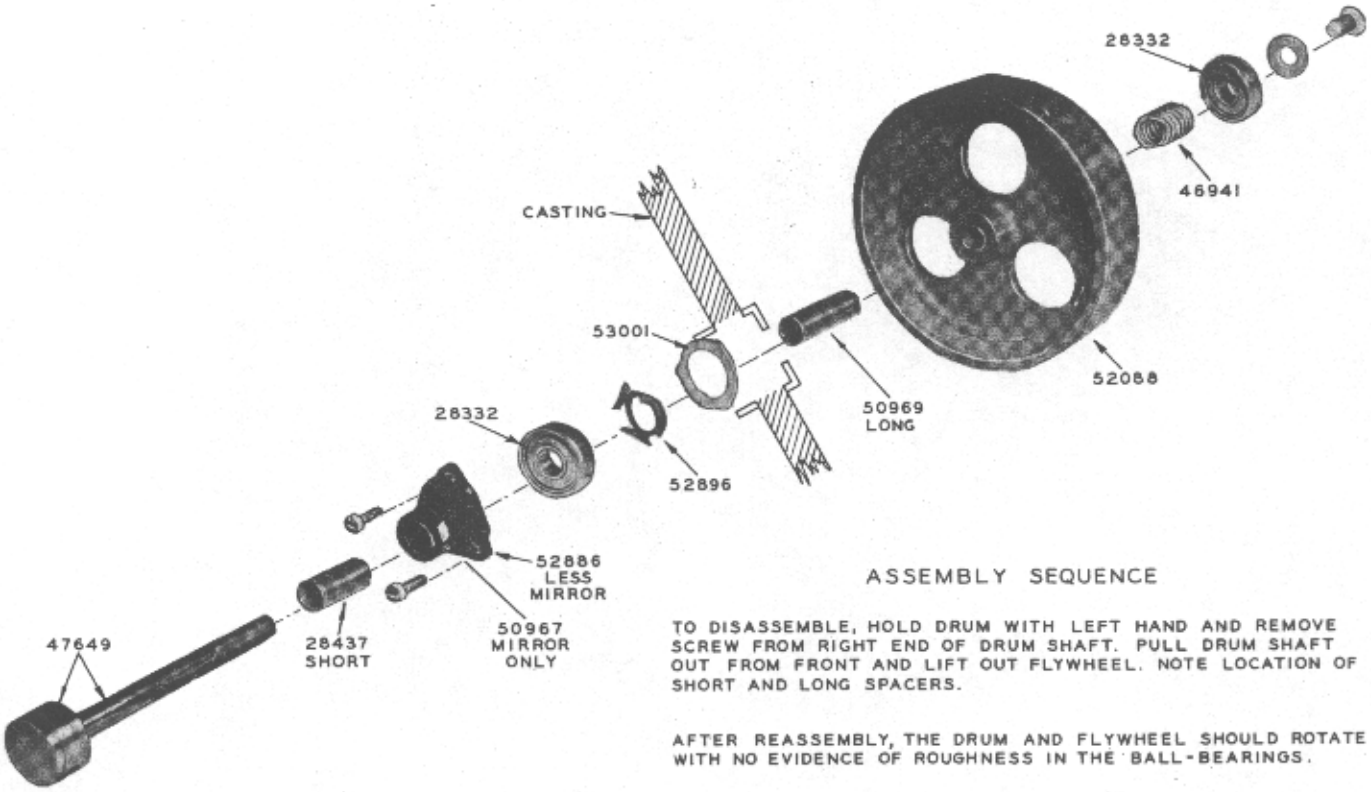
TO ADJUST SPROCKET SHOE



1. LOOSEN ALLEN SETSCREW
2. PLACE TWO THICKNESSES OF FILM BETWEEN SPROCKET AND SHOE
3. PUSH SHOE UP EVEN AND SNUG AGAINST SPROCKET AND CENTER SO THAT NEITHER EDGE HITS SPROCKET.
4. TIGHTEN ALLEN SETSCREW.



DRUM SHAFT, MIRROR BRACKET AND FLYWHEEL ASSEMBLY



ASSEMBLY SEQUENCE

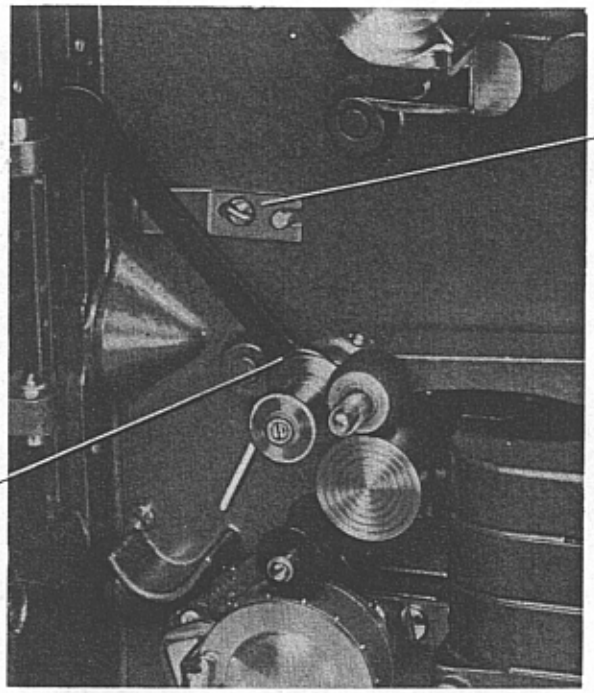
TO DISASSEMBLE, HOLD DRUM WITH LEFT HAND AND REMOVE SCREW FROM RIGHT END OF DRUM SHAFT. PULL DRUM SHAFT OUT FROM FRONT AND LIFT OUT FLYWHEEL. NOTE LOCATION OF SHORT AND LONG SPACERS.

AFTER REASSEMBLY, THE DRUM AND FLYWHEEL SHOULD ROTATE WITH NO EVIDENCE OF ROUGHNESS IN THE BALL-BEARINGS.

GUIDE ROLLER ASSEMBLY

LATERAL ADJUSTMENT OF SOUND TRACK

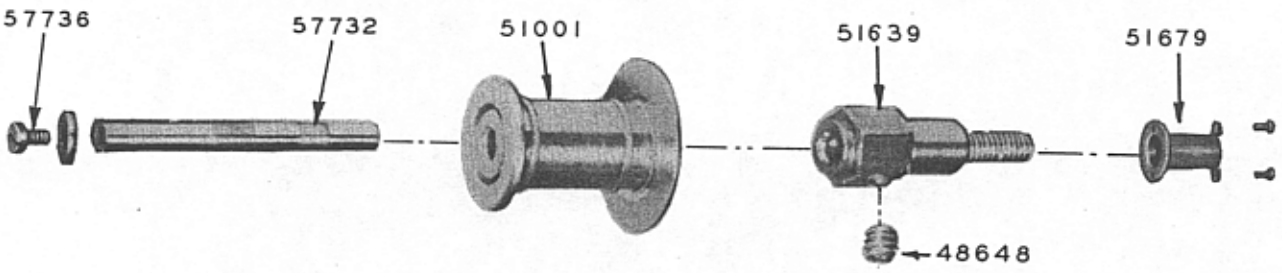
1. CONNECT SPEAKER AND POWER CORDS TO PROJECTOR-AMPLIFIER.
2. THREAD LOOP OF S.M.P.E. Z22.57-1947 BUZZ TRACK FILM IN PROJECTOR.
3. TURN AMPLIFIER "ON", SET VOLUME CONTROL AT 5.



4. PLACE $\frac{5}{16}$" END-WRENCH OVER HEX NUT AT REAR OF GUIDE ROLLER. DO NOT LOOSEN SET SCREW IN THIS NUT - IT HOLDS GUIDE ROLLER TO SHAFT.
5. START PROJECTOR. TURNING HEX NUT CLOCKWISE WILL PRODUCE A LOW FREQUENCY NOTE. TURNING IT COUNTER-CLOCKWISE WILL PRODUCE A HIGH FREQUENCY NOTE. WHEN PROPERLY ADJUSTED NEITHER NOTE WILL BE HEARD.

CLEANING AND LUBRICATING

1. REMOVE FILLISTER-HEAD SCREW, WASHER AND ROLLER FROM SHAFT
2. CLEAN THE ROLLER WITH CARBON TETRACHLORIDE
3. APPLY ONE DROP OF LIGHT OIL TO SHAFT HOLE IN ROLLER

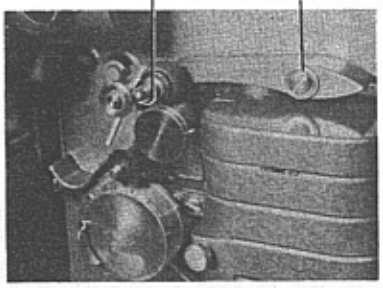


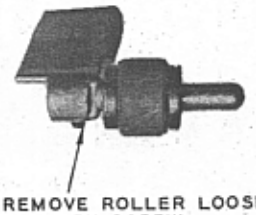
SOUND PRESSURE ROLLER ASSEMBLY

ADJUSTMENT

POSTAL SCALE

ROLLER SHOULD JUST LEAVE SOUND DRUM AT AN 8-OZ. PULL. PRESSURE IS CONTROLLED BY SPRING IN BACK OF ROLLER ARM. BEND SPRING TO GIVE CORRECT PRESSURE. TO REMOVE ROLLER ARM, REMOVE THIS SCREW.

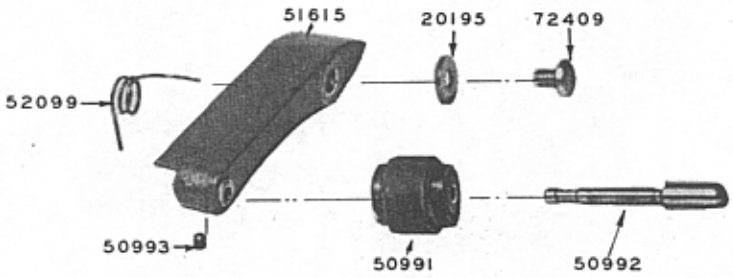




TO REMOVE ROLLER LOOSEN THIS ALLEN SCREW.

ROLLER SHOULD ROTATE FREELY WITH MINIMUM END PLAY

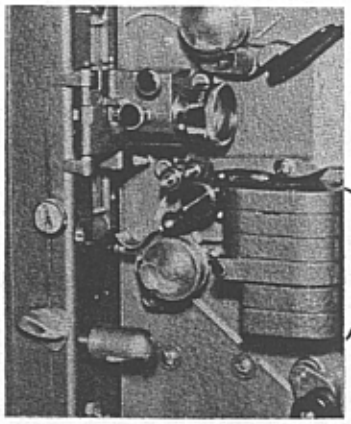
CAUTION:- IF PRESSURE ROLLER FAILS TO ENGAGE SOUND DRUM, PHOTOCELL SHIELD MAY HAVE SPRUNG OUT OF NORMAL POSITION AND BE OBSTRUCTING ROLLER ARM. PUSH SHIELD BACK INTO PLACE.



SOUND OPTICAL BRACKET ASSEMBLY

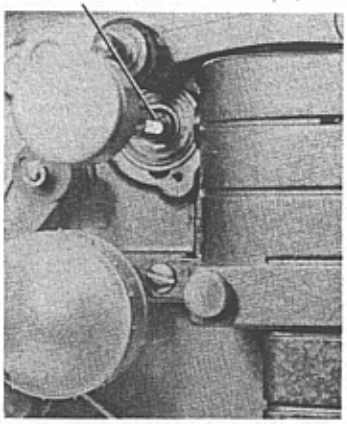
CENTERING SOUND SCANNING LIGHT BEAM

1. LOOSEN ALLEN SETSCREWS HOLDING OPTICAL BRACKET HINGE PINS ALLOWING SOUND OPTICAL BRACKET TO BE MOVED UP OR DOWN.



ALLEN SETSCREWS HOLDING HINGE PINS ARE IMMEDIATELY BEHIND MAIN FRAME AT THESE POINTS. REMOVE LOWER BELT GUARD TO DO THIS.

2. REMOVE FLYWHEEL AND WITHDRAW SOUND DRUM.
3. REMOVE MIRROR BRACKET.
4. REPLACE SOUND DRUM SHAFT UNTIL IT JUST ENGAGES BACK BEARING.
5. TURN AMPLIFIER "ON" AND CLOSE SOUND OPTICAL BRACKET.
6. MOVE COMPLETE OPTICAL BRACKET UP OR DOWN UNTIL ENLARGED IMAGE OF SCANNING LIGHT BEAM IS EXACTLY CENTERED ON DRUM SHAFT. SQUEEZE HINGE PINS TIGHTLY TOGETHER TO AVOID END-PLAY.



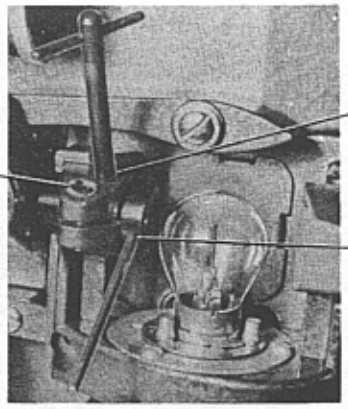
7. RETIGHTEN OPTICAL BRACKET HINGE PIN SETSCREWS.
8. REMOVE SOUND DRUM AND REINSTALL MIRROR BRACKET, LEAVING SCREWS SLIGHTLY LOOSE.
9. CENTER SCANNING BEAM ON PHOTOCELL CATHODE BY TURNING MIRROR BRACKET TO RIGHT OR LEFT, SO THAT ALL OF THE REFLECTED LIGHT WILL ENTER PHOTOTUBE SHIELD WINDOW.
10. TIGHTEN MIRROR BRACKET SCREWS
11. REPLACE SOUND DRUM AND FLYWHEEL.

FOCUSING THE SOUND OPTIC AND ADJUSTING ITS AZIMUTH POSITION

THESE TWO ADJUSTMENTS ARE MADE SIMULTANEOUSLY AND ARE CRITICAL, REQUIRING THE USE OF SPECIAL TOOLS AND EQUIPMENT.

1. THREAD A 5-FT. LOOP OF 5000 CYCLE FREQUENCY FILM (S.M.P.E. Z22.42-1946) IN PROJECTOR, EMULSION SIDE TOWARDS LENS.
2. CLIP THE LEADS OF A LOW READING A.C. VOLTMETER ACROSS THE SPEAKER VOICE COIL IN THE SPEAKER CASE, WHICH SHOULD BE ON TEST BENCH.

3. BREAK RCA SEAL IN SOUND OPTIC BRACKET AND LOOSEN SETSCREW JUST SUFFICIENTLY TO PERMIT MOVEMENT OF SOUND OPTIC.

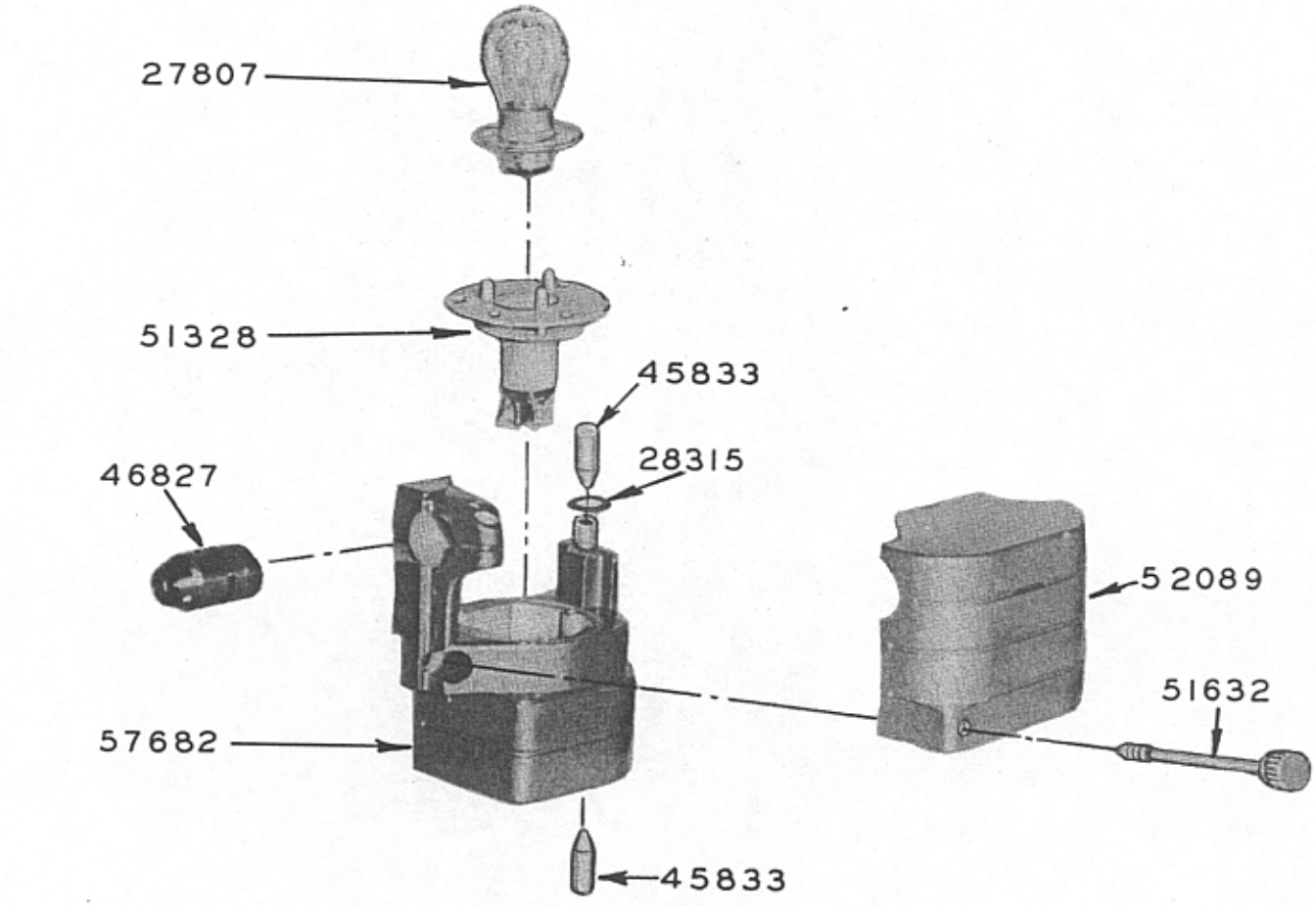


INSERT #49101 FOCUS ADJUSTMENT WRENCH HERE.

INSERT #49108 AZIMUTH ADJUSTMENT PIN HERE.

4. INSERT SPECIAL OPTIC ADJUSTMENT TOOLS AS ILLUSTRATED.
5. TURN AMPLIFIER "ON". SET VOLUME CONTROL FOR A CONVENIENT METER READING AND START PROJECTOR, TONE CONTROL ON "10".
6. SIMULTANEOUSLY ADJUST OPTIC AZIMUTH (ROTATIONAL) AND FOCAL ADJUSTMENTS FOR MAXIMUM VOLTAGE READING.
7. CAREFULLY TIGHTEN OPTIC SETSCREW CHECKING METER THAT OUTPUT DOES NOT DROP, WHICH WOULD INDICATE A CHANGE OF OPTIC ADJUSTMENT.
8. RESEAL OPTIC SETSCREW WITH SEALING WAX.

SOUND OPTICAL BRACKET
(CONTINUED)

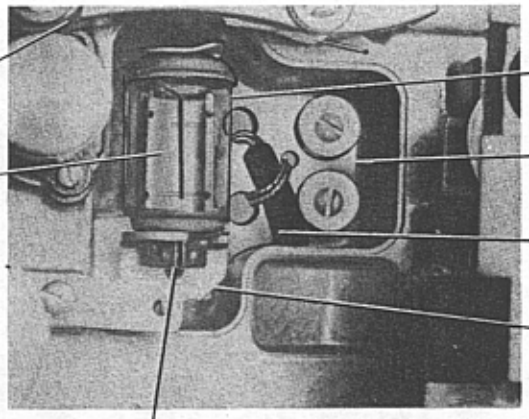


PHOTOTUBE BRACKET ASSEMBLY

THE PHOTOTUBE IS HELD IN PLACE IN ITS CUSHIONED BRACKET BY A SPRING CONTACTOR PRESSING DOWN FROM THE TOP.

TO REMOVE PHOTOTUBE

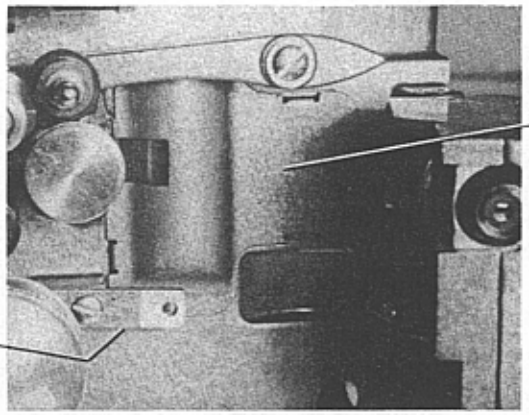
1. RAISE THE SOUND PRESSURE ROLLER; INSERT A SMALL SCREWDRIVER IN WINDOW IN PHOTOTUBE COVER AND PULL OUTWARD.
2. STEADY PHOTOTUBE ENVELOPE WITH LEFT HAND.



3. WITH RIGHT FOREFINGER, PRESS UP ON SQUARE BASE CONTACTOR AND LIFT PHOTOTUBE OUT TO THE RIGHT. NOTE POSITION OF PHOTOTUBE CATHODE WHEN PHOTOTUBE IS CORRECTLY INSTALLED.

TO INSTALL PHOTOTUBE

PRESS UPPER SPRING CONTACTOR UP WITH TOP OF PHOTOTUBE AND SLIP SQUARE BASE CONTACTOR INTO POSITION IN ITS RECEPTACLE. REPLACE TUBE COVER BY PRESSING FIRMLY INTO PLACE MAKING SURE IT DOES NOT INTERFERE WITH OPERATION OF PRESSURE ROLLER ARM. CORRECT POSITION OF PHOTOTUBE CATHODE IS SHOWN IN ILLUSTRATION ABOVE.



COVER-SHIELD IN PLACE

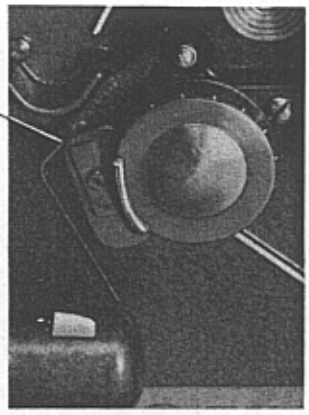
TENSION ROLLER ASSEMBLY

THIS ROLLER CONTROLS "FLUTTER" AND "WOW" (HIGH AND LOW FREQUENCY SOUND VARIATIONS.) THE ROLLER AND ARM ARE HELD IN CORRECT POSITION BY A SHAFT ATTACHED TO A FLAT SPRING BEARING AGAINST A FELT PAD LOCATED IN A BOX IMMEDIATELY BEHIND THE CASTING THROUGH WHICH THE ARM SHAFT PASSES. IT IS REACHED THROUGH THE REAR OF THE PROJECTOR.

TO ADJUST TENSION ROLLER

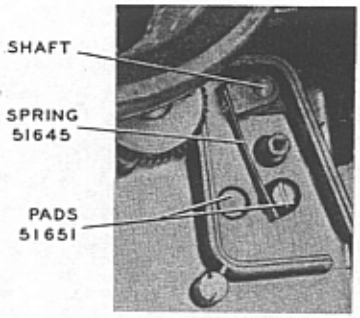
1. LOOSEN THIS ALLEN SETSCREW.
2. HOLD ARM UP AGAINST STOP.
3. RETIGHTEN SETSCREW

WHEN CORRECTLY ADJUSTED, FILM IN MOTION WILL BE APPROX. HORIZONTAL LEAVING SOUND DRUM.



"A"

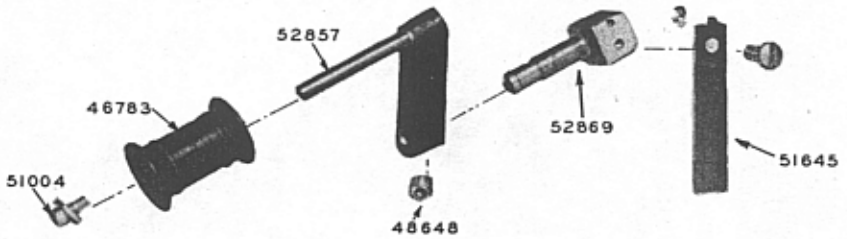
TO REPLACE SPRING 51645



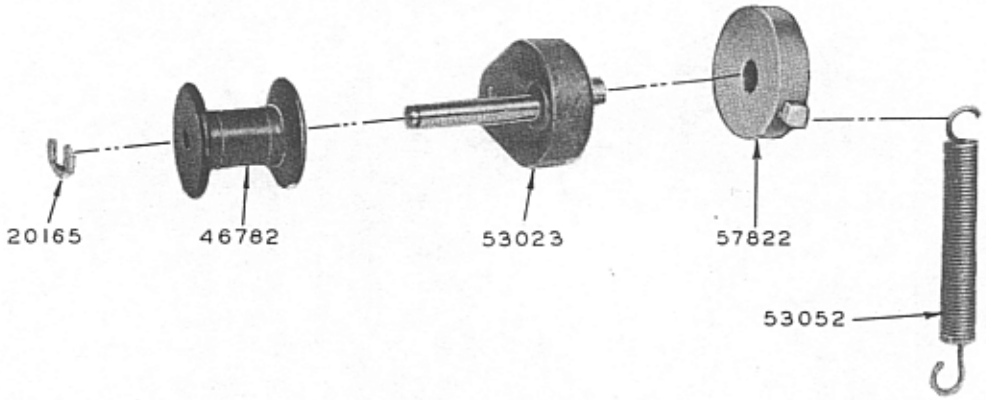
"B"

1. LOOSEN ALLEN SET-SCREW (FIG."A")
2. REMOVE CENTER SCREW HOLDING BOX COVER
3. PULL OUT SPRING AND SHAFT WITH LONG NOSE PLIERS FROM REAR.
4. INSTALL NEW SPRING ON SHAFT ASSEMBLY.
5. HOLD WITH PLIERS AND CAREFULLY GUIDE FLAT SPRING AGAINST FELT PAD AND INTO CASTING HOLE
6. PUSH FIRMLY INTO PLACE.
7. ADJUST TENSION ARM, FIG. "A"

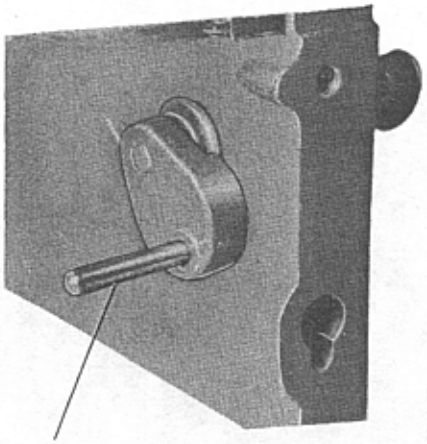
51673
COVER



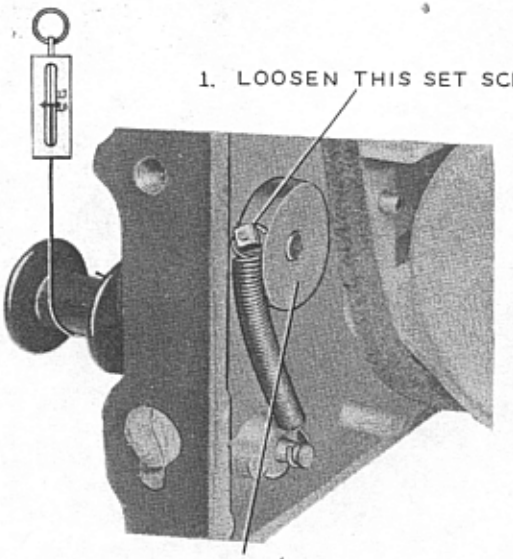
SNUBBER ROLLER ASSEMBLY



TO ADJUST SNUBBER ROLLER TENSION

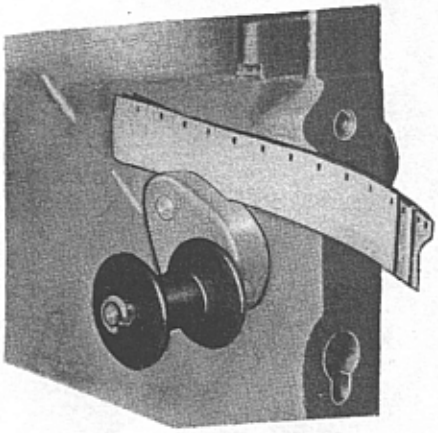


IF ROLLER STICKS OR SQUEAKS REMOVE 20165 C RETAINING WASHER AND 46782 ROLLER AND POLISH THIS SHAFT. LUBRICATE BY RUBBING WITH SOFT LEAD PENCIL OR MICROFINE GRAPHITE. CLEAN SHAFT HOLE IN ROLLER.



1. LOOSEN THIS SET SCREW

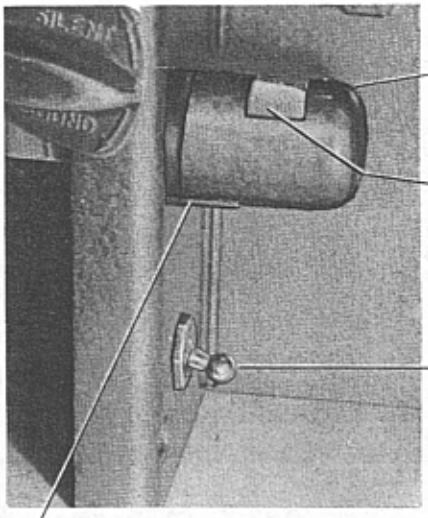
2. ROTATE COLLAR (WHICH CONTROLS SPRING TENSION) UNTIL A POSTAL SCALE, HOOKED OVER SNUBBER ROLLER, INDICATES A PULL OF 17 TO 18 OUNCES TO RAISE IT OFF ITS STOP



3. INSERT 3 THICKNESSES OF FILM BETWEEN ROLLER ARM AND FRAME TO ADJUST END-PLAY.

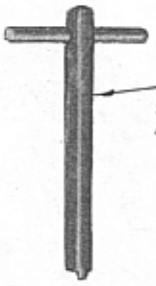
4. BEFORE TIGHTENING COLLAR SET SCREW, PRESS COLLAR AND ROLLER ARM SNUG AGAINST FRAME. FILM STRIPS WILL SUPPLY CORRECT END PLAY SPACING (.015 TO .020). ARM MUST ROTATE FREELY. SNUBBER ROLLER SHOULD ROTATE FREELY WHEN FILM IS IN MOTION.

THREADING LAMP ASSEMBLY



TO REPLACE LAMP, SQUEEZE SIDES OF SHIELD NEAR BASE AND PULL OUT. UNSCREW LAMP

SPECIAL SERVICE TOOLS



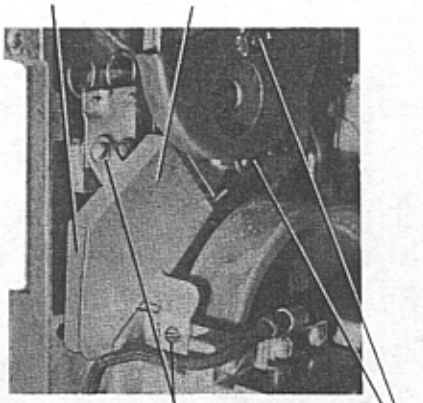
49101
SOUND OPTICAL ADJUSTING WRENCH

49108
SOUND OPTICAL ADJUSTING PIN

49109
CLAW GAUGE PLATE

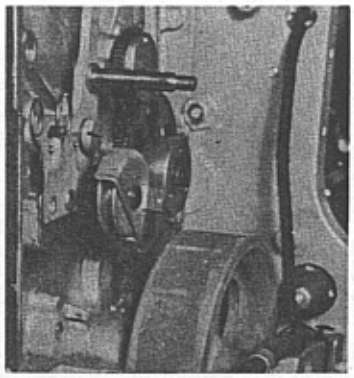
TAKEUP AND REWIND MECHANISM

"OPERATE"-"REWIND"

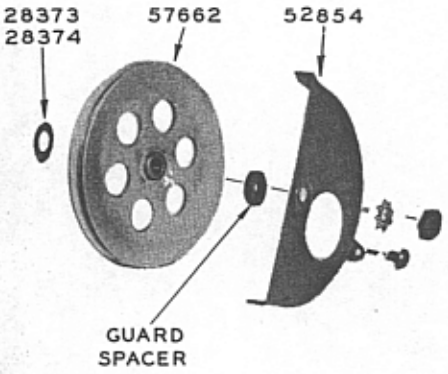


REMOVE THESE TWO SCREWS TO REMOVE BELT GUARDS. REMOVE NUT AND SCREW TO REMOVE LARGE PULLEY GUARD AND PULLEY

TO DISASSEMBLE



LARGE PULLEY AND GUARD REMOVED

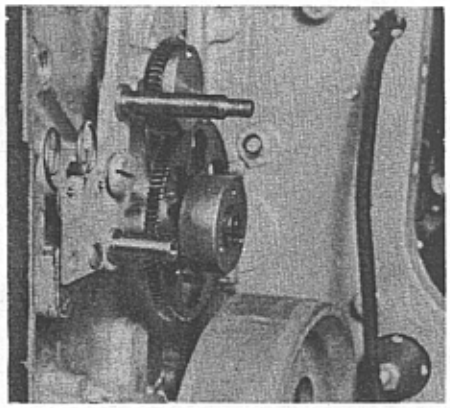


WHEN REASSEMBLING BEND PULLEY GUARD AS REQUIRED TO PREVENT BELT FROM COMING OFF PULLEY WHEN PUSHED INTO CARRYING CASE.

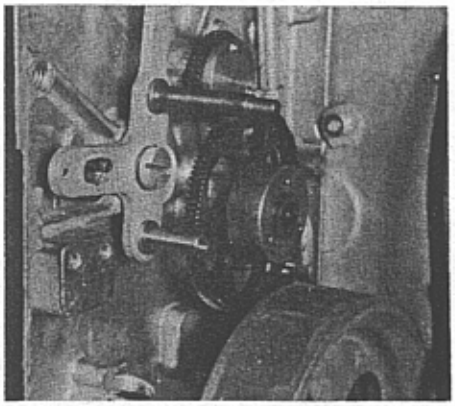
SPRING BELTS

46936 LOWER — 21567 TAKE-UP

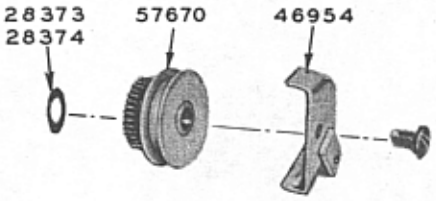
46937 UPPER — 21567 REWIND

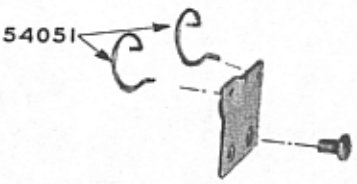


REMOVE SMALL PULLEY AND GEAR ASSEMBLY.

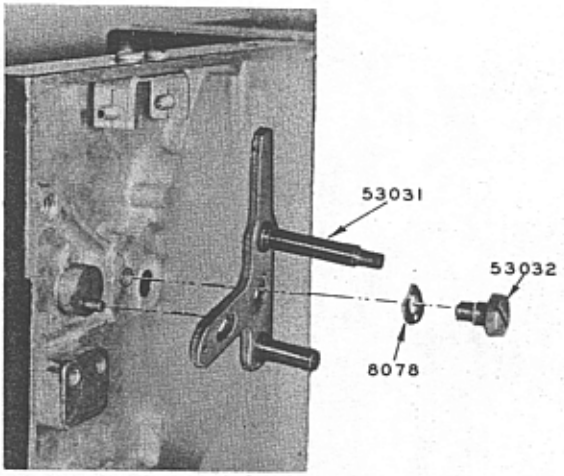


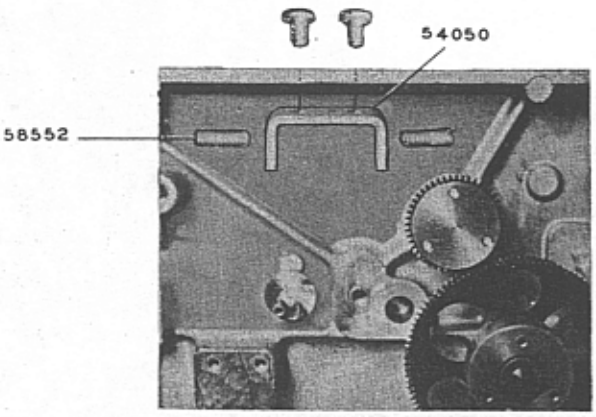
REMOVE SPRINGS AND BRACKET.

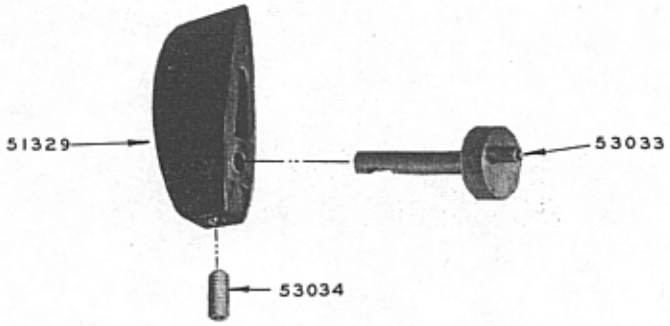


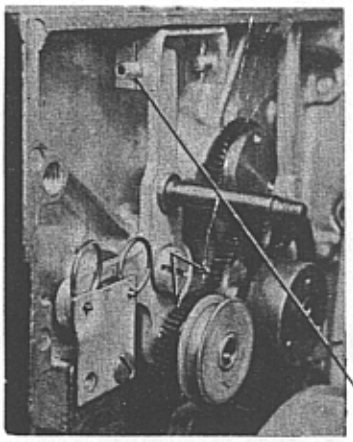


TAKEUP AND REWIND MECHANISM

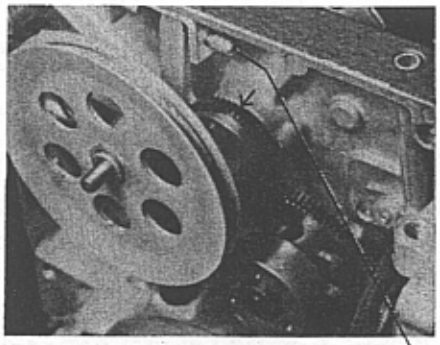








WITH SHIFT KNOB IN "OPERATE" POSITION, ADJUST THIS SCREW TO ALLOW A SMALL AMOUNT OF BACKLASH BETWEEN THESE TWO GEARS

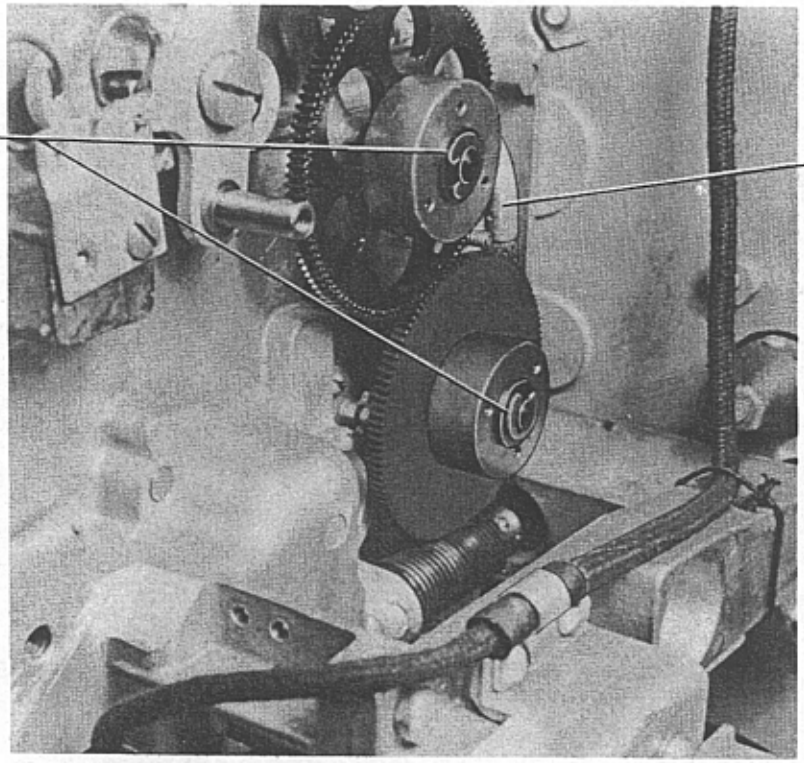


WITH SHIFT KNOB IN "REWIND" POSITION, ADJUST THIS SCREW TO ALLOW A SMALL AMOUNT OF BACKLASH BETWEEN THIS GEAR AND LARGE PULLEY GEAR.

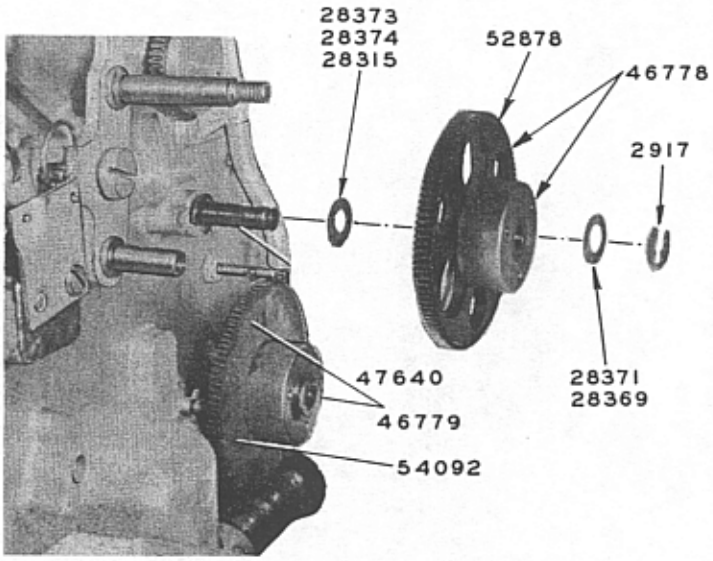
AN ADDITIONAL HALF-TURN "IN" OF THE ADJUSTING SCREWS AFTER THE GEARS JUST BECOME FREE WILL PROVIDE THE CORRECT BACKLASH.

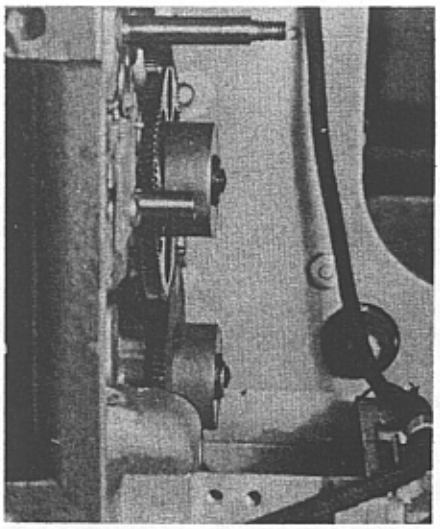
IDLER GEAR ASSEMBLIES, UPPER AND LOWER
STEEL AND BAKELITE

TO REMOVE GEARS, PULL THESE "C" WASHERS



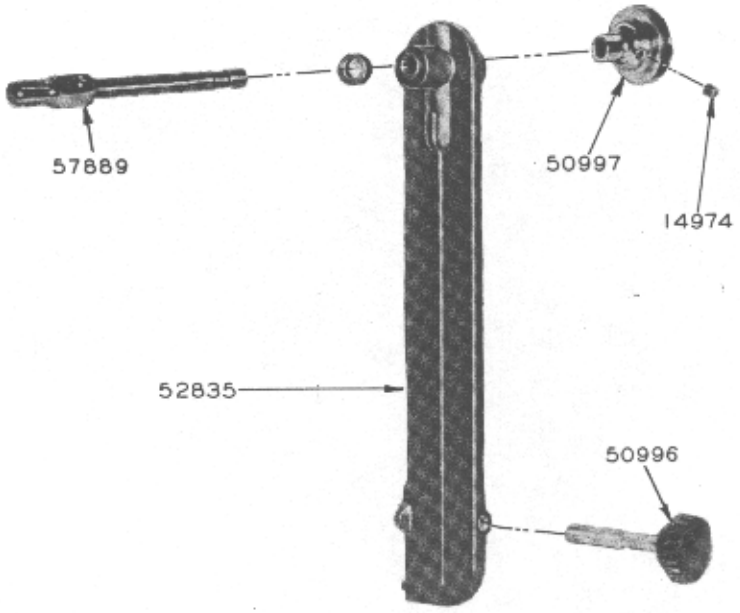
53026
ASSEMBLE OIL PIPE WITH WICK JUST TOUCHING BAKELITE GEAR TEETH

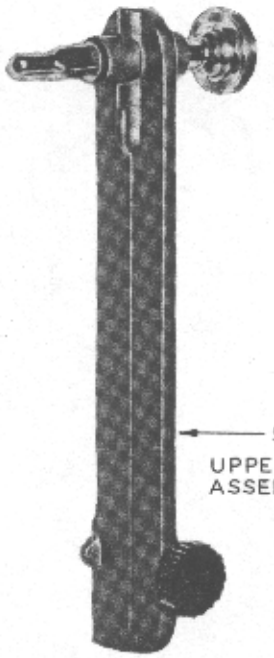




TEETH OF BAKELITE GEAR MUST COMPLETELY MESH WITH TEETH OF STEEL GEAR. USE SPACER WASHERS 28373, 28374, ETC. ON SHAFT BEHIND GEARS AND "C" WASHERS TO ATTAIN PROPER ALIGNMENT.

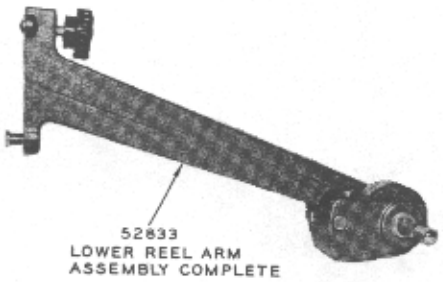
REEL ARM ASSEMBLY, UPPER



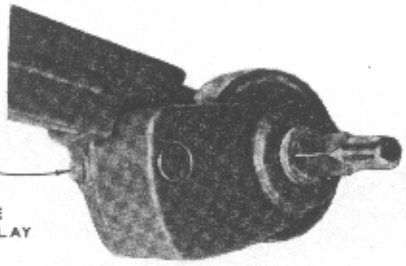


REEL ARM ASSEMBLY (LOWER)

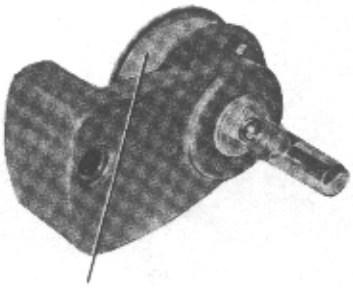
TO SERVICE LOWER REEL ARM ASSEMBLY



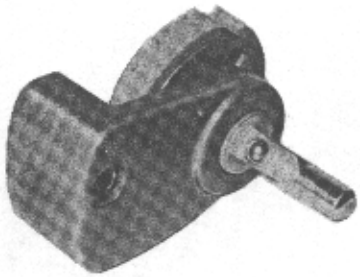
52833
LOWER REEL ARM
ASSEMBLY COMPLETE



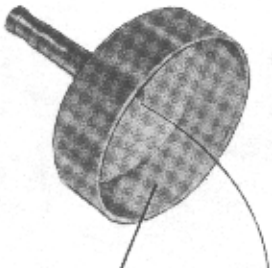
LOOSEN THIS SET SCREW TO REMOVE FRICTION CLUTCH ASSEMBLY. LEAVE SMALL AMOUNT OF END-PLAY WHEN REINSTALLING.



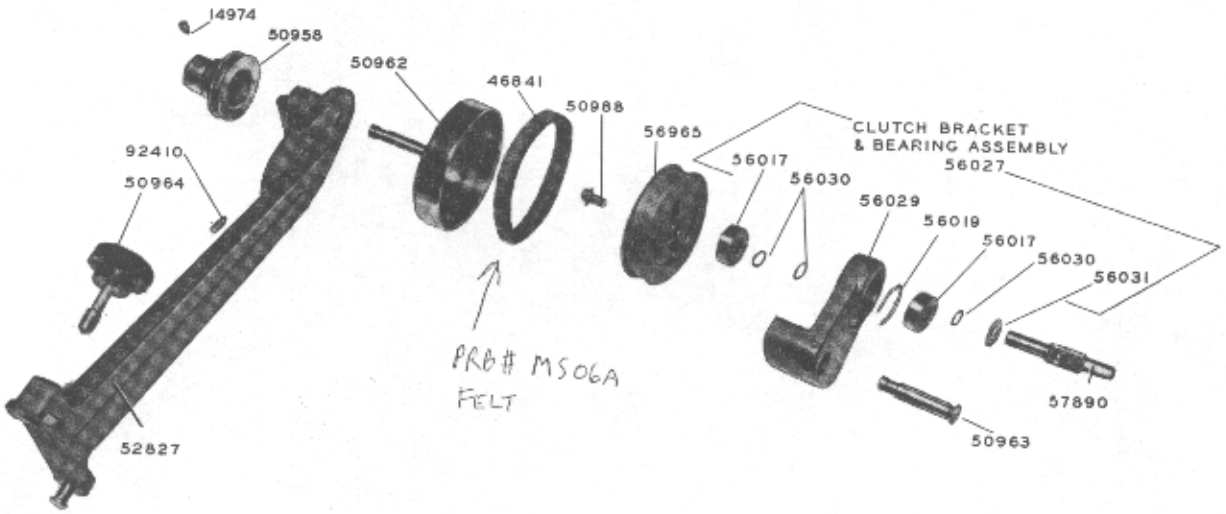
CLUTCH SURFACE SHOULD BE SMOOTH. REEL SHAFT SHOULD ROTATE FREELY.



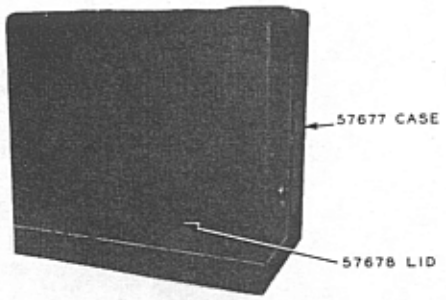
FELT SHOULD BE SLIGHTLY NARROWER THAN CLUTCH GROOVE AND ENDS SHOULD BE APPROXIMATELY $\frac{1}{8}$" APART WHEN WRAPPED AROUND CLUTCH.

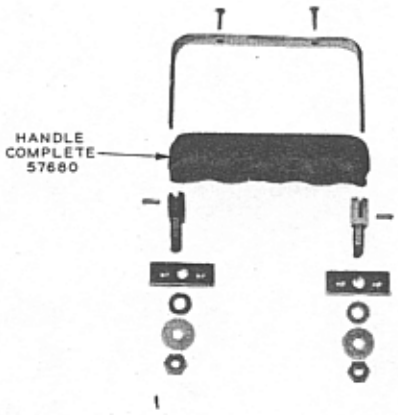


INNER SURFACE SHOULD BE SMOOTH AND UNDENTED. FLANGE MUST NOT WOBBLE ON SHAFT.



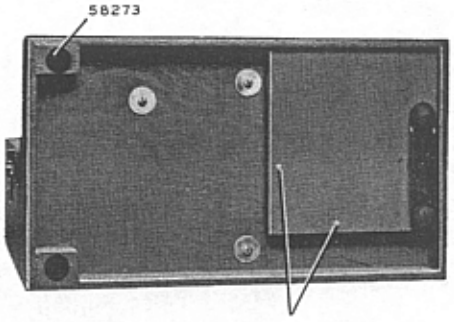
CASE – PROJECTOR CARRYING CASE



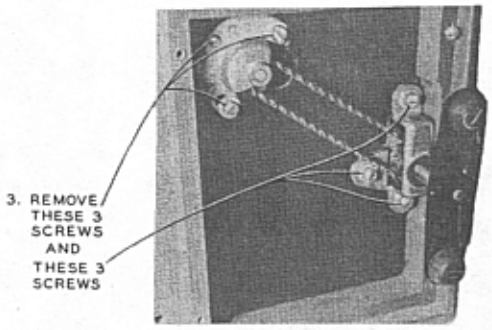


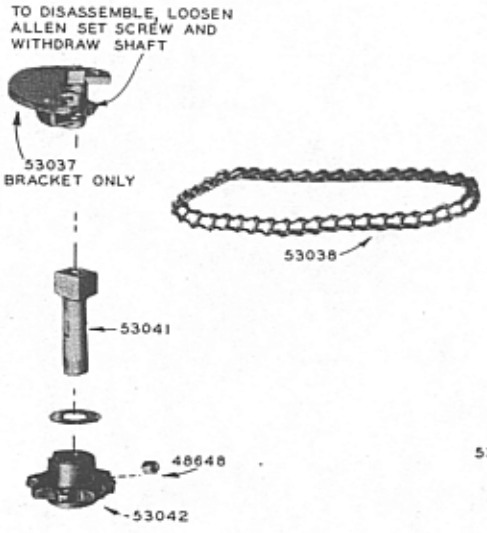
TO DISASSEMBLE TILT MECHANISM

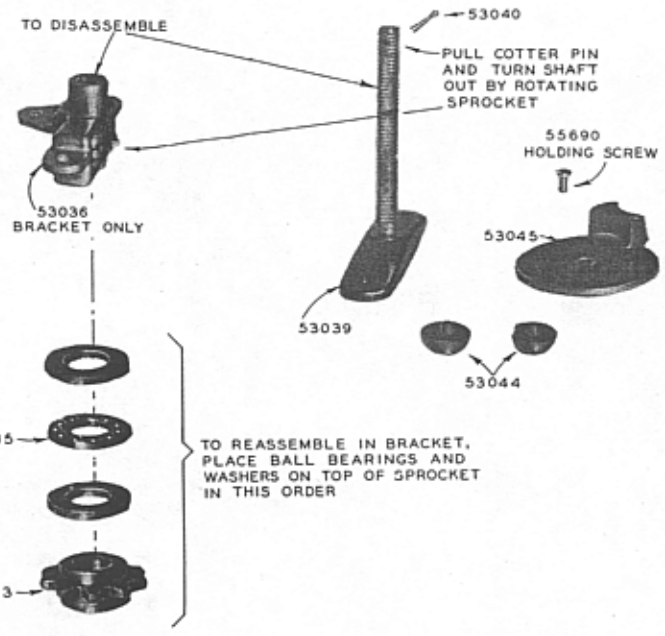
1. REMOVE TILT CONTROL DISC ON FRONT FLOOR OF CASE



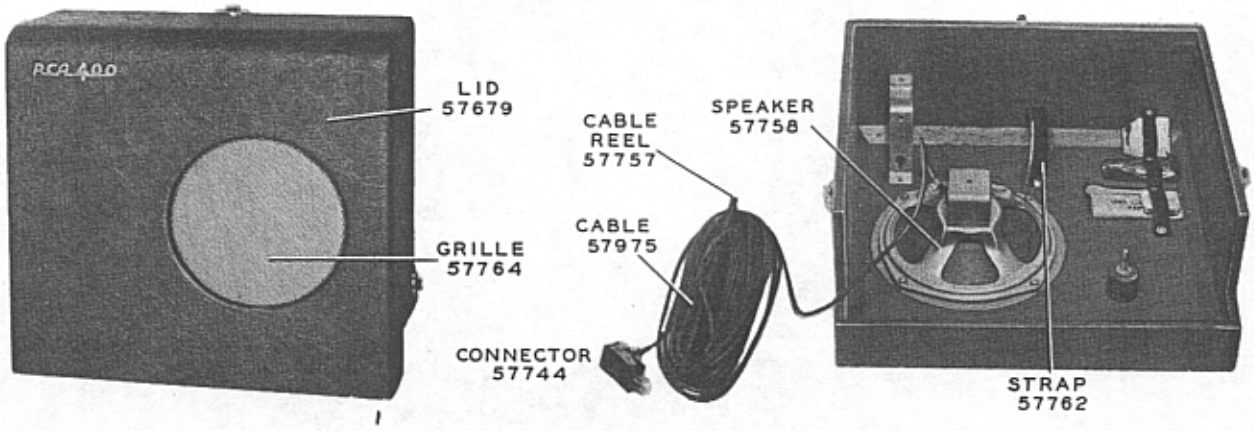
2. REMOVE THESE 2 SCREWS AND SLIDE COVER OFF TO LEFT



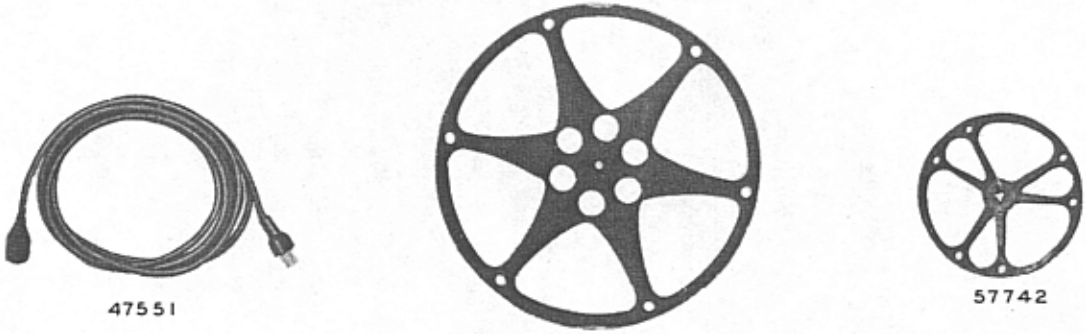




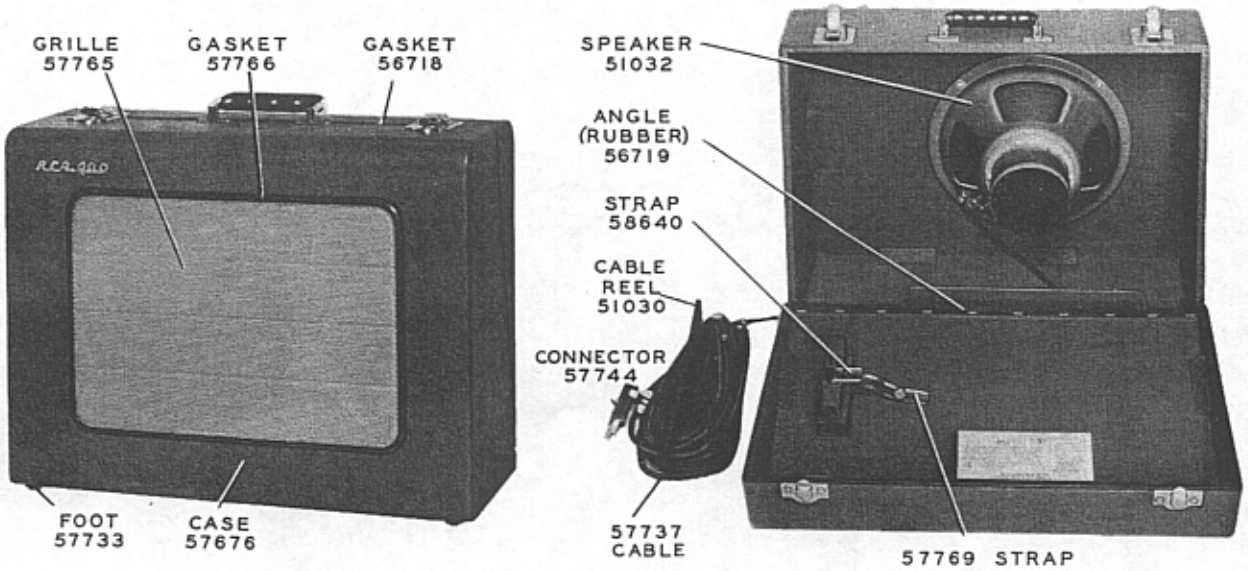
CASE - PROJECTOR CASE LID AND SPEAKER HOUSING FOR RCA 400 JUNIOR (MI-1313)



POWER CABLE AND REELS



CASE - SPEAKER CARRYING CASE (MI-1306-I) FOR RCA 400 SENIOR

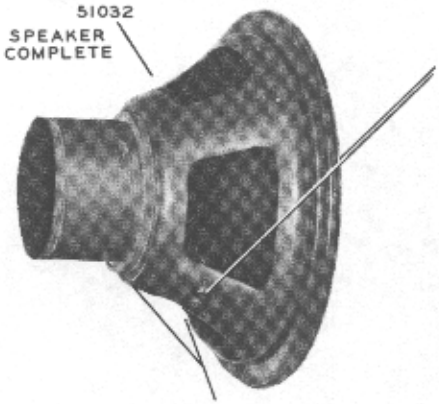


CASE– SPEAKER CARRYING CASE, MI-1306-1

SERVICING THE LOUDSPEAKER

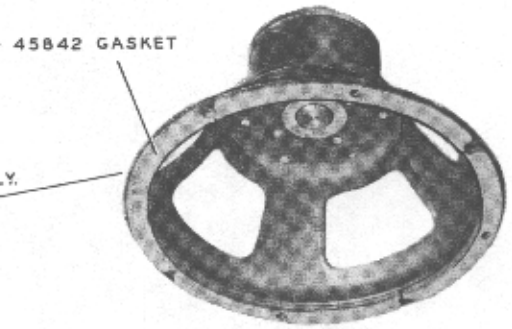
REPLACING CONE

TEST VOICE COIL WITH AN OHMMETER CONNECTED ACROSS VOICE COIL LEADS. THE RESISTANCE SHOULD MEASURE APPROXIMATELY 5-1/2 OHMS. IF NECESSARY TO REPLACE CONE AND VOICE COIL, PROCEED AS FOLLOWS:

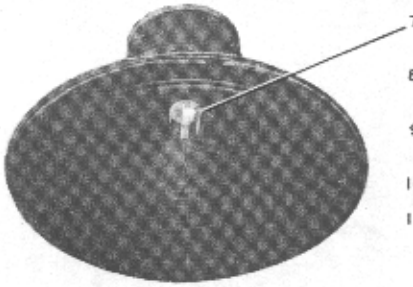


1. UNSOLDER THESE VOICE-COIL LEADS.
2. CUT OLD CONE AWAY FROM METAL RIM OF CONE HOUSING

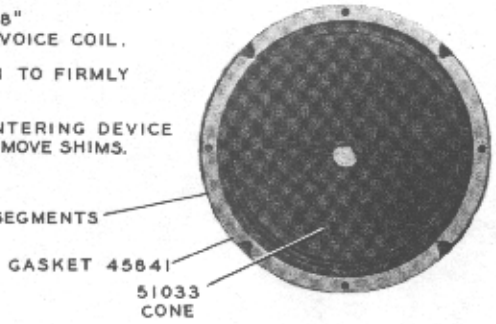
3. REMOVE THE TWO FILISTER HEAD MACHINE SCREWS THAT HOLD VOICE-COIL CENTERING DEVICE AND WITHDRAW CONE AND VOICE-COIL ASSEMBLY. MASK VOICE-COIL AIRGAP WITH SCOTCH TAPE TO PREVENT FOREIGN MATERIAL ENTERING.



4. REMOVE THE RIM GASKETS AND CLEAN METAL RIM OF CONE HOUSING.
5. CEMENT FOUR NEW THIN GASKET SEGMENTS TO RIM OF CONE HOUSING. COAT SURFACE OF NEW GASKET WITH CEMENT.
6. REMOVE MASKING FROM AIR-GAP AND DROP NEW CONE INTO PLACE. ALIGNING SLOTS IN CENTERING DEVICE BRACKET WITH THE TWO CORRESPONDING SCREW HOLES. PUT VOICE COIL LEADS THROUGH RIVET HOLES IN TERMINALS AND SOLDER IN PLACE.



7. CENTER VOICE COIL WITH FOUR .008" SHIMS PLACED BETWEEN CORE AND VOICE COIL.
8. PRESS CONE DOWN ALL AROUND RIM TO FIRMLY CEMENT IN PLACE.
9. REPLACE AND TIGHTEN THE TWO CENTERING DEVICE MACHINE SCREWS & CLAMPING NUTS. REMOVE SHIMS.
10. CEMENT DUST CAP IN PLACE.
11. CEMENT THE FOUR HEAVY GASKET SEGMENTS IN PLACE.



RE-CENTERING CONE ASSEMBLY

IF TEST INDICATES CONE IS NOT PROPERLY CENTERED PROCEED AS FOLLOWS:

1. PLACE A LIGHTED 60-CYCLE LIGHT BULB NEAR PHOTOCELL AND ADVANCE VOLUME CONTROL UNTIL A STRONG HUM IS HEARD.
2. LOOSEN THE TWO SCREWS HOLDING VOICE COIL CENTERING DEVICE.
3. MOVE CONE FROM SIDE TO SIDE UNTIL VOICE COIL DOES NOT RUB POLE PIECE.
4. RE-TIGHTEN CENTERING DEVICE SCREWS.

NOTE:- MAGNETIC PARTICLES MAY BE REMOVED FROM THE POLE PIECE AND AIRGAP BY PRESSING THE STICKY SIDE OF SCOTCH TAPE AGAINST THE PARTICLES, THEN REMOVING TAPE.

WHEN NECESSARY TO ADD EXTENSIONS TO SPEAKER OR POWER CABLES, USE #14 RUBBER COVERED WIRE OR LARGER, DEPENDING ON LENGTH INVOLVED, TO AVOID LOSS OF POWER DUE TO VOLTAGE DROP IN CONDUCTORS.

CLEANING AND LUBRICATION

Inspect all bushings, bearings, and other parts for cleanliness.
Thoroughly clean all parts before reassembly with carbon tetrachloride or other solvent to avoid abrasive action of dirt on moving parts.
Apply four or five drops of light oil such as Socony Vacuum "Vactra Light X" (RCA Stock 25367) to all shafts and bushings prior to their reassembly.
Lightly apply lubriplate 110 to the teeth of all gears after their reassembly.
Place a few drops of light oil in motor oil holes once every 1000 hours.
Felt oil pads and wicks in oiling tubes should be saturated with "Sta-Put 370 Oil" (E. F. Houghton Co.).
Lubricate shafts carrying plastic rollers with micro-fine graphite or a soft lead pencil.
Do not use carbon tetrachloride or other solvent to clean coated lens surfaces. Breathe on lens and clean with lens tissue.
Do not force the assembly of parts. It should not be necessary to alter any parts by operations such as filing, tapping, drilling, scraping, etc., to enable them to be assembled.
Always use the proper tool designed to do the job.

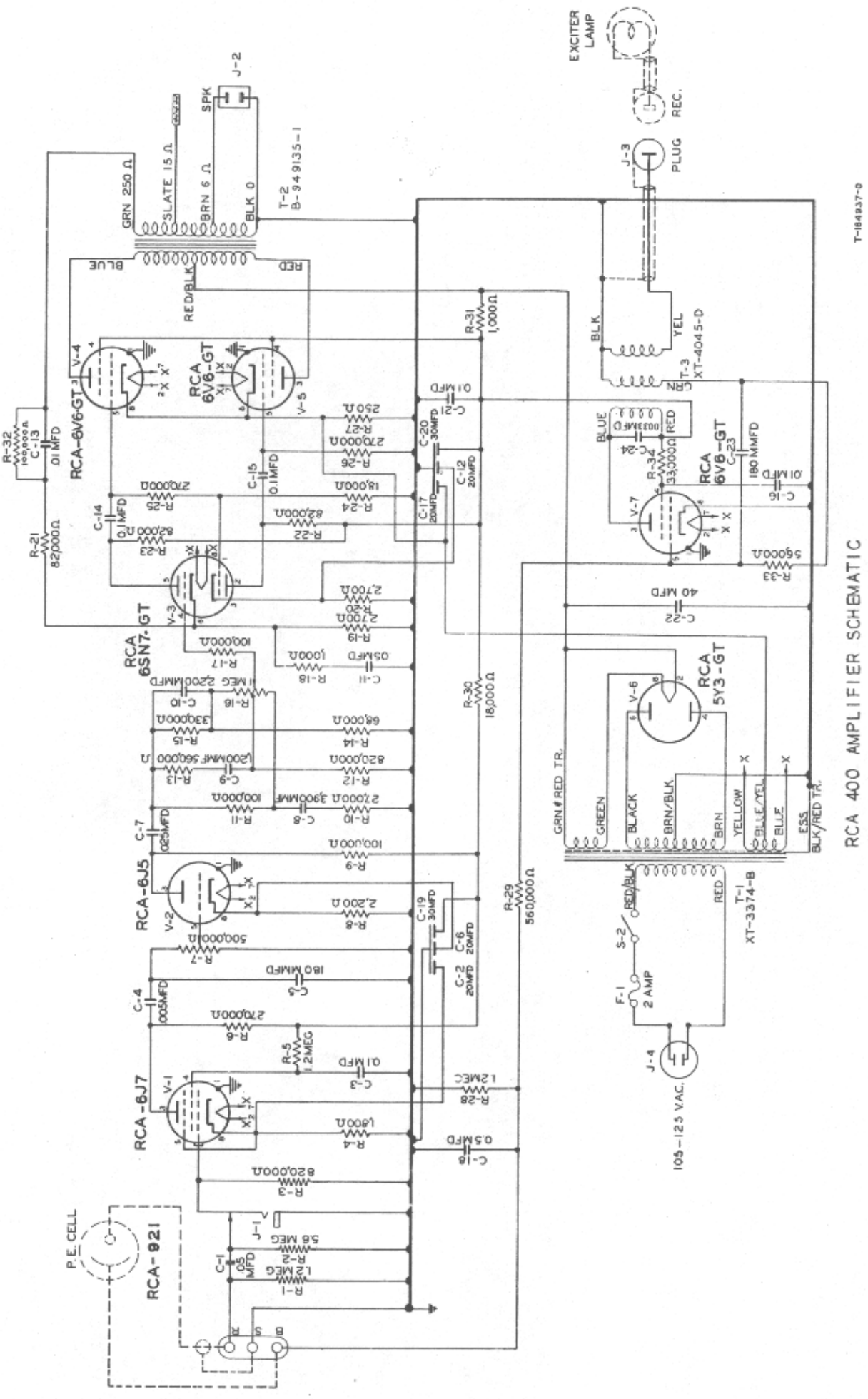
SERVICE AIDS

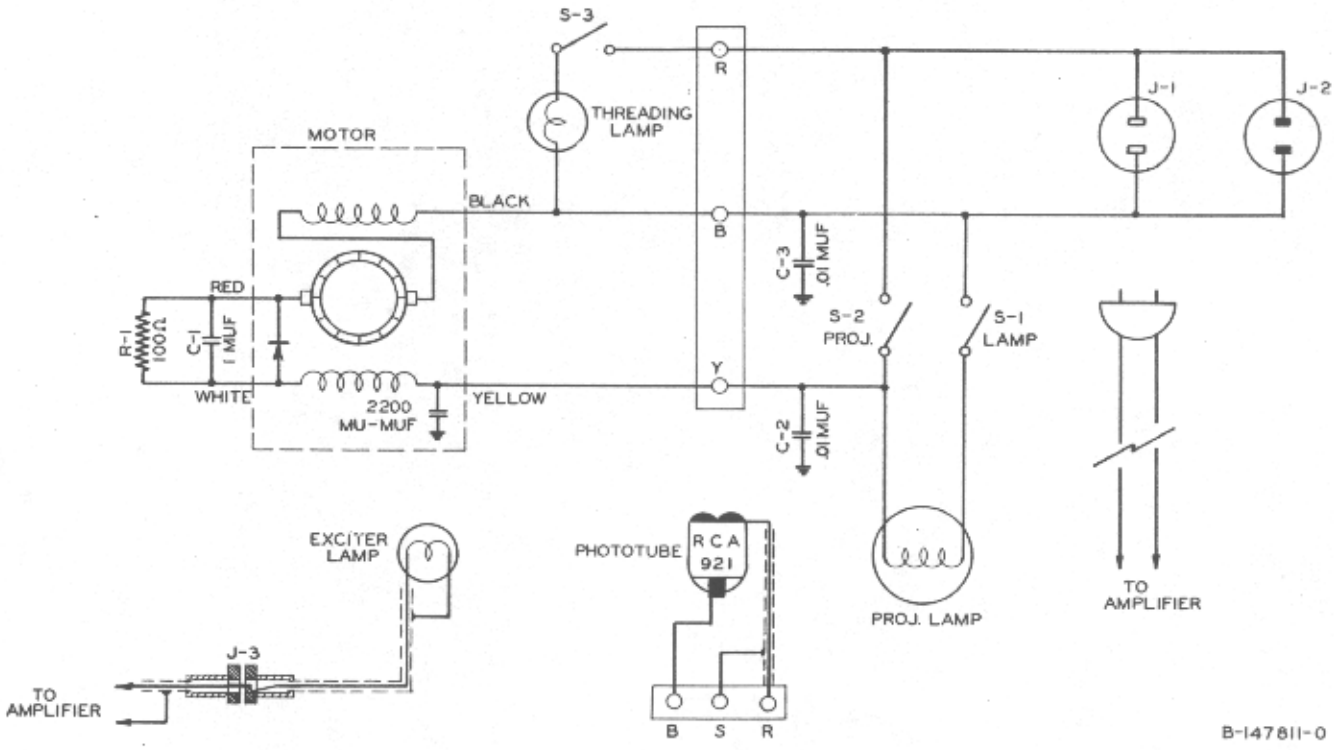
These notes have been prepared to aid the 16mm technician to quickly localize the cause of a given effect when its symptom is apparent and to suggest the required corrective action.

SOUND SYSTEM

Symptom	*Probable Cause*	*Correction*
Weak or no sound, projection lamp lighted.	AMPL switch off.	Turn switch on.
	Volume control off.	Adjust control.
	Blown amplifier fuse.	Replace with 2 amp. fuse only. If recurrent, determine cause.
	Loudspeaker not connected.	Plug in.
	Plug out of back of projector.	Plug in.
	Power cord not connected to proper source of supply.	Check frequency and voltage.
	Exciter lamp out.	Replace. If new exciter lamp does not light, replace Oscillator tube 6V6GT.
	Defective Oscillator coil.	Replace.
	Weak rectifier tube 5Y3GT.	Replace.
	Open speaker voice coil circuit.	Replace cone after first checking speaker connections.
	Sound optic dirty or out of adjustment.	Clean, See Page 24.
	Sound mirror dirty or out of adjustment.	Clean, See Page 21.
	Phototube installed incorrectly.	Install in correct position, see page 26.
Sound on MIC—no sound on FILM.	Microphone plug in jack.	Remove plug from jack.
	Exciter lamp out.	Replace—Check Oscillator tube.
	Sound optic dirty or out of adjustment.	Clean, See Page 24.
	Sound mirror dirty or out of adjustment.	Clean, See Page 21.
	Photocell defective or installed incorrectly.	See Page 26.
Sound on FILM—no sound on MIC.	Microphone plug not in jack.	Insert plug in jack.
	Microphone plug or receptacle defective.	Repair or replace.
	Microphone defective.	Replace.
Sound microphonic (Ringing noise)		
(a) With Volume control on.	Phototube loose or hitting cover.	See Page 26.
	Defective 6J7 tube.	Replace.
(b) With Volume control off.	Defective 6J5 or 6SN7GT tube.	Replace.
Tone unsteady. (High or low frequency variations in pitch)	Film threaded under tension roller.	Thread over tension roller.
	Sound drum, shaft or bearings.	See Page 21.
	Pressure roller incorrectly adjusted.	See Page 23.
	Pressure roller dirty or binding.	Clean, See Page 23.
	Tension roller incorrectly adjusted.	See Page 27.

Symptom	*Probable Cause*	*Correction*
Tone unsteady (continued)	Sound drum dirty. Guide roller sticking. Phototube cover interfering with pressure roller arm. Erratic takeup tension.	Clean. See Page 22. Install cover correctly, see page 26. See Page 34.
Motor "hash" in sound.	Open capacitor across governor control, 1 mfd. Open capacitor from power line to frame .01 mfd or 2200 mfd (inside motor). Defective governor or governor brushes. Commutator brushes not seated. Lock washers missing from screws holding amplifier cover.	Replace. Replace. Repair or replace. Repair. Replace.
Sound but no picture.	Lamp switch off. Projection lamp missing or burned out.	Turn on. Replace.
Loses both film loops.	Upper sprocket shoe out of adjustment.	Adjust, See Page 33.
Loses lower loop.	Broken sprocket holes. Bad splices. Film binding in gate. Claw out of adjustment. Dirty claw.	Cut out and splice film. Resplice. Check for thick splices. Check side pressure shoes. Adjust, See Pages 13, 14 and 15. Remove dirt and emulsion from claw.
Improper tapeup operation.	Takeup bearing sticking. Excessive takeup tension.	See Page 34. See Page 34.
Projector mechanism noisy.	Claw travel excessive.	See Page 15.
Tears sprocket holes.	Upper reel arm shaft binding. Under-cut claw. Under-cut film sprocket teeth. Excessive takeup tension.	See Page 33—Adjust end play. See Page 13. See Page 20. See Page 34.
Travel ghosts. White streaks above or below white areas on screen image)	Shutter out of adjustment.	See Page 12.
Picture motion unsteady.	Unsteadiness present in picture print. Claw travel too short. Improper threading. Claw undercut. Side pressure shoe springs on aperture plate too weak. Picture gate not latched securely.	 See Page 32. Check loops for proper length. See Page 13. See Page 18. Bend latch spring, See Page 19.
Picture indistinct or illumination low.	Projection lens dirty. Condenser lens dirty. Condenser lens incorrectly assembled. Reflector dirty or damaged. Projection lamp black or blistered. Low line voltage.	Clean, See Page 3. Clean, See Page 7. See Page 7. Clean or replace, See Page 7. Replace lamp. Use a Voltage Booster.
Film scratched.	Film pressure shoe dirty or damaged. Sound drum pressure roller dirty or damaged. Emulsion hardened on film-gate shoe. Aperture plate dirty or damaged. Guide roller dirty or sluggish. Snubber roller damaged.	Clean or replace, See Page 19. Clean, See Page 23. Remove emulsion. Clean or replace, See Page 18. Clean, See Page 22. See Page 28.


RCA 400 AMPLIFIER SCHEMATIC
T-184937-D
EXCITER LAMP
REC.
PLUG
J-3
J-2
SPK
T-2
B-94913S-1
GRN 250 Ω
SLATE 15 Ω
BRN 6 Ω
BLK 0
BLUE
RED
RED/BLK
R-31
1,000 Ω
BLK
YEL
T-3
XT-4045-D
RCA-6V6-GT
V-4
V-5
RCA 6V6-GT
V-7
RCA 6SN7-GT
V-3
RCA-6J5
V-2
RCA-6J7
V-1
RCA 5Y3-GT
V-6
P.E. CELL
RCA-921
J-1
J-4
105-125 VAC.
F-1
2 AMP
S-2
T-1
XT-3374-B
R-32
C-13
.01 MFD
R-21
82,000Ω
C-14
.01 MFD
C-15
0.1MFD
C-17
20MFD
C-12
20MFD
C-20
30MFD
C-21
.01 MFD
C-22
40 MFD
C-23
180 MMFD
R-34
33,000Ω
R-33
56,000Ω
C-16
.01 MFD
C-11
.05MFD
C-10
2200MMFD
C-9
1200MMF
C-8
3900MMF
C-7
.025MFD
C-4
.005MFD
C-5
180 MMFD
C-3
.01MFD
C-18
0.5 MFD
C-2
20MFD
C-6
20MFD
C-19
30MFD
R-30
18,000 Ω
R-29
560,000Ω
R-28
1.2MEG
R-5
1.2MEG
R-1
1.2 MEG
R-2
5.6 MEG
C-1
.05 MFD
GRN & RED TR.
GREEN
BLACK
BRN/BLK
BRN
YELLOW
BLUE/YEL
BLUE
BLK/RED TR.
X
X



RCA 400 PROJECTOR CIRCUITS

ADDENDA TO

SERVICE MANUAL

MODEL 400

16MM MOTION PICTURE EQUIPMENT

When ordering amplifier replacement parts use the parts list in this addenda and not the list on page 42 in the Service Manual IB-24926.

LIST OF AMPLIFIER PARTS

Symbol No.	DESCRIPTION	Stock No.
C-1	Capacitor, 0.05 mfd., 400 v.	70615
C-2	Capacitor, 20-20-30 mfd., 25-25-450 v.	51339
C-3	Capacitor, 0.1 mfd., 400 v.	73551
C-4	Capacitor, 0.005 mfd., 400 v.	70606
C-5	Capacitor, 180 mmf., 500 v.	51416
C-6	Part of C-2	
C-7	Capacitor, 0.025 mfd., 400 v.	70612
C-8	Capacitor, 3900 mmf., 500 v.	39666
C-9	Capacitor, 1200 mmf., 500 v.	39654
C-10	Capacitor, 2200 mmf., 500 v.	39660
C-11	Same as C-1.	
C-12	Same as C-2.	
C-13	Capacitor, 0.01 mfd., 400 v.	70610
C-14, 15	Same as C-3.	
C-16	Same as C-13.	
C-17	Part of C-12	
C-18	Capacitor, 0.5 mfd., 100 v.	70619
C-19	Part of C-2	
C-20	Part of C-12	
C-21	Same as C-3.	
C-22	Capacitor, 40 mfd., 450 v.	37308
C-23	Same as C-5.	
C-24	Capacitor, .0033 mfd., 500 v.	39664
F-1	Fuse, 2 amperes	3883
	Holder, fuse	52097
J-1	Jack, microphone	47613
J-2	Connector, speaker, 2 contact female	57756
J-3	Connector, exciter lamp cable, single contact male	31048
J-4	Connector, power cable, 2 contact male	4577
R-1	Resistor, 1.2 meg., ½ w.	30162
R-2	Resistor, 5.6 meg., ½ w.	31455
R-3	Resistor, 820,000 ohms, ½ w.	30161
R-4	Resistor, 1800 ohms, ½ w.	1800
R-5	Same as R-1.	
R-6	Resistor, 270,000 ohms, ½ w.	30651
R-7	Control, volume control, 0.5 meg.	52094
R-8	Resistor, 2200 ohms, ½ w.	34767

Symbol No.	DESCRIPTION	Stock No.
R-9	Resistor, 100,000 ohms, ½ w.	3252
R-10	Resistor, 27,000 ohms, ½ w.	30409
R-11	Same as R-9.	
R-12	Same as R-3.	
R-13	Resistor, 560,000 ohms, ½ w.	30653
R-14	Resistor, 68,000 ohms, ½ w.	14138
R-15	Resistor, 330,000 ohms, ½ w.	14983
R-16	Control, tone control, 1.0 meg.	53029
R-17	Same as R-9.	
R-18	Resistor, 1000 ohms, ½ w.	34766
R-19	Resistor, 2700 ohms, ½ w.	30730
R-20	Same as R-19.	
R-21	Resistor, 82,000 ohms, ½ w.	8064
R-22	Resistor, 82,000 ohms, 1 w.	52609
R-23	Same as R-22.	
R-24	Resistor, 18,000 ohms, ½ w.	3219
R-25, 26	Same as R-6.	
R-27	Resistor, 250 ohms, 7.4 w.	51340
R-28	Same as R-1.	
R-29	Same as R-13.	
R-30	Same as R-24.	
R-31	Resistor, 1000 ohms, 10.9 w.	52938
R-32	Same as R-9.	
R-33	Resistor, 56,000 ohms, 1 w.	17440
R-34	Resistor, 33,000 ohms, 2 w.	28744
S-2	Switch, toggle switch	58976
T-1	Transformer, power transformer	53030
T-2	Transformer, output transformer	57828
T-3	Coil, oscillator coil	52939
	Board, terminal (P.E. cell)	54113
	Cover, amplifier cover	57740
	Cushion, tube socket, cushion	37396
	Knob, volume or tone control	32116
	Plate, mounting, for C-2, C-12, C-22	28452
	Screw, amplifier cover screw #10-32 x ¼", binder head	56508
	Socket, tube socket	31319
	Socket, cushioned tube socket	52937

LIST OF PROJECTOR PARTS

DESCRIPTION	Stock No.
APERTURE PLATE (Illus. pages 17, 18)	
Clip	52098
Flare, light flare	52086
Guide, film, stationary	51642
Plate, aperture plate assembly	53017
Screw, mounting, film guide	38605
Shoe, side pressure	51633
Spring, side pressure shoe spring	52096
ARM, UPPER AND LOWER (See Reel Arm)	
BELT SHIFTER ASSEMBLY (Speed Changer) (Illus. page 11)	
Arm, stop arm for shifter rod	54107
Bracket, shifter rod	54096
Bushing, spring holding	54115
Collar, shift rod spacer	57743
Knob, shift	54097
Rod, shifter	54095
Screw, setscrew for knob	14974
Screw, setscrew for stop arm	53034
Spring, "C" spring, for shift rod	54051
CASE—PROJECTOR CARRYING CASE (Illus. page 35)	
Case, projector carrying case only, less lid	57677
Lid, projector case lid	57678
Foot, rubber	58273
Handle, carrying case	57680
Escutcheon, top belt escutcheon, with rivets	57314
Escutcheon, front belt escutcheon, with rivets	57313
Screw, projector mounting, chromium, bd. hd., No. 10-32 x 1⅛"	57673
TILTING MECHANISM	
Bearing, ball, thrust	53035
Bracket, tilt shaft	53036
Bracket, drive sprocket	53037
Chain, drive, ladder	53038
Foot and Tilt Shaft Assembly	53039
Foot, rubber foot	53044
Pin, cotter, tilt shaft	53040
Screw, setscrew for drive sprocket	48648
Shaft, drive sprocket	53041
Sprocket, drive wheel	53042
Sprocket, tilt shaft	53043
Wheel, drive wheel assembly	53045
Screw, drive wheel bd. hd.	55690
CASE—PROJECTOR CASE LID AND SPEAKER HOUSING Part of MI-1313 (Illus. page 36)	
Cable, speaker cable only	57975
Cable, projector power cable and connectors	47551
Case, speaker case, lid only	57679
Cone and Voice Coil, speaker, with dust cap and gaskets	57931
Connector, speaker cable, 2 contact male	57744
Foot, rubber, for projector case	58273
Reel, film reel, 400 ft.	57742
Reel, speaker cable	57757
Speaker, complete 8" P.M. speaker	57758
Strap, speaker cable reel strap	57762
Grille, round speaker grille	57764

DESCRIPTION	Stock No.
CASE—SPEAKER AND CARRYING CASE, MI-1306-1 (Illus. page 36)	
Angle, rubber lid hinge angle	56719
Cable, projector power cable and connectors	47551
Cable, speaker cable and connector	57737
Case, speaker carrying case only	57676
Cone and Voice Coil, speaker, with dust cap and gaskets	51033
Connector, microphone	52825
Connector, speaker cable, 2 contact, male	57744
Cover, dust cover for speaker cone (pkg. of 5)	55893
Foot, rubber foot	57733
Gasket, grille gasket	57766
Gasket, rubber lid gasket	56718
Gasket, speaker (inner set of 4)	45842
Gasket (outer set of 4), 2 sets required	45841
Grille, rectangular speaker grille	57765
Handle, carrying case	57680
Reel, film reel (1600 feet)	57741
Reel, speaker cable	51030
Speaker, complete	51032
Strap, reel arm strap, 4⅞" long	58640
Strap, reel arm strap, 4⅛" long	57769
CLAW (See Intermittent Assembly)	
CONDENSER LENS (See Lamphouse)	
DRIVE BELT IDLER ROLLER ASSEMBLY (Illus. page 10)	
Arm, idler roller	54108
Pad, roller oil pad	54117
Roller, idler roller and bushing	54112
Screw, setscrew for roller arm	26619
Spacer, idler spring	54099
Spring, idler spring	54109
Shaft, idler roller	54110
Washer, roller spacer	54114
DRIVE SHAFT AND PULLEY (LARGE) ASSEMBLY (Illus. page 9)	
Bushing, rubber, for gear	57643
Bearing, drive shaft bearing and set screw	58836
Gear, drive pulley, nylon	57666
Pulley, drive pulley only	57688
Screw, shaft bearing retaining screw	58837
Screw, setscrew for pulley, No. 10-32 x 3/16"	92410
Screw, shoulder screw, No. 4-40 x ½"	55103
Shaft, drive and worm gear assembly	57674
Spacer, worm shaft	57738
Washer, drive shaft thrust washer	58684
DRUM SHAFT, MIRROR BRACKET AND FLYWHEEL ASSEMBLY (Illus. page 21)	
Bearing, ball bearing, drum shaft	28332
Bracket, mirror bracket, less mirror	52886
Flywheel	52088
Mirror, only, for bracket	50967
Retainer, bearing drum shaft	53001
Shaft and drum, assembled	47649
Spacer, drum shaft, short	28437
Spacer, drum shaft, long	50969
Spring, coil spring, drum shaft	46941
Washer, spring, drum shaft bearing	52896

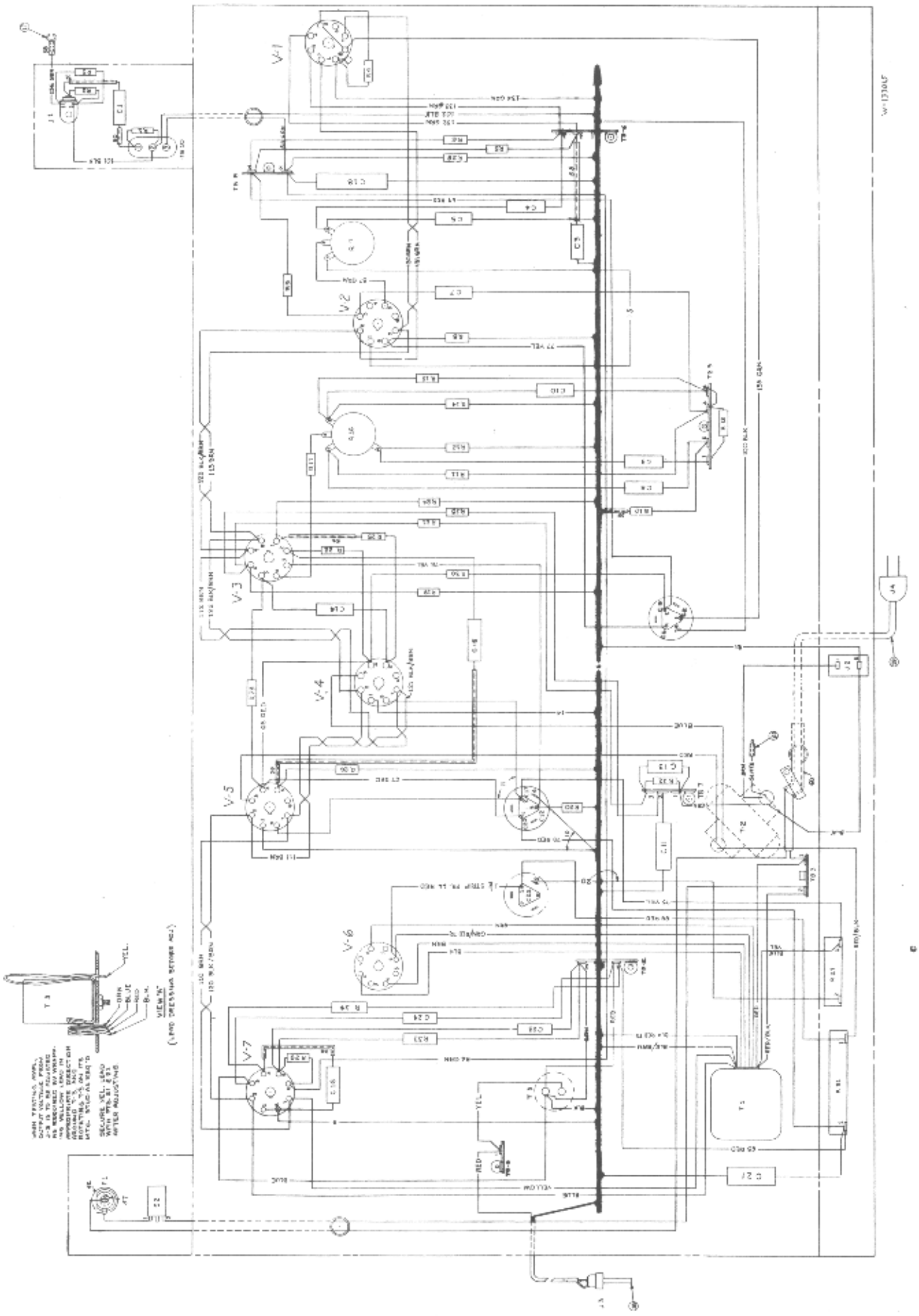
DESCRIPTION	Stock No.
FILM GATE ASSEMBLY (Illus. page 19)	
Gate, film gate and knob assembly	57647
Lens, projection	51300
Pin, hinge	45833
Pin, shoe pin	57683
Screw, for shoe pin	52999
Screw, for lens locking spring and pin, bd. hd. No. 4-40 x 3/16"	39388
Screw, setscrew, gate adjusting, No. 4-40 x 7/16"	57954
Screw, thumb screw, lens locking	57685
Shoe, film shoe	56036
Spring, film shoe	46830
Spring and pin, for locking lens	52865
FLYWHEEL ASSEMBLY (See Drum Shaft)	
FRAMING DEVICE ASSEMBLY (Illus. page 16)	
Arm, framing arm and bushing	53018
Collar, framing shaft	49362
Eccentric, pin, for claw	52902
Pin, framing arm pivot pin	57730
Screw, framing arm	52901
Screw, setscrew, for adjusting eccentric pin No. 8-32 x 7/16"	58552
Screw, setscrew, framing arm No. 8-32 x 5/16"	53034
Shaft, shaft and knob assembly	54118
Screw, setscrew, for shaft collar, No. 6-32 x 1/4"	34300
Screw, setscrew, for shaft collar, No. 6-32 x 1/8"	48648
Washer, framing arm screw washer	57209
Washer, spring washer	46809
Washer, lockwasher	70814
GATE (See Film Gate)	
GEAR (See Drive, Idler, Shutter Sprocket or Worm Gear Assemblies)	
GUIDE ROLLER ASSEMBLY (Illus. page 22)	
Nut, anchor for shoulder screw	51679
Roller, guide roller	51001
Screw, shoulder, for mounting roller shaft	51639
Screw, setscrew for roller shaft, No. 6-32 x 1/8"	48648
Screw, roller screw, fil. hd. No. 2-56 x 3/16"	57736
Shaft, roller shaft	57732
Spring, gate locking	57928
IDLER GEAR ASSEMBLIES, STEEL AND BAKELITE (Illus. page 32)	
Bushing, idler gear	52877
Gear, idler gear only, upper, steel	52878
Gear, idler gear and bushing assembly complete, upper, steel	46778
Gear, idler gear only, lower, bakelite	54092
Gear, idler gear and bushing assembly complete, lower, bakelite	46779
Pipe, oil pipe, main drive	53026
Screw, gear mtg. screw	38605
Shaft, upper and lower idler gear	47640
Washer, "C" washer, for idler gear	2917
*Washer, .002" thick, spacing	28373
*Washer, .003" thick, spacing	28374
*Washer, .010" thick, spacing	28315
*Washer, .020" thick, spacing	28371
*Washer, .030" thick, spacing	28369
*For gear shaft.	

DESCRIPTION	Stock No.
IDLER ROLLER (See Drive Belt Idler Roller Assembly)	
INTERMITTENT MECHANISM CLAW ASSEMBLY (Illus. pages 13, 14, 15)	
Ball	10129
Bearing, eccentric pin spring	56240
Claw, intermittent claw and body only	56967
Gear, nylon gear and cam, assembled	57728
Gear, shutter gear only, nylon	57666
Pad, oil, inner, for claw	52884
Pad, oil, outer, for claw	52883
Plate, gear plate, for cam and shutter gears	52871
Plate, cam follower, updown motion	57729
Pipe, oil pipe	53220
Screw, mounting, for cam gear	47683
Spring, for cam follower plate (claw)	52882
Spring, claw, in-out motion	52910
Spring, coil, for eccentric	56360
Washer, "C" washer, for eccentric pin and framing arm pivot pin	2917
Washer, spacer, .002" thick	28373
Washer, spacer, cam gear, shutter gear .003" thick	28374
Washer, spring retaining, for eccentric pin spring	28315
LAMP HOUSE AND DOOR ASSEMBLY (Illus. pages 6, 7)	
Baffle, chimney	57669
Board, terminal	54102
Bracket, projection lamp, stationary	28834
Bracket, projection lamp, adjustable	28835
Capacitor, fixed paper, 0.01 mfd., ± 10%, 600 v.	70631
Chimney, projection lamp	52868
Connector, 2 contact, female	52855
Connector, 2 contact, male	47594
Door, lamp house	57645
Hinge, lamp house door	52093
House, lamp, casting only with pin, l.h., rear	57646
House, lamp house, r.h., front	52083
Lamp, projection	28448
Lens, condenser, front	47138
Lens, condenser, rear	47139
Monogram, door	50975
Pin, spring and pin for lens	28514
Reflector, projection lamp	28306
Ring, lens mounting only	51627
Screw, adjusting, projection lamp	51664
Screw, bracket holding, with A-1 spring, washers and spacer, etc.	28839
Screw, thumb screw for door	51631
Screw, for lens retaining spring	50986
Screw, projection lamp socket	47590
Screw, b.h., projection lamp bracket	50988
Screw, b.h., door hinge	50989
Socket, projection lamp	47588
Spacer, lens	45835
Spring, coil, reflector	28380
Spring, coil, for bracket screw	46834
Spring, lens retaining	45836
Support, fall, for door	51641
Switch, toggle switch	47591
Washer, "C" for thumbscrew, door	33726
Washer, insulating, for baffle	58683
LENS, CONDENSER (See Lamp House)	
LENS, PROJECTION (See Film Gate Assembly)	
LENS, SOUND OPTIC (See Sound Optical Bracket)	

DESCRIPTION	Stock No.
LOUDSPEAKER	
(See Case, Speaker Carrying Case)	
MIRROR BRACKET	
(See Drum Shaft)	
MOTOR AND MOUNTING ASSEMBLY	
(Illus. page 8)	
Belt, motor drive PRB # FRF 14.5	52852
Blower rotor	57060
Brush, governor, set of 2	55385
Brush, commutator, set of 2	55386
Bushing, drive shaft	48319
Capacitor, motor, 1.0 mfd., 600 v.	45807
Capacitor, 2200 mmfd.	39660
Governor, motor	55384
Motor, projector	57641
Pulley, motor pulley	54098
Resistor, 100 ohms, 50 w.	53027
Washer, .002" thick, spacing, for ¼" shaft	28373
Washer, .003" thick, spacing, for ¼" shaft	28374
Screw, setscrew, socket-head, No. 10-32 x ¼"	26617
OPTICAL BRACKET	
(See Sound Optical Bracket Assembly)	
PHOTOTUBE BRACKET ASSEMBLY	
(Illus. page 26)	
Bracket, phototube	51652
Cable, shielded, phototube	53053
Cover, phototube	57687
Cushion, rubber, phototube bracket	52947
Phototube	RCA-921
PICTURE GATE	
(See Film Gate)	
PRESSURE ROLLER	
(See Sound Pressure Roller Arm Assembly)	
REEL ARM ASSEMBLY (UPPER)	
(Illus. page 33)	
Arm, upper reel arm, complete	52826
Arm, reel arm with bushing and pin only	52835
Pulley, drive pulley with setscrew	50997
Screw, pulley setscrew	14974
Screw, thumb screw	50996
Shaft, reel shaft assembly	57889
REEL ARM ASSEMBLY (LOWER)	
(Illus. page 34)	
Arm, lower reel arm, complete	52833
Arm, reel arm with bushing only	52827
Bearing, clutch bearing only	56017
Bracket, clutch bracket only	56029
Clutch bracket and bearing assembly complete including bearing, bracket, retainer ring and washers	56027
Flange, drive flange and shaft assembly	50962
Pulley, clutch	56965
Pulley, drive pulley with setscrew	50958
Ring, drive, felt PRB # MS96A	46841
Ring, bearing retaining ring	56019
Screw, reel shaft retaining screw and washer	50988
Screw, clutch pivot shaft setscrew, No. 10-32 x 3/16"	92410
Screw, thumb screw, reel arm	50964
Screw, pulley setscrew	14974
Shaft, clutch pivot shaft	50963
Shaft, reel shaft assembly	57890
Washer, small washer, 5/16" O.D.	56030
Washer, large washer, ½" O.D.	56031
REWIND MECHANISM	
(See Takeup and Rewind Mechanism)	
ROLLER	
(See Guide, Drive Belt Idler, Snubber, Sound Pressure, or Tension Roller Assemblies)	
SHOE, SIDE PRESSURE	
(See Aperture Plate)	
SHOE, SPROCKET	
(See Sprocket)	
SHUTTER ASSEMBLY	
(Illus. page 12)	
Bushing, shutter gear, rubber	57643
Bushing, shutter gear	57727
Gear, shutter gear, nylon	57666
Screw, mounting, for shutter gear	55103
Screw, shutter assembly retaining screw	45772
Shutter, shutter only	53900
Washer, spacer, cam gear, shutter gear, .003" thick	28374
SHUTTLE	
(See Intermittent Movement)	
SNUBBER ROLLER ASSEMBLY	
(Illus. page 28)	
Arm and shaft, snubber roller	53023
Collar, snubber roller arm with setscrew	57822
Roller, snubber roller	46782
Spring, snubber, roller arm	53052
Washer, "C" washer, roller retainer	20165
SOUND OPTICAL BRACKET ASSEMBLY	
(Illus. pages 24, 25)	
Bracket, optical	57682
Cable, shielded, exciter lamp, with single contact female connector	53019
Cover, exciter lamp	52089
Optical unit, complete	46827
Lamp, exciter	27807
Plate, stop plate, lamp cover (shown in photocell bracket assembly illustration)	51661
Screw, thumb screw, lamp cover	51632
Screw, setscrew for hinge pin	14974
Socket, exciter lamp	51328
Pivot, optical bracket pivot pin	45833
Washer, optical bracket shaft washer	28315
SOUND PRESSURE ROLLER ASSEMBLY	
(Illus. page 23)	
Arm, pressure roller arm	51615
Roller, pressure roller	50991
Screw, setscrew, roller shaft, No. 4-40 x ⅛"	50993
Shaft, roller shaft	50992
Spring, pressure roller arm	52099
Screw, arm screw, No. 8-32 x ¼" bd. hd.	72409
Washer, No. 8 plain steel, arm washer	20195

DESCRIPTION	Stock No.
SPEAKER	
(See Case, Projector Case Lid and Speaker Housing, or Speaker and Carrying Case)	
SPEED CHANGER ASSEMBLY	
(See Belt Shifter Assembly)	
SPROCKET, GEAR, SHAFT AND FLANGE ASSEMBLY, UPPER AND LOWER	
(Illus. page 20)	
Bushing, oilite, sprocket shaft bushing	51613
Gear, upper sprocket gear, steel	58494
Gear, lower sprocket gear, fibre	45728
Screw, gear mounting screw	38605
Screw, sprocket setscrew, No. 8-32 x 3/16"	14974
Shaft and flange assembly, upper and lower sprockets	57671
Sprocket assembly and setscrew	57667
SPROCKET SHOE ASSEMBLY	
(Illus. page 20)	
Bracket, assembly, sprocket shoe	52874
Pin, sprocket shoe pin, with screw and washer	57668
Screw, setscrew, for sprocket shoe pin, No. 10-32 x 3/16"	92410
Shoe, sprocket shoe	57644
Spring, sprocket shoe spring	51655
TAKE-UP AND RE-WIND MECHANISM	
(Illus. pages 30, 31)	
Arm, pulley arm and shaft assembly	53031
Belt, spring, rewinding, upper	46937
Belt, spring, take-up, lower	46936
Bracket, stop bracket	54050
Guard, small pulley	46954
Guard, large pulley	52854
Guard, belt, lower section	57663
Guard, belt, upper section	57664
Knob, shift, plastic	51329
Pulley and gear assembly, large	57662
Pulley and gear assembly, small	57670
Screw, shoulder screw for pulley arm	53032
Shaft and pin assembly for shift knob	53033

DESCRIPTION	Stock No.
Spring, take-up and rewind bracket spring	54051
Screw, socket hd. for shift knob, No. 8-32 x 3/8"	53034
Screw, adj. screw for stop bracket, No. 8-32 x 1/2"	58552
Washer, spring for pulley shaft arm	8078
Washer, spacing, .003" thick	28374
Washer, spacing, .002" thick	28373
TENSION ROLLER ASSEMBLY	
(Illus. page 27)	
Arm and shaft, tension roller	52857
Cover, tension roller spring	51673
Pad for tension spring	51651
Roller, tension roller	46783
Screw, roller shaft screw with washer	51004
Setscrew, roller arm, Allen, No. 6-32 x 1/8"	48648
Spring, for support and shaft, roller arm	51645
Support and shaft assembly, roller arm	52869
THREADING LAMP ASSEMBLY	
(Illus. page 29)	
Lamp, threading lamp	36728
Shield, lamp shield	57731
Socket, threading lamp	52851
Switch, threading lamp	28322
TILTING MECHANISM	
(See Case, Projector Carrying)	
WORM GEAR ASSEMBLY	
(See Drive Shaft and Pulley (Large) Assembly)	
TOOLS, SPECIAL SERVICE	
(Illus. page 29)	
Plate, claw guage plate for intermittent adjustments	49109
Pin, sound optical adj. pin	49108
Wrench, sound optical adj. wrench	49101
WORM GEAR ASSEMBLY	
(See Drive Shaft and Pulley (Large) Assembly)	



RCA 400 AMPLIFIER WIRING DIAGRAM

SPECIAL SERVICE MANUAL FOR MI-35001 AND MI-35001-F

USE WITH IB-24933

RCA 400 Optical Magnetic 16 mm Motion Picture Equipment

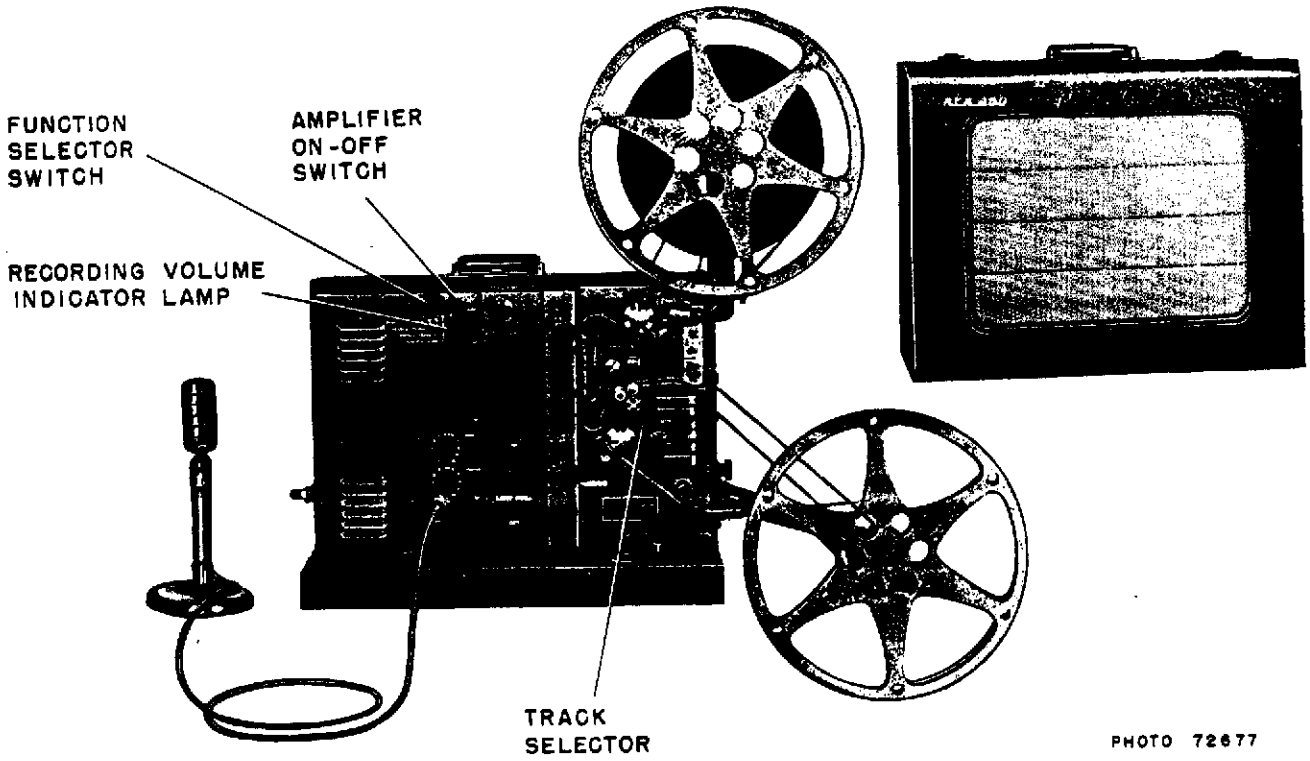
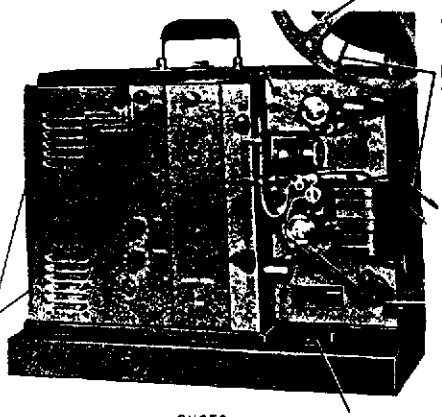


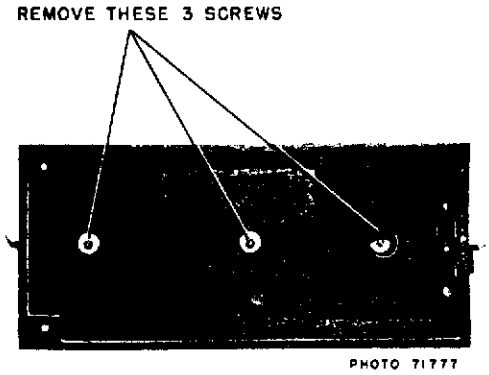
PHOTO 72677

IMPORTANT: Read IB-24933 and this Manual carefully before servicing the equipment. MI-35001 must be operated from 60 cycles and MI-35001-F from 50 cycles. If there is doubt concerning the power available, consult the electric-power company.

RCA OPTICAL MAGNETIC PROJECTOR AMPLIFIER

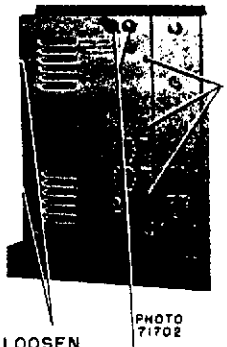
TO REMOVE PROJECTOR AMPLIFIER FROM THE CARRYING CASE



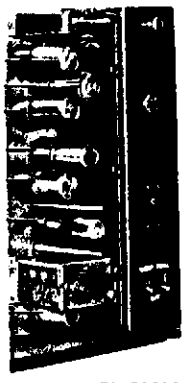


SLIDE PROJECTOR AMPLIFIER OUT OF CARRYING CASE

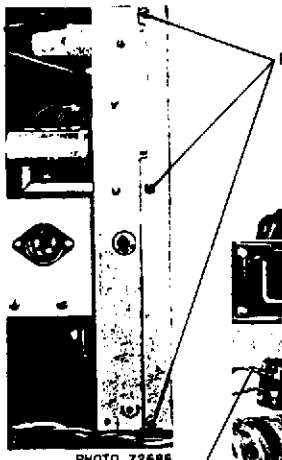
TO INSPECT AMPLIFIER TUBES

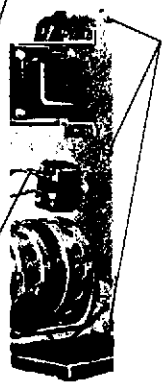


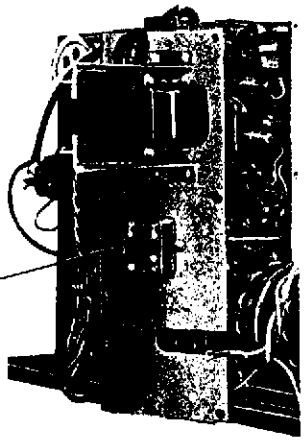
TUBE LOCATION



TO SERVICE AMPLIFIER







FOR DESCRIPTION OF AMPLIFIER COMPONENTS SEE SCHEMATIC DIAGRAM AND PARTS LIST

TO REMOVE LAMPHOUSE AND AMPLIFIER ASSEMBLY

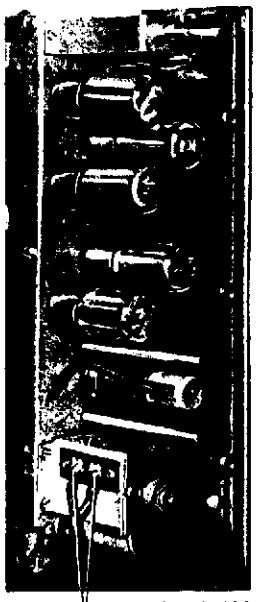


PHOTO 72692

1. DISCONNECT 2 PHOTOTUBE LEADS

2. REFER TO PAGE 7 OF IB-24933 AND REMOVE THREE SCREWS FROM FRONT OF PROJECTOR

3. REACH THROUGH HOLE AND REMOVE BELT FROM LOWER PULLEY ONLY

REMOVE THIS SCREW

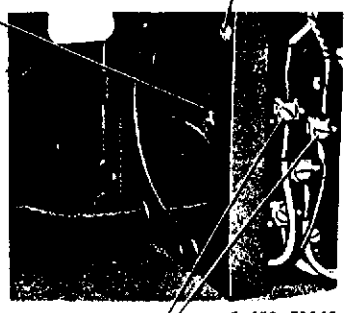
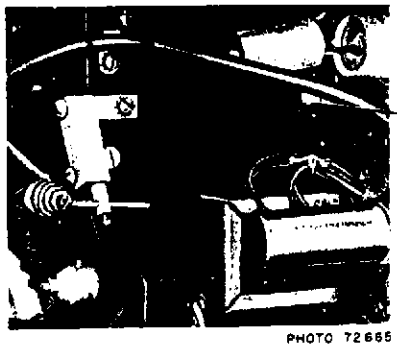


PHOTO 72665

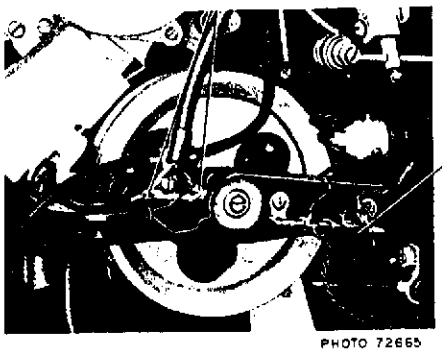
4. DISCONNECT 2 THREADING LAMP LEADS FROM 2 TOP TERMINALS



5. DISCONNECT EXCITER LAMP CABLE

PHOTO 72665

6. DISCONNECT 2 CABLE LEADS



7. UNSOLDER 2 AMPLIFIER LEADS

PHOTO 72665

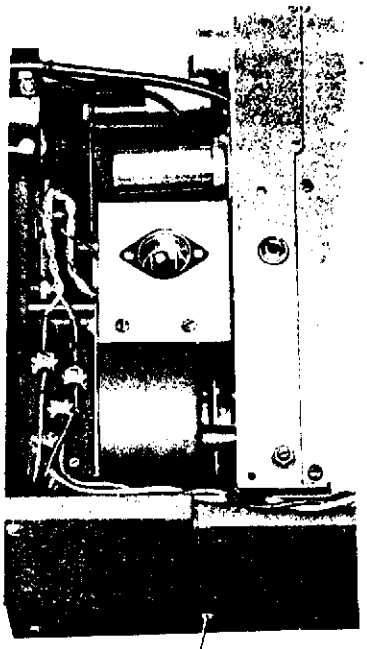


PHOTO 72663

8. REMOVE THIS SCREW

MOTOR AND BLOWER ASSEMBLY

TO DISCONNECT AND REMOVE MOTOR FROM BASE

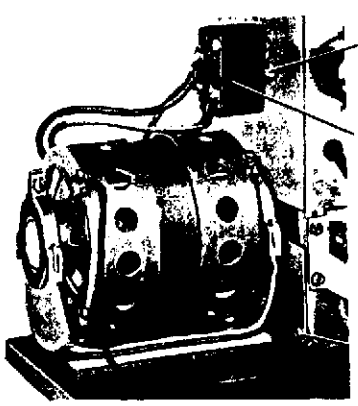


PHOTO 72713

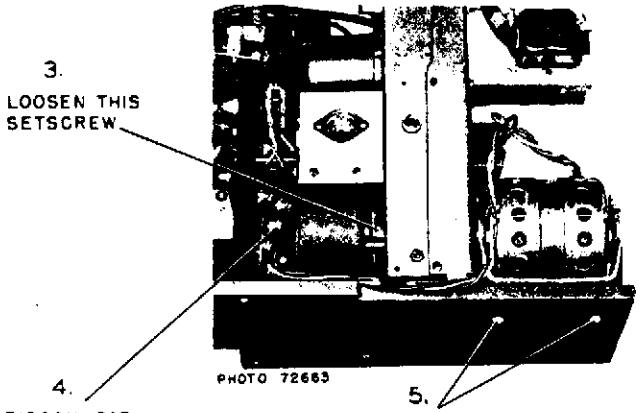


PHOTO 72663

TO REMOVE BLOWER

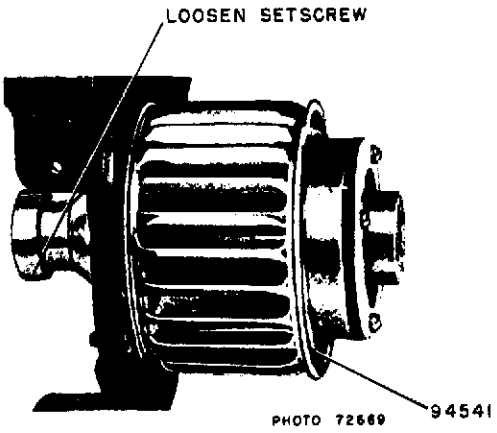


PHOTO 72669

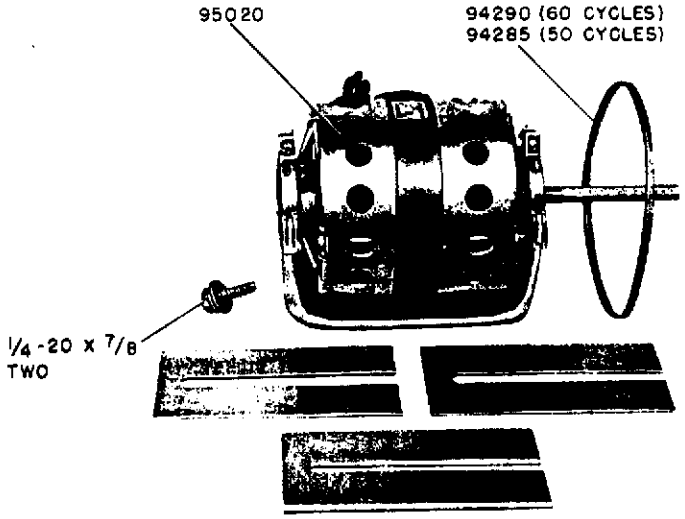


PHOTO 72668

BLOWER

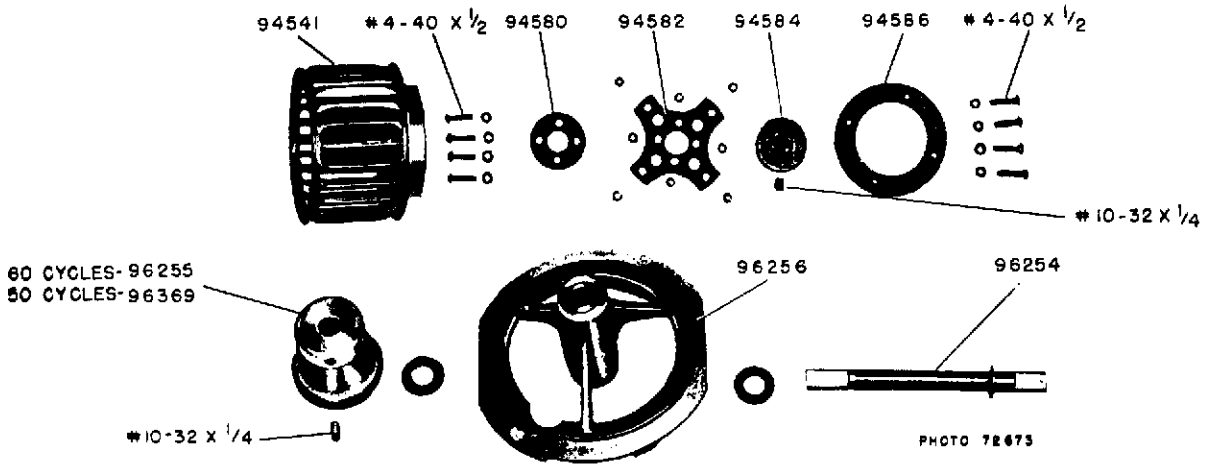


PHOTO 72673

MAGNETIC UNIT - REPRODUCE RECORD HEAD ASSEMBLY

TO REMOVE REPRODUCE RECORD HEAD AND ARM ASSEMBLY

REFER TO PAGES 23 AND 24 OF IB-24933 AND REMOVE THE GUIDE ROLLER AND THE SOUND PRESSURE ROLLER ASSEMBLIES

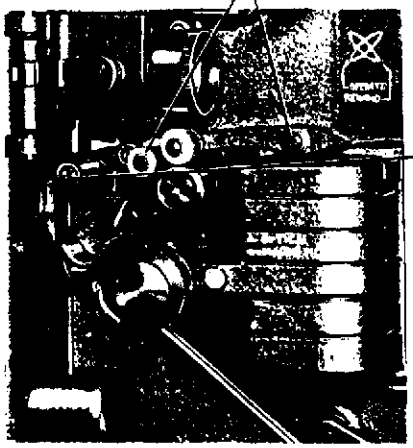
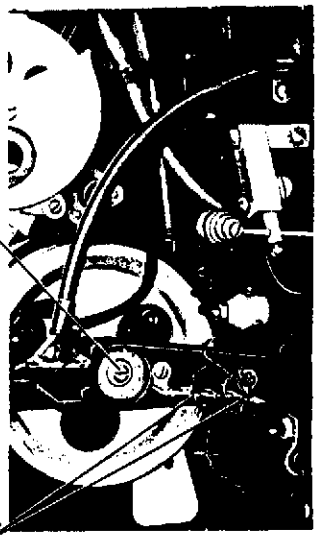


PHOTO 72680

1. REMOVE SCREW AND KNURLED NUT

2. REFER TO PAGE 22 OF IB-24933 AND REMOVE SCREW, BALLBEARING AND SPRING



3. UNSOLDER THESE LEADS. PULL CABLE THROUGH TO FRONT AND OUT OF TUBE, FREEING IT

PHOTO 72665

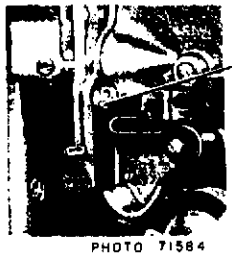


PHOTO 71584

4. TAKE HOLD OF PIN WITH TWEEZERS AND PULL OUT ECCENTRIC BUSHING

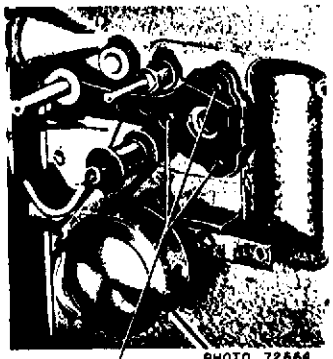


PHOTO 72664

REMOVE 3 SCREWS TO REMOVE BRACKET

5. PULL OUT SOUND DRUM AND HEAD AND ARM ASSEMBLY UNTIL ARM SLIPS OFF ITS MOUNTING PIVOT. LIFT HEAD CLEAR OF SOUND DRUM

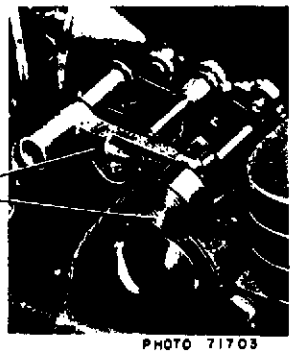


PHOTO 71703

REPRODUCE RECORD HEAD ASSEMBLY

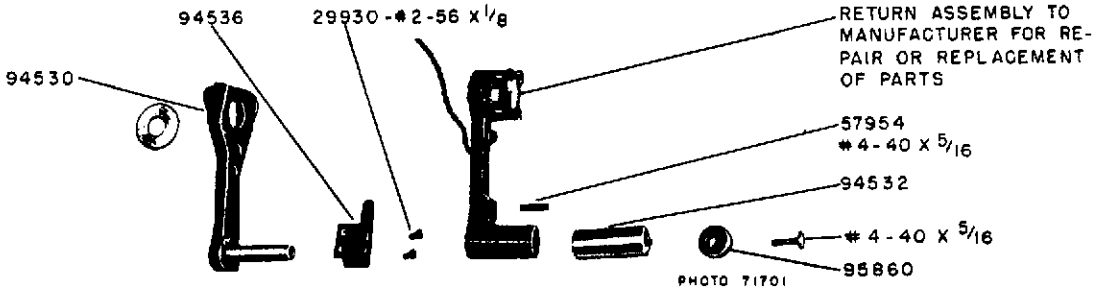


PHOTO 71701

ERASE HEAD ASSEMBLY

TO REMOVE ERASE HEAD

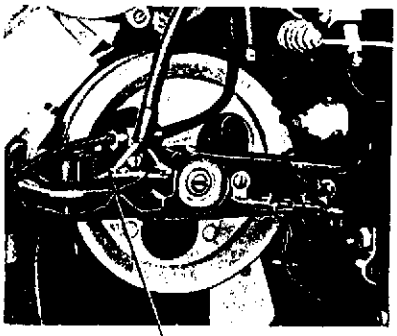


PHOTO 72685

1. UNSOLDER 2 TWISTED LEADS

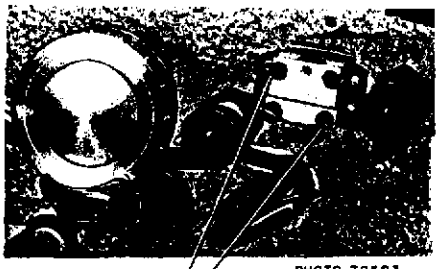


PHOTO 72693

2. REMOVE 2 MOUNTING SCREWS

TO REMOVE ROLLERS

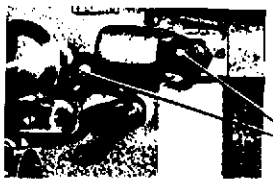


PHOTO 72680

REMOVE MOUNTING SCREWS

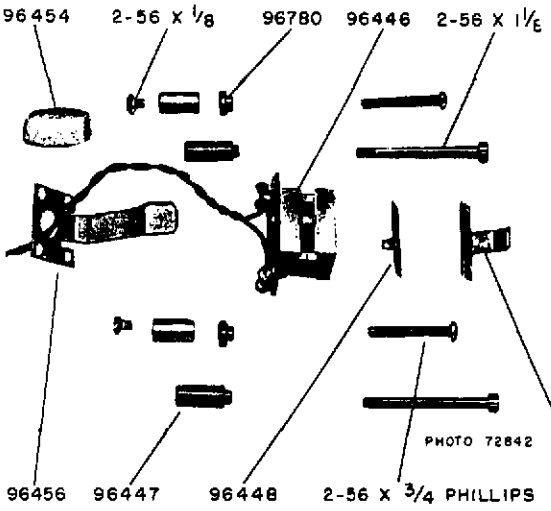


PHOTO 72642

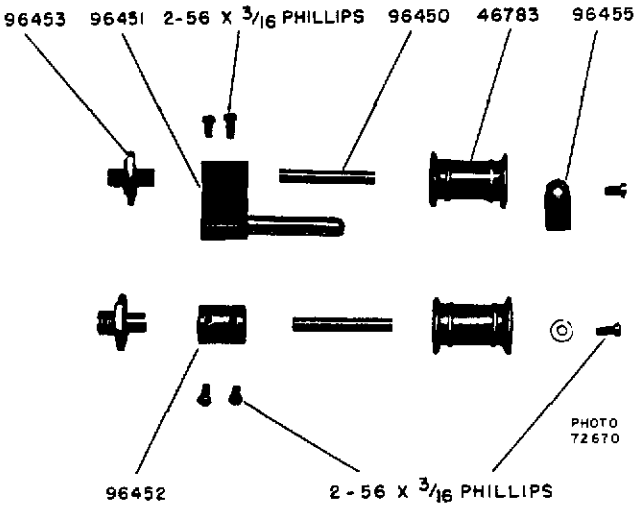
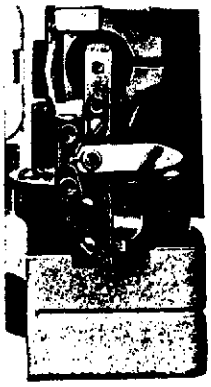


PHOTO 72670

TRACK SELECTOR CONTROL ASSEMBLY

TO ADJUST TRACK SELECTOR



1. MOUNT TRACK SELECTOR WITH 2 SCREWS.

2. PLACE LEVER IN OPTICAL POSITION — UPWARD.

3. LOOSEN MOUNTING SCREWS SLIGHTLY AND SLIDE ASSEMBLY UP OR DOWN – AS REQUIRED – TO POSITION MAGNETIC HEAD ABOUT 2 FILM THICKNESSES BELOW DRUM SURFACE. TIGHTEN SCREWS.

4. PLACE LEVER IN MAGNETIC POSITION — DOWNWARD — AND LOOSEN SCREW ABOVE LEVER.

5. TURN FUNCTION SELECTOR SWITCH TO OPTICAL SOUND AND THE AMPL-OFF SWITCH TO AMPL. CONNECT THE LOUDSPEAKER.

6. MOVE UPPER SECTION OF TRACK SELECTOR ASSEMBLY INTO POSITION TO INTERRUPT BEAM OF LIGHT FROM EXCITER LAMP. PHOTOTUBE HISS SHOULD CEASE. TIGHTEN SCREW.

TRACK SELECTOR ASSEMBLY

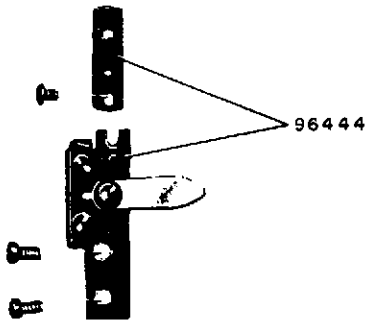


PHOTO 72671

POWER TRANSFORMER

TO REMOVE POWER TRANSFORMER

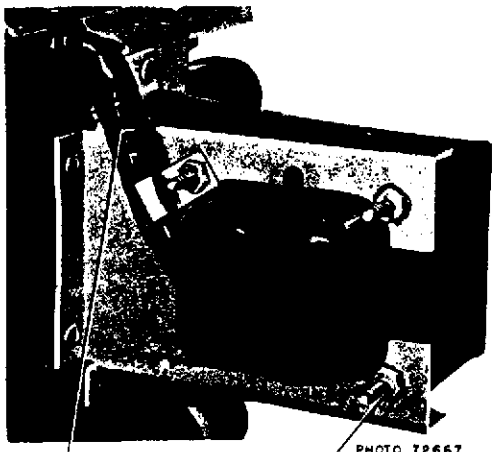
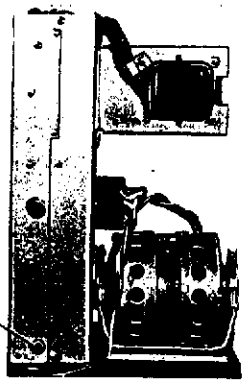


PHOTO 72667

REMOVE FOUR NUTS AND SCREWS

DISCONNECT CABLE LEADS FROM AMPLIFIER

TO ADJUST FOR MINIMUM HUM



TO MINIMIZE HUM CONNECT AN OUTPUT METER TO THE AMPLIFIER OUTPUT CIRCUIT AND TURN SCREW FOR MINIMUM INDICATION ON METER. TIGHTEN LOCK NUT.

PHOTO 72688

HUM BUCKING COIL

TO REMOVE COIL AND MOUNTING ASSEMBLY TO REACH CLAW ADJUSTMENT SCREW

1. MARK POSITION OF BLOCK WITH SCRIBER OR PENCIL
2. REMOVE THIS SCREW ONLY—DO NOT DISTURB OTHERS.

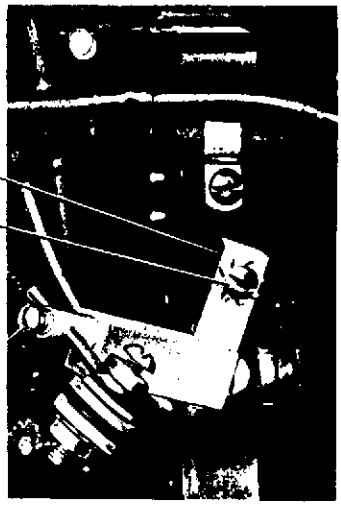


PHOTO 71425

TO DETERMINE POSITION OF MINIMUM HUM

1. LOOSEN THIS SCREW. REMOVE ROD FROM MOUNTING POST.
2. CONNECT LOUDSPEAKER TO PROJECTOR AMPLIFIER. CONNECT EQUIPMENT TO 115 VAC POWER LINE.
3. A. TURN AMPL-OFF SWITCH TO AMPL.
   B. TURN VOLUME CONTROL TO "10"
   C. TURN TONE CONTROL TO ZERO
   D. SET PROJ-ON SWITCH TO PROJ
   E. SET FUNCTION SELECTOR SWITCH AT MAGNETIC SOUND.
4. MOVE THE HUM BUCKING COIL ABOUT IN SPACE AND EXPLORE THE FIELD IN A VOLUME OF APPROXIMATELY 3 INCH RADIUS. LISTEN TO THE HUM IN THE LOUDSPEAKER AND FIND COIL POSITION FOR MINIMUM HUM.
5. REMOUNT COIL SUPPORTING ROD IN MOUNTING POST.
6. REORIENT SUPPORTING ASSEMBLY ELEMENTS TO ESTABLISH COIL IN MINIMUM HUM POSITION.
7. TIGHTEN ALL SCREWS.

LATERAL ADJUSTMENT OF MAGNETIC SOUND TRACK

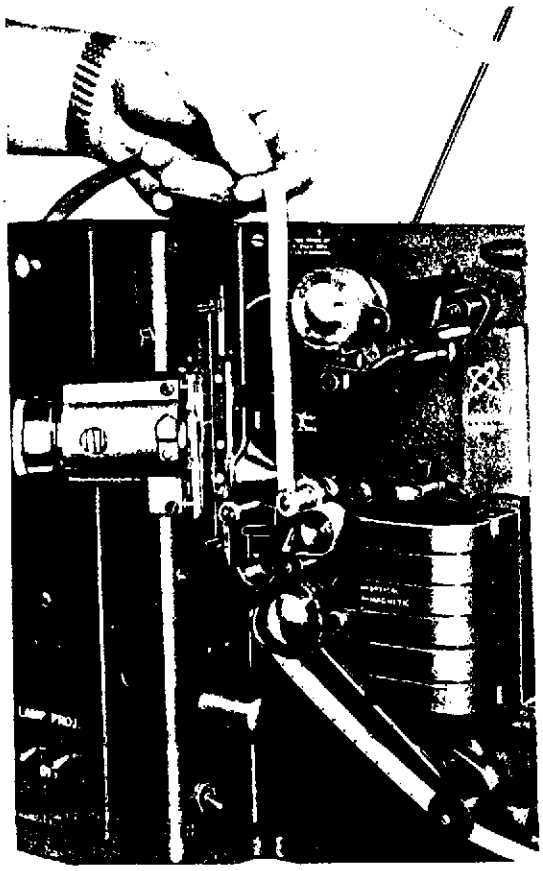


PHOTO 72715

1. REMOVE SOUND PRESSURE ROLLER ASSEMBLY. REFER TO PAGE 24 OF IB-24933

2. CAREFULLY SCRAPE 1/4 INCH OF MAGNETIC SOUND TRACK MATERIAL FROM A PIECE OF CLEAR FILM.

3. THREAD THE FILM UNDER THE GUIDE ROLLER, OVER AND AROUND THE SOUND DRUM AND THROUGH REMAINDER OF PROJECTOR IN THE MANNER ILLUSTRATED. POSITION SCRAPED-OFF PORTION OF FILM DIRECTLY OVER MAGNETIC HEAD.

4. HOLD UPPER END OF FILM TAUT. OBSERVE POSITION OF SOUND TRACK WITH RESPECT TO MAGNETIC HEAD — A MAGNIFYING GLASS MAY BE HELPFUL. IF TRACK IS NOT ALIGNED CENTRALLY WITH RESPECT TO WIDTH OF MAGNETIC HEAD, PLACE A 5/16 END-WRENCH OVER HEX NUT BEHIND GUIDE ROLLER AND ROTATE HEXAGONAL SHAFT IN PROPER DIRECTION TO BRING SOUND TRACK INTO CENTRAL ALIGNMENT WITH MAGNETIC HEAD. REFER TO PAGE 23 OF IB-24933 FOR ILLUSTRATION OF GUIDE ROLLER ADJUSTMENT.

NOTE: LATERAL ADJUSTMENT OF SOUND TRACK BY MOVING GUIDE ROLLER IS MADE ONLY FOR MAGNETIC SOUND TRACK FILM. FOR OPTICAL SOUND TRACK THE OPTICAL BRACKET IS ADJUSTED AS DESCRIBED ELSEWHERE IN THIS ADDENDA. THE MAGNETIC SOUND TRACK ADJUSTMENT SHOULD BE MADE FIRST

LONGITUDINAL ADJUSTMENT OF MAGNETIC HEAD ASSEMBLY

1. THREAD A 6000 CYCLE CONSTANT FREQUENCY FILM THROUGH THE PROJECTOR AMPLIFIER.

2. CONNECT THE SPEAKER TO THE PROJECTOR AMPLIFIER AND CONNECT EQUIPMENT TO POWER LINE.

3. CONNECT AN OUTPUT METER ACROSS SPEAKER TERMINALS.

4. SET TONE CONTROL AT 10 AND VOLUME CONTROL TO SUITABLE LEVEL.

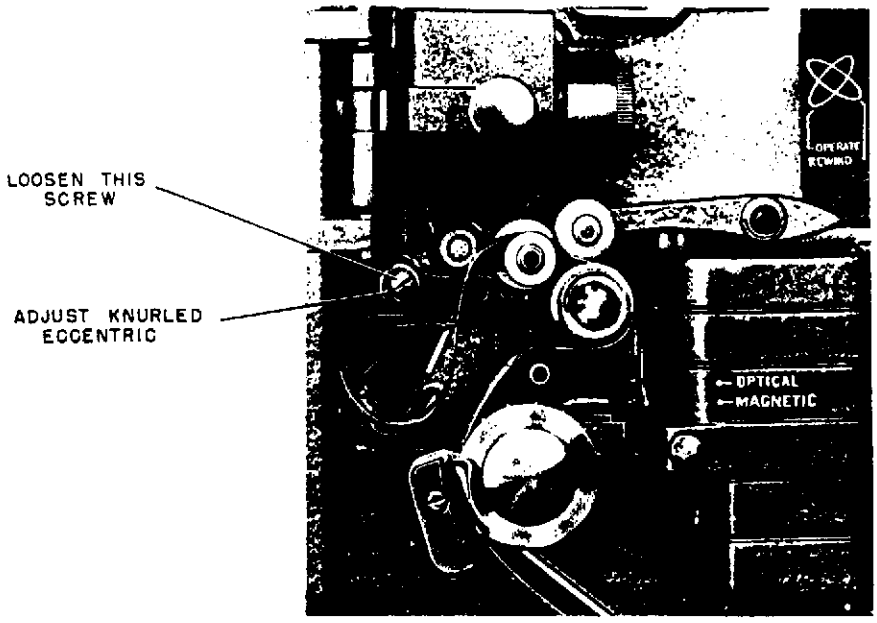


PHOTO 72681

5. PUT AMPL-OFF SWITCH IN AMPL POSITION AND PROJ-OFF SWITCH IN PROJ POSITION.

6. LOOSEN THE SCREW HOLDING THE KNURLED ECCENTRIC — SEE ILLUSTRATION. WITH THE PROJECTOR AMPLIFIER OPERATING, OBSERVE THE INDICATION ON THE OUTPUT METER AND SLOWLY ROTATE THE KNURLED ECCENTRIC CLOCKWISE AND COUNTERCLOCKWISE UNTIL A MAXIMUM INDICATION IS OBTAINED ON THE METER. TIGHTEN THE HOLDING SCREW.

7. THE CORRECT PRESSURE IS 25 TO 30 GRAMS WHEN THE MAGNETIC HEAD IS IN LINE WITH THE UPPER SOUND DRUM SURFACE. TO AVOID DAMAGE TO THE HEAD, MEASURE THE PRESSURE DIRECTLY ON THE SMALL CLAMP WHICH HOLDS THE HEAD IN PLACE, USING A SPRING TENSION GAUGE SUCH AS WESTERN ELECTRIC CO. #70J — WHICH MAY BE PURCHASED FROM GRAYBAR ELECTRIC CO. — OR SIMILAR. TO INSURE PROPER PRESSURE INDICATION, TAP THE ARM SLIGHTLY WHILE MEASURING, TO RELIEVE STATIC RESISTANCE. SHOULD THE PRESSURE REQUIRE ADJUSTMENT, TURN THE #4-40 ALLEN SETSCREW (STOCK #57954) CLOCKWISE TO INCREASE PRESSURE OR COUNTERCLOCKWISE TO REDUCE PRESSURE.

8. RECHECK ARM PRESSURE EVERY TIME KNURLED ECCENTRIC POSITION IS CHANGED.

9. REMOVE FILM FROM PROJECTOR AND LISTEN CAREFULLY FOR RUBBING SOUND. MAKE SURE MAGNETIC HEAD IS NOT RUBBING AGAINST INSIDE OF SOUND DRUM. MAKE LISTENING TEST WITH TRACK SELECTOR IN BOTH MAGNETIC AND OPTICAL POSITIONS.

LATERAL ADJUSTMENT OF OPTICAL SYSTEM

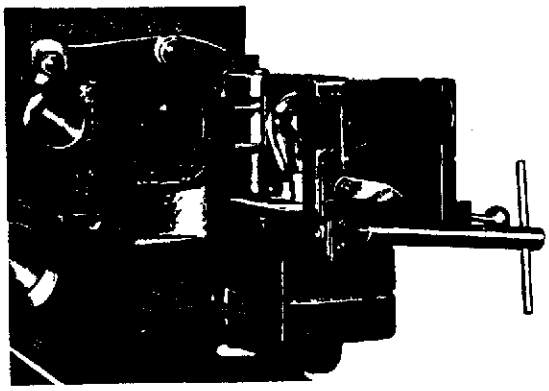


PHOTO 72687

1. CONNECT PROJECTOR AMPLIFIER TO 115 VAC POWER SERVICE. CONNECT LOUDSPEAKER TO PROJECTOR AMPLIFIER.
2. THREAD LOOP OF S.M.P.T.E. Z22-57-1947 BUZZ TRACK FILM THROUGH PROJECTOR.
3. SET AMPL-OFF SWITCH IN AMPL POSITION AND PROJ-OFF SWITCH IN PROJ POSITION.
4. INSERT THE LATERAL ADJUSTMENT WRENCH IN THE SPLIT BUSHING IN THE SOUND OPTICAL BRACKET — SEE ILLUSTRATION.
5. CLOSE THE SOUND OPTICAL BRACKET ASSEMBLY AND PUT IT IN THE OPERATING POSITION.
6. ADJUST THE VOLUME CONTROL FOR A DESIRABLE SOUND LEVEL.
7. TURN THE WRENCH CLOCKWISE AND COUNTERCLOCKWISE UNTIL NO TONE IS HEARD. TURNING THE WRENCH CLOCKWISE WILL PRODUCE A LOW FREQUENCY NOTE AND TURNING IT COUNTERCLOCKWISE WILL PRODUCE A HIGH FREQUENCY NOTE. WHEN PROPERLY ADJUSTED NEITHER NOTE WILL BE HEARD IN THE LOUDSPEAKER.

OPERATE REWIND KNOB

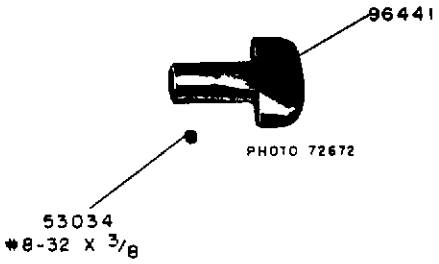
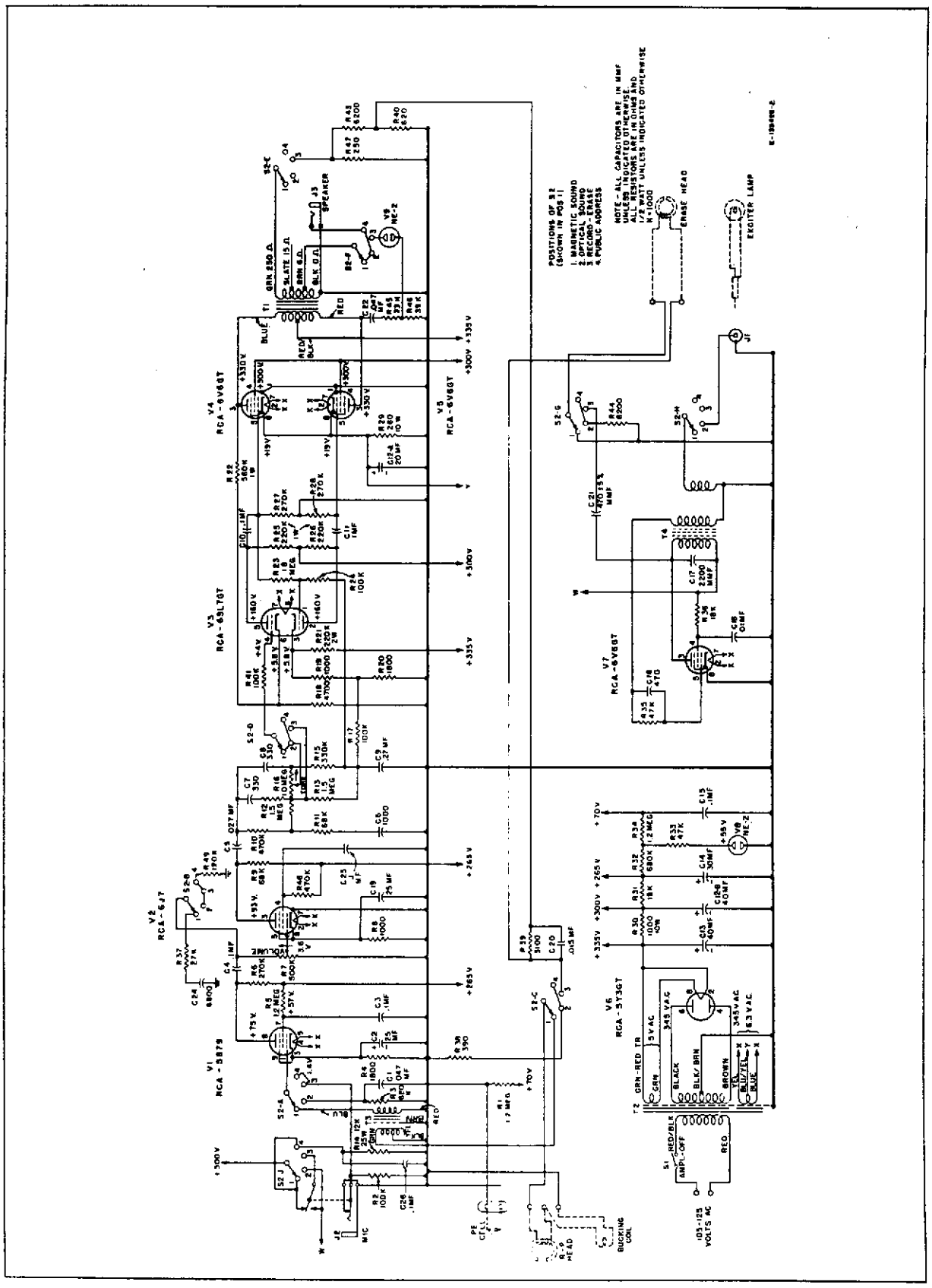


PHOTO 72672



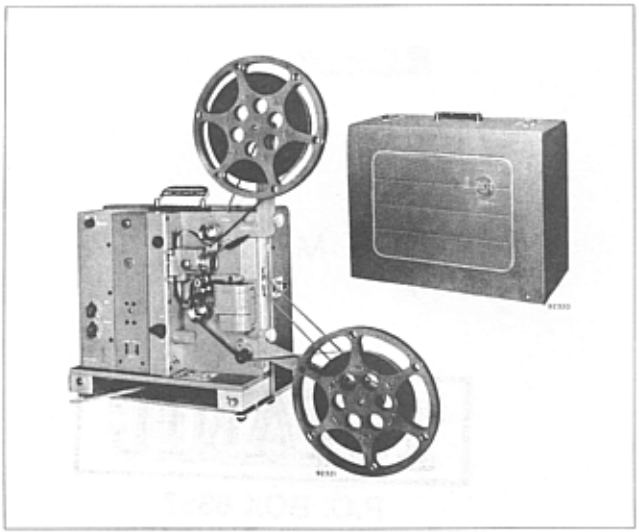
SCHEMATIC DIAGRAM OF MI-35001 AMPLIFIER

16 mm Motion Picture Equipment

RCA 400

SERVICE MANUAL

RADIO CORPORATION OF AMERICA
INDUSTRIAL ELECTRONIC PRODUCTS, CAMDEN, N. J.



RCA 400 Senior Projector and Speaker

LAMPS:
BTR - 1000W 200 HR.
DFT - 1000W 25 HR
DHT - 1200W 10 HR.
DFD - 1000W 10 HR.
DDB/DDW 750W 25 HR

RCA 400

16mm MOTION PICTURE EQUIPMENT

SENIOR

MI-1338-C Projector, Sound and Silent Speed
MI-1312-C Speaker and Accessories

JUNIOR

MI-1345-C Projector, Sound and Silent Speed

AUXILIARY SPEAKER FOR BOTH MODELS

MI-1312-C Auxiliary Speaker

TECHNICAL DATA

***Power Required**

MI-1338-C

1000 watts—with 750 watt lamp
1150 watts—with 1000 watt lamp
1350 watts—with 1200 watt lamp

MI-1345-C

975 watts—with 750 watt lamp
1150 watts—with 1000 watt lamp
1350 watts—with 1200 watt lamp
* 105 to 125 volts, 60 cycles

Projection Lens

Speed: f/1.6
Focal length: 2 inches
Coated on all air-to-glass surfaces

Projection Lamp

1000-watt, 115-volt, T12P

Sound Lamp

¾-ampere, 4-volt, prefocused, S-8 double contact BGB/BGK

Tube Complement

MI-1338-C	*MI-1345-C*
1 RCA 6J7	1 RCA 6SL7GT
1 RCA 6J5	2 RCA 50L6GT
1 RCA 6SL7GT	1 RCA 6V6GT
3 RCA 6V6GT	1 GE 12AY7
1 RCA 5Y3GT	1 RCA 921
1 RCA 921	

Dimensions (Inches)	*MI-1338-C*	*MI-1312-C*	*MI-1345-C*
Length	15½	19⅝	13⅞
Height	15	15⅝	15
Width	10	9¼	9⅝

Weight (Pounds)	*MI-1338-C*	*MI-1312-C*	*MI-1345-C*
Equipment	39¼	19	33
Shipping	46	26½	39

NOTE

This Manual also applies to the 50-cycle equipments: MI-1338-CF and MI-1345-CF

INDEX

SERVICE OPERATIONS

RCA 400 JUNIOR PROJECTOR AND SPEAKER (IN COVER)

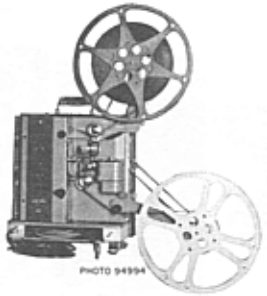
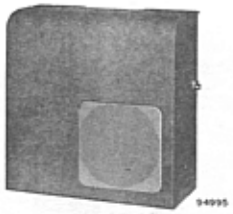
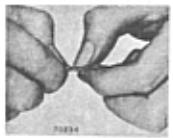


PHOTO 94994



94995

REMOVING BELTS



PUSH FIRST TURN WITH THUMBNAIL OR STRETCH SPLICE OUT AND UNSCREW.

REPLACING BELTS

1. BEFORE PULLING OUT OLD BELT ATTACH ONE END OF NEW BELT TO AN END OF OLD BELT.
2. IF REPLACING TOP BELT PLACE REWIND LEVER IN OPERATE POSITION. IF REPLACING LOWER BELT PLACE REWIND LEVER IN REWIND POSITION.
3. PULL NEW BELT INTO MACHINE BY PULLING OUT UNATTACHED END OF BELT. UNATTACH OLD BELT.
4. COUNT NUMBER OF TURNS ON SMALL END OF NEW BELT.
5. TWIST SMALL END OF BELT BACKWARDS= AS IF REMOVING A SCREW- AN EQUAL NUMBER OF TURNS.
6. SCREW ENDS OF BELT TOGETHER. THIS METHOD PREVENTS BELT FROM COMING APART DURING OPERATION.

INCORRECT 94992

TO IDENTIFY UPPER AND LOWER BELTS REMEMBER "LOWER IS LONGER."

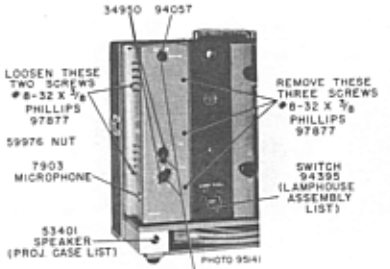
CORRECT 94993

PARTS

Stock No.	Drawing No.	Description
215670	184261-8	Belt, rewind spring belt, upper
215671	184261-9	Belt, take-up spring belt, lower

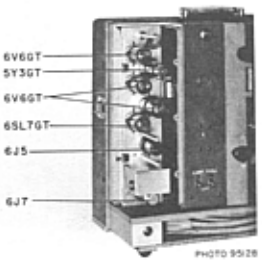
RCA 400 SENIOR AMPLIFIER

TO INSPECT AMPLIFIER TUBES



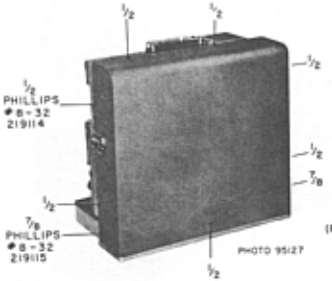
LOOSEN THESE #8 AND #6-32 SETSCREWS AND REMOVE KNOBS. REMOVE COVER.

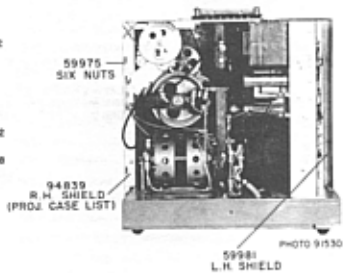
TUBE LOCATION



MAKE SURE ALL TUBES ARE FIRMLY SEATED

TO OBTAIN ACCESS TO BACK OF PROJECTOR



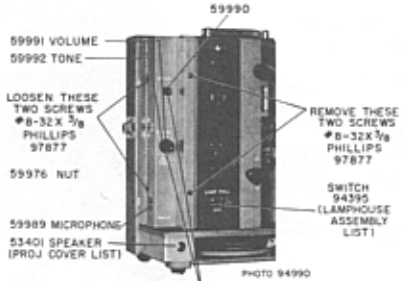


REMOVE NINE #8-32 SCREWS LENGTH AS SHOWN.

FOR AMPLIFIER COMPONENTS SEE PAGES 52 THROUGH 54

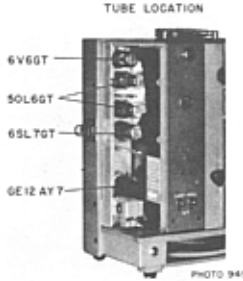
RCA 400 JUNIOR AMPLIFIER

TO INSPECT AMPLIFIER TUBES



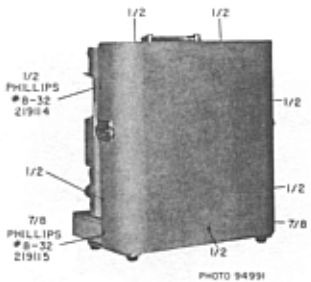
LOOSEN THESE TWO SETSCREWS #6-32 X 1/8 AND REMOVE KNOBS. REMOVE COVER.

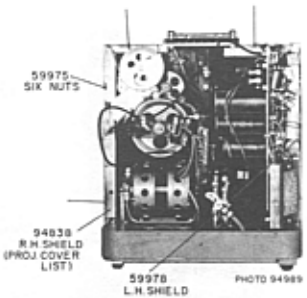
TUBE LOCATION



MAKE SURE ALL TUBES ARE FIRMLY SEATED

TO OBTAIN ACCESS TO BACK OF PROJECTOR





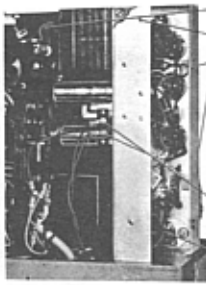
REMOVE NINE #8-32 SCREWS, LENGTH AS SHOWN.

FOR AMPLIFIER COMPONENTS SEE PAGES 54 THROUGH 57

RCA 400 "SENIOR" AND "JUNIOR" AMPLIFIERS

TO SERVICE AMPLIFIERS

SENIOR



DISCONNECT EXCITER LAMP CABLE. REMOVE THIS #8-32 X 1/4 SCREW AND THESE TWO #8-32 X 3/8 PHILLIPS SCREWS (INSIDE OF SHIELD.)

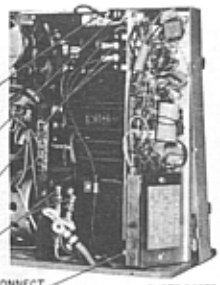
DISCONNECT SPEAKER LEADS

DISCONNECT PHOTOTUBE CABLE

PHOTO 95129

IF AMPLIFIER ONLY IS TO BE REMOVED, DISCONNECT 2 AMPLIFIER LEADS-BUT NOT THE RED LEAD-FROM 2 UPPER TERMINALS. IF AMPLIFIER AND LAMPHOUSE ARE TO BE REMOVED DISCONNECT THE RED LEAD FROM THE UPPER-LEFT-TERMINAL AND ALL LEADS FROM THE LOWER 2 TERMINALS.

JUNIOR



DISCONNECT EXCITER LAMP CABLE.

REMOVE THIS #8-32 X 1/4 SCREW TO REMOVE SHIELD

DISCONNECT SPEAKER LEADS

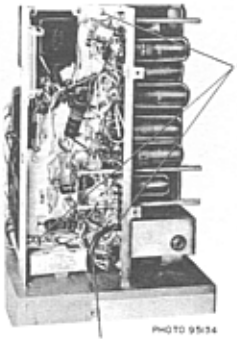
DISCONNECT PHOTOTUBE CABLE

PHOTO 94973

IF AMPLIFIER ONLY IS TO BE REMOVED, DISCONNECT 2 LEADS FROM UPPER TERMINALS. IF AMPLIFIER AND LAMPHOUSE IS TO BE REMOVED DISCONNECT 2 BLACK LEADS FROM 2 UPPER TERMINALS AND 2 LEADS FROM 2 LOWER TERMINALS.

TO REMOVE AMPLIFIER

SENIOR

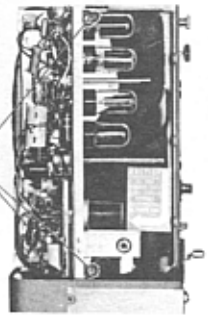


REMOVE THESE THREE #10-32 X 5/16 SCREW

PHOTO 95134

DISCONNECT PHOTOTUBE CABLE

JUNIOR

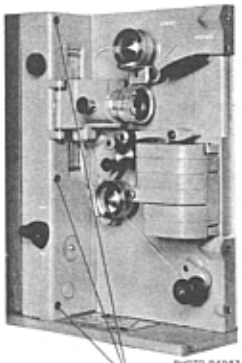


REMOVE THESE THREE SCREWS (#10-32 X 5/16) (#8-32 X 1/4) (#8-32 X 3/4)

PHOTO 94974

LAMPHOUSE AND DOOR ASSEMBLY

TO REMOVE LAMPHOUSE



REMOVE THESE THREE SCREWS #10-32 X 5/8 PHILLIPS

PHOTO 94983

"SENIOR"

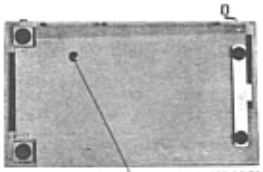


PHOTO 95135

REMOVE THIS SCREW #10-32 X 5/8

"JUNIOR"

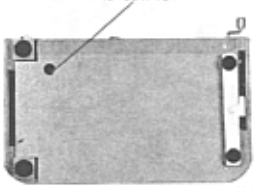
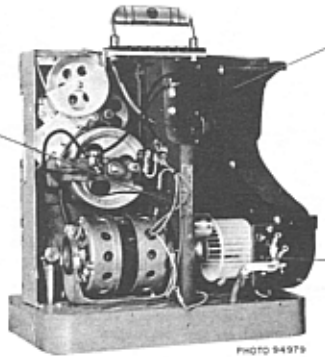


PHOTO 94984



REMOVE THIS SCREW #10-32 X 5/8 PHILLIPS

215102 (JUNIOR)
215103 (SENIOR)

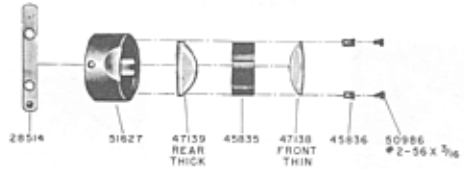
SLIDE LAMPHOUSE OFF TO THE RIGHT BEING CAREFUL NOT TO LET BLOWER ROTOR BIND IN HOUSING. BLOWER ROTOR MAY BE DAMAGED IF NOT CAREFULLY REMOVED.

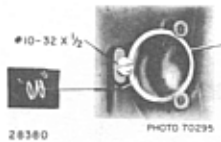
59832

PROJECTION LAMP 28448

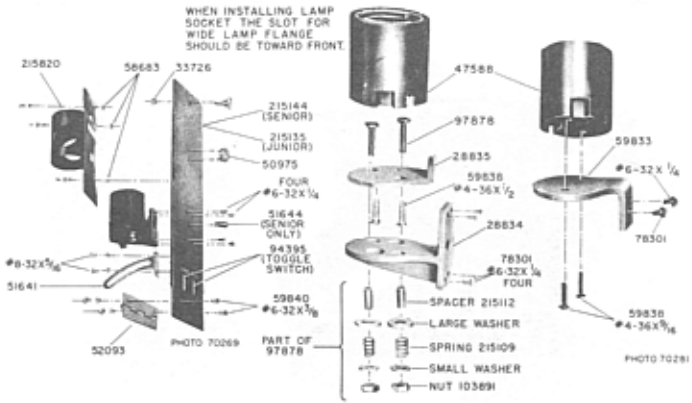
PHOTO 94979

LAMPHOUSE AND DOOR ASSEMBLY





SOCKETS ASSEMBLED - BOTTOM VIEW



PARTS

Stock No.	Drawing No.	Description
		LAMPHOUSE ASSEMBLY FOR MI-1338-C, -CF AND MI-1345-C
59832	8876364-1	Board, terminal
59833**	8876064-1	Bracket, projection lamp, stationary
28834*	182040-3	Bracket, projection lamp, stationary
28835*	182041-3	Bracket, projection lamp, adjustable
215820	148370-502	Chimney, lamp chimney and baffle assembly
215144*	175483-4	Door, lamphouse
215135**	148375-502	Door, lamphouse door, machining
52093	181297-3	Hinge, lamphouse door
215103*	8876067-505	Lamphouse, blower housing assembly (left half)
215102**	8876067-504	Lamphouse, blower housing (left half)
215119	176972-2	Lamphouse, blower housing assembly (right half)
45304	810897-5	Lamp, projection, 1000 w, 115 v.
47138	181279-3	Lens, front condenser
47139	181279-4	Lens, rear condenser
50975	8958720-1	Monogram, door, RCA
103891*	57435-104	Nut, 6-32, adjustable bracket
28514	8876095-501	Spring, and pin assembly - condenser lens
28306	181289-2	Reflector, projection lamp
51627	8875977-1	Mounting, lens
51664*	8850740-2	Screw, projection lamp adjusting screw
97878*	182043-1	Screw, adjustable bracket, screw, spring, nut and washers, spacer
51631	185629-3	Screw, lamphouse door thumbscrew
59838	73101-106	Screw, projection lamp socket
78301	990106-605	Screw, projection lamp bracket
59840	8876207-2	Screw, door hinge
50986	57452-403	Screw, lens retaining spring, 2-56 x 3/16
47588	185610-1	Socket, projection lamp
45835	182923-1	Spacer, condenser lens
28380	206418-7	Spring, reflector coil spring
45836	182842-2	Spring, condenser lens retaining
51641	189368-1	Support, door fall support
94395	8890681-3	Switch, toggle SPST
215112*	181437-124	Spacer, adjustable bracket
215109*	819107-14	Spring, adjustable bracket
33726	82639-1	Washer, "C" washer, door thumbscrew
58683	76709-11	Washer, lamp chimney and baffle, insulating

* MI-1338-C, -CF only
** MI-1345-C, -CF, -CT only

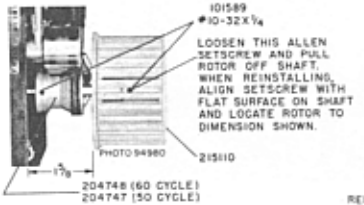
PARTS

Stock No.	Drawing No.	Description
MOTOR AND BLOWER ASSEMBLY 60 CYCLE OPERATION - MI-1338-C, MI-1345-C,-CT		
94290	145285-3	Belt, motor drive (green dot)
215110	8412419-1	Blower, rotor
215619	484379-1	Motor, drive 115 V, 50/60 cycles
204748	148332-3	Pulley, motor drive
59811	8876288-1	Relay, drive motor starting relay
101589	8888539-183	Screw, blower rotor setscrew, 10-32 x 1/4 stl.
94309	8876398-6	Spacer, motor mounting spacer

Stock No.	Drawing No.	Description
50 CYCLE OPERATION - MI-1338-CF, MI-1345-CF		
94285	145285-4	Belt, motor drive (white dot)
215110	8412419-1	Blower, rotor
215619	484379-1	Motor, drive 115 V, 50/60 cycles
204747	148938-3	Pulley, motor drive
94987	8876288-2	Relay, drive motor starting
101589	8888539-183	Screw, blower rotor setscrew
94309	8876398-6	Spacer, motor mounting spacer
96473	145331-3	Rod, belt shifter

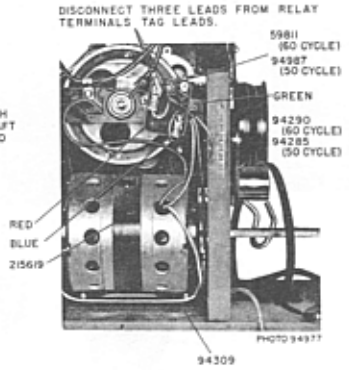
MOTOR AND BLOWER ASSEMBLY

TO REMOVE BLOWER ROTOR AND MOTOR DRIVE PULLEY

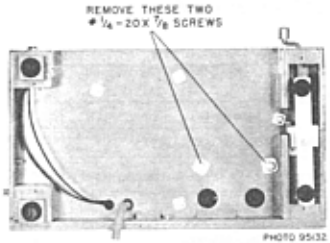


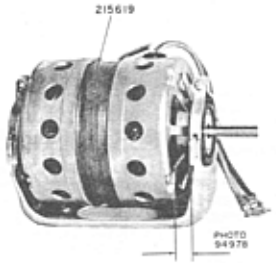
SLIP DRIVE BELT OFF PULLEY. LOOSEN ALLEN SETSCREW AND REMOVE PULLEY FROM SHAFT. WHEN REASSEMBLING ALIGN SETSCREW WITH FLAT SURFACE ON SHAFT. ALIGN THE TWO PULLEY BELT DRIVE SURFACES WITH THOSE OF LARGE PULLEY IMMEDIATELY ABOVE. WHEN REINSTALLING DRIVE BELT, PLACE RUBBER SIDE OF BELT AGAINST PULLEY.

TO DISCONNECT MOTOR



TO REMOVE MOTOR FROM WOOD BASE





IF MOTOR MOUNTING BRACKET IS REMOVED, REASSEMBLE WITH SHORT DIMENSION AT THIS END. SEE PAGE 14, PHOTOGRAPH NO. 70272 FOR MOTOR SHAFT LOCATING DIMENSION WHEN REASSEMBLING.

PULLEY (LARGE), DRIVE SHAFT AND WORM GEAR ASSEMBLIES

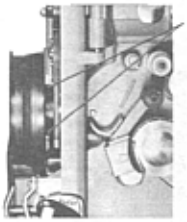


PHOTO 94985

TO REMOVE LARGE DRIVE PULLEY, LOOSEN ALLEN SCREWS ABOUT 3 TURNS.

59860 RETAINING SCREW FOR DRIVE SHAFT BEARING

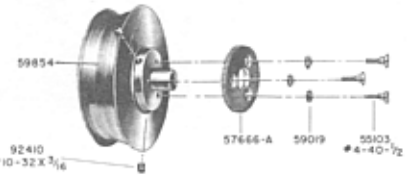
BE SURE POINT OF RETAINING SCREW ENTERS HOLE IN SHAFT BUSHING. MAKE CERTAIN THAT WORM SHAFT DOES NOT BIND AFTER RETAINING SCREW IS TIGHTENED.

PHOTO 94996

TO REINSTALL PULLEY, HOLD LOWER SPROCKET IN EXTREME COUNTERCLOCKWISE POSITION TO TAKE UP END PLAY IN PULLEY SHAFT. AFTER REINSTALLING PULLEY THERE SHOULD BE .003 END PLAY AFTER SETSCREWS ARE TIGHTENED. USE A THICKNESS GAUGE.

BE SURE TO REPLACE BOTH 5/16 THRUST WASHERS

BE CAREFUL TO REASSEMBLE STEEL WASHER BETWEEN BRONZE WASHER AND SHAFT BUSHING.



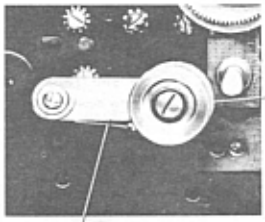
WORM GEAR ASSEMBLY

PHOTO 8705

PARTS

Stock No.	Drawing No.	Description
PULLEY (LARGE), DRIVE SHAFT AND WORM GEAR ASSEMBLIES		
207312	8874353-2	Bearing, drive shaft (includes 59860 retaining screw)
56240	877803-3	Bearing, pulley thrust
59019	182882-4	Bushing, gear mounting bushing, rubber
57666-A	147771-1	Gear, drive pulley gear (nylon)
59854	148380-1	Pulley, large drive pulley only
59860	8877233-1	Screw, shaft bearing retaining screw
92410	8888539-182	Screw, pulley setscrew, 10-32 x 3/16, SH
55103	8872159-1	Screw, shoulder, gear, 4-40 x 1/2
215663	8412598-501	Shaft, drive shaft and worm gear assembly
58684	286391-27	Washer, drive shaft thrust washer

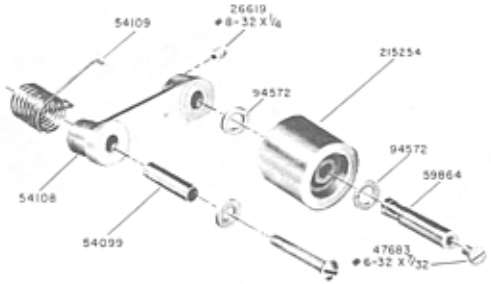
DRIVE BELT IDLER ROLLER ASSEMBLY



70274

HOLD END-PLAY OF ROLLER TO MINIMUM

CORRECT POSITION OF IDLER ROLLER, BELT REMOVED. IF INCORRECT, ADJUST BY BENDING THIS SPRING

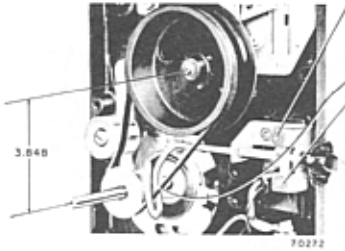


PARTS

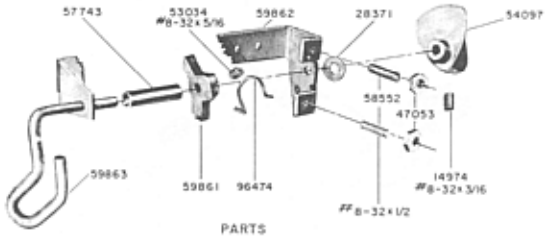
Stock No.	Drawing No.	Description
DRIVE BELT IDLER ROLLER ASSEMBLY		
54108	8853592-1	Arm, idler roller
215254	8928699-501	Roller, idler roller and bushing assembly
26619	8888539-143	Screw, roller arm setscrew, 8-32 x 1/4
47683	182812-2	Screw, roller shaft
59864	8853597-2	Shaft, idler roller
54099	8887098-14	Spacer, idler arm
54109	8853593-1	Spring, idler roller arm
94572	868561-6	Washer, roller

BELT SHIFTER ASSEMBLY
(SPEED CHANGER)

TO ADJUST BELT SHIFTER



1. WITH SPEED CONTROL UP IN SILENT POSITION, LOOSEN THIS NUT AND ADJUST SCREW TO RIGHT OR LEFT UNTIL BELT DOES NOT RUB EITHER SIDE OF BELT SHIFTER ARM. TIGHTEN LOCK-NUT.
2. MOVE SPEED CONTROL DOWN TO SOUND SPEED POSITION AND REPEAT ABOVE ADJUSTMENT OF LOWER SET SCREW.
3. BELT MUST NOT RUB AGAINST SHIFTER ROD IN ANY POSITION.



PARTS

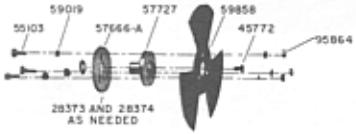
Stock No.	*Description*	*Drawing No.*
	BELT SHIFTER ASSEMBLY	
59861	8876701-1	Arm, shifter rod stop
59862	145332-2	Bracket, shifter rod
57743	8876293-1	Collar, shift rod spacer
54097	148366-501	Knob, shift
47053	57435-105	Nut, stop screw
59863	145331-2	Rod, belt shifter, 4-7/8" long
14974	8888539-142	Screw, shift knob setscrew, 8-32 x 3/16
53034	8888539-144	Screw, stop arm setscrew, 8-32 x 5/16
58552	56442-108	Screw, stop, 8-32 x 1/2
96474	184300-5	Spring, shift rod "C" spring
28371	82278-106	Washer, shift rod, No. 10

SHUTTER ASSEMBLY

TO REMOVE SHUTTER ASSEMBLY TAKE OUT THIS SCREW.

TO DISASSEMBLE SHUTTER ASSEMBLY

1. REMOVE SHUTTER ASSEMBLY.
2. REMOVE THE 3 NUTS AND WASHERS
3. UNSCREW SCREWS AT BACK.
4. DO NOT MISPLACE SHIM, THRUST WASHERS IF ANY ON SHUTTER SHAFT.



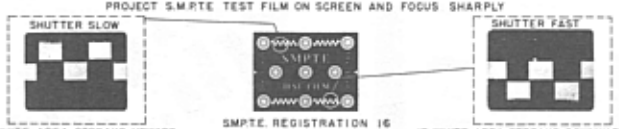
TO INSTALL SHUTTER ASSEMBLY

1. LINE UP MARK ON CAM GEAR WITH ANY ONE OF THREE HOLES IN SHUTTER GEAR. ALIGN THE GEARS AT THE POINT OF QUIETEST OPERATION.
2. INSTALL SHUTTER SO THAT DOTS ON CAM AND SHUTTER GEARS CAN BE SEEN THROUGH SLOT IN SHUTTER.

ADJUSTING SHUTTER

WHITE STREAKS OF LIGHT ABOVE OR BELOW WHITE AREAS ON BLACK BACKGROUND ARE GENERALLY REFERRED TO AS "TRAVEL GHOST." A FIVE FOOT LOOP OF TITLE FILM WITH TRANSPARENT LETTERS ON A BLACK BACKGROUND MAKES A HANDY TEST FILM FOR CHECKING "TRAVEL GHOST."

PROJECT S.M.P.T.E. TEST FILM ON SCREEN AND FOCUS SHARPLY



IF WHITE AREA STREAKS UPWARD, LOOSEN 3 NUTS HOLDING SHUTTER AND MOVE SHUTTER SLIGHTLY CLOCKWISE.

SMPTE REGISTRATION 16 TEST FILM

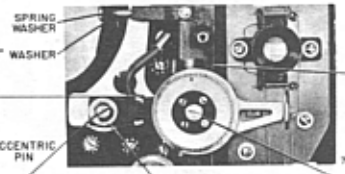
IF WHITE AREA STREAKS DOWNWARD, MOVE SHUTTER SLIGHTLY COUNTERCLOCKWISE. WHEN CORRECTLY ADJUSTED ANY TENDENCY TO "TRAVEL GHOST" SHOULD BE EVENLY BALANCED TOP AND BOTTOM.

PARTS

Stock No.	*Drawing No.*	*Description*
		SHUTTER ASSEMBLY
59019	182882-4	Bushing, shutter gear, rubber
57727	8874324-502	Flange, shutter flange and bushing assembly
57666-A	147771-1	Gear, shutter, nylon
95864	57435-103	Nut, shutter mounting, 4-40 hex
55103	8872159-1	Screw, shutter gear mounting, shoulder
45772	182812-1	Screw, shutter assembly retaining
59858	8852431-2	Shutter, 70° blade
28374	286391-34	Washer, .003" thick for adjusting
28373	286391-33	Washer, .002" thick shutter, gear, cam and gear assemblies

INTERMITTENT MECHANISM CLAW ASSEMBLY

TO REMOVE INTERMITTENT MECHANISM



1. SPREAD THIS BAND AND REMOVE WICK

2. REMOVE "C" WASHER, FLAT WASHER AND SPRING. (DO NOT TURN SLOTTED ECCENTRIC PIN.) (DURING REASSEMBLY MAKE SURE #59868 SPRING PASSES FREELY THROUGH INSERT AND FELT PADS AND THAT END OF ROUND OIL WICK DOES NOT EXTEND UNDER IN AND OUT CAM.)

3. REMOVE THIS LEFT-HAND THREADED SCREW BY TURNING CLOCKWISE.

4. PULL OFF CAM GEAR ASSEMBLY. DO NOT LOSE 3/16 DIA. BALL FOR THRUST SPRING LOCATED IN COUNTERSUNK HOLE IN BACK PLATE.

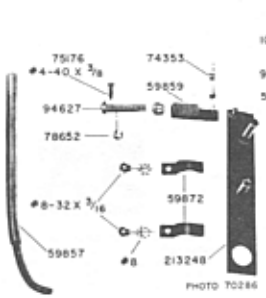


PHOTO 70286

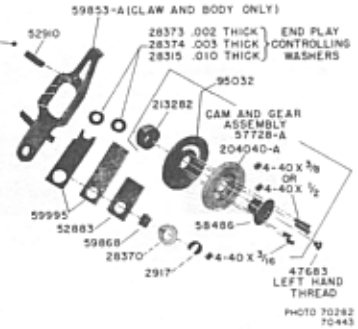


PHOTO 70282
70443

NOTE PROPER ASSEMBLY OF TWO OIL PADS. CAM FOLLOWER PLATES MUST BE PERFECTLY SMOOTH. NOISY OPERATION OF INTERMITTENT WILL RESULT IF RAIL SPRING HAS LOST ITS TENSION. DO NOT ATTEMPT TO BEND TO GIVE MORE TENSION, REPLACE #52882 SPRING.

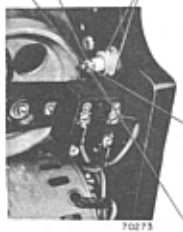
CAM SURFACE MUST BE PERFECTLY SMOOTH.

PARTS

Stock No.	*Drawing No.*	*Description*
	INTERMITTENT MECHANISM AND CLAW ASSEMBLY	
10129	76757-B	Ball, claw thrust spring ball, 3/16" dia.
57728-A	147807-501	Cam, cam and gear assembly
213282	892640I-1	Cam, intermittent up-down cam
95032	147825-1	Cam, intermittent in-out cam
59853-A	173066-504	Claw, intermittent claw and bushing assembly
58486	188557-501	Bushing, intermittent cam and gear
204040-A	147771-4	Gear, cam assembly gear only, nylon laminate
94566	146860-2	Gauge, claw protrusion gauge
94565	8877523-1	Gauge, claw travel gauge
59859	8876086-1	Link, gear plate adjusting link
52883	8852696-2	Pad, intermittent oil pad, outer
59995	8852696-1	Pad, oil and insert, long
59857	8876081-502	Pipe, intermittent oil pipe assembly
213248	8410108-501	Plate, intermittent gear plate
57729	8874821-1	Plate, cam follower - up-down - plate
47683	182812-2	Screw, cam and gear assembly retaining screw
94627	8876388-1	Screw, gear plate adj. screw, 10-32 x 1/8 special
75176	57474-159	Screw, adj. screw lock screw, 4-40 x 3/8"
94818	8851479-2	Spring, cam follower plate spring
52910	8853059-1	Spring, in and out claw, thrust
59872	8876089-1	Spring, gear plate clamp spring
28373	286391-33	Washer, .002" thick for adj. shutter, gear cam & gear assy.
28374	286391-34	Washer, .003" thick for adj. shutter, gear cam & gear assy.
74353	61933-5	Washer, link retaining "C" washer
78652	60503-3	Washer, adj. screw "C" washer
59868	8853059-11	Spring, eccentric pin coil spring
2917	61933-1	Washer, eccentric pin spring washer tension

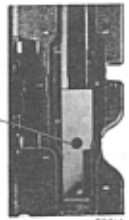
INTERMITTENT CLAW ASSEMBLY ADJUSTMENTS

ADJUSTING CLAW PROTRUSION THROUGH APERTURE PLATE



70273

94987


70514

1. TURN FRAMING KNOB SO THAT SPACE BETWEEN BLOCK AND STOP-NUTS IS EQUAL ON BOTH SIDES.

3. PLACE PROTRUSION GAUGE 94566 ON APERTURE PLATE AS SHOWN, (WITH WORD "HIT" VISIBLE). IF PROTRUSION GAUGE IS NOT AVAILABLE USE THICK SIDE OF CLAW TRAVEL GAUGE 94565.

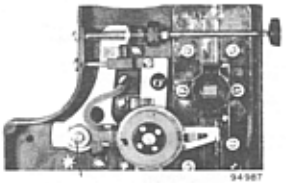
7. PUSH IN ON ECCENTRIC PIN AND SIMULTANEOUSLY TURN ALLEN HEAD ADJUSTMENT SCREW - ITEM 4 - COUNTERCLOCKWISE UNTIL PROTRUSION GAUGE 94566 DOES NOT HIT CLAW TEETH WHEN SLID PAST CLAW. THEN TURN ADJUSTMENT SCREW CLOCKWISE UNTIL GAUGE JUST HITS CLAW TEETH. LOCK ONE SETSCREW - ITEM 6. TURN GAUGE AROUND EXPOSING WORD "CLEAR" AND SLIDE GAUGE PAST CLAW. WHEN CORRECTLY ADJUSTED CLAW TEETH WILL CLEAR THE GAUGE.

8. TIGHTEN LOCKNUT AND BOTH SETSCREWS SECURELY.

ADJUSTING CLAW LATERAL POSITION IN APERTURE PLATE

1. INSERT EDGE OF CLAW TRAVEL GAUGE 94565 BETWEEN CLAW AND FIXED FILM GUIDE.

2. REPEAT "CLAW PROTRUSION" ADJUSTMENTS 1, 2 AND 6 (ABOVE)


94987

3. TURN ECCENTRIC PIN COUNTERCLOCKWISE UNTIL CLAW PRESSES FIRMLY AGAINST GAUGE TO INSURE EXACT ADJUSTMENT USE A SCREWDRIVER LARGE ENOUGH TO FIT SNUGLY IN ECCENTRIC PIN SLOT.

4. TURN ECCENTRIC PIN SLOWLY CLOCKWISE UNTIL CLAW GAUGE JUST DROPS OUT BY ITS OWN WEIGHT.

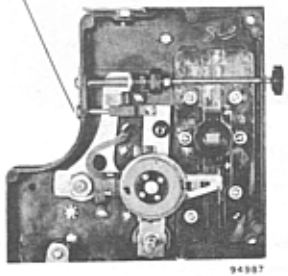
5. MAKE SURE THAT ECCENTRIC PIN IS PUSHED IN ALL THE WAY AND TIGHTEN ALLEN SETSCREWS ON BACK.

CLAW TRAVEL ADJUSTMENT

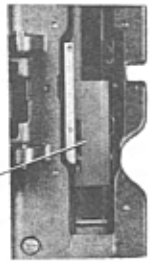
(UP-DOWN EXCURSION IN APERTURE PLATE)

1. REPEAT CLAW PROTRUSION ADJUSTMENT NUMBER ONE.

2. LOOSEN SETSCREW ON BACK AND TURN SCREW COUNTERCLOCKWISE UNTIL GEAR PLATE CORNER TOUCHES APERTURE PLATE.


94987

3. WITH CLAW AT TOP-START OF PULL DOWN TRAVEL - PLACE CLAW GAUGE 94566 FLAT ON APERTURE PLATE AS SHOWN.


70284

4. SLOWLY ROTATE CAM GEAR COUNTERCLOCKWISE ONE COMPLETE REVOLUTION. (ONE COMPLETE CLAW EXCURSION).

5. WHEN CLAW COMES THROUGH APERTURE PLATE AT START OF SECOND PULL DOWN IT WILL PUSH GAUGE AWAY FROM APERTURE PLATE. (OBSERVE THIS ACTION CLOSELY.)

6. TURN SCREW - STEP "2" ABOVE - CLOCKWISE ONE TURN - THIS LENGTHENS CLAW TRAVEL .002 INCH.

7. REPEAT STEPS 4, 5 AND 6 UNTIL CLAW DOES NOT PUSH GAUGE AWAY FROM PLATE. DO NOT TURN SCREW MORE THAN ONE TURN AT A TIME.

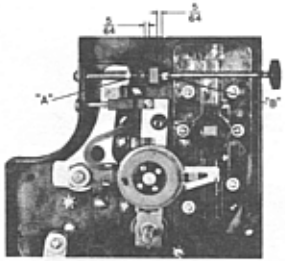
8. CHECK FOR TRAVEL GHOST AND ADJUST SHUTTER AS NECESSARY.

9. AFTER THE ABOVE ADJUSTMENTS HAVE BEEN MADE, AND FOR REFERENCE PURPOSE, SCRIBE A LINE ALONGSIDE OF GEAR.

FRAMING DEVICE ASSEMBLY

TO ADJUST FRAMING DEVICE

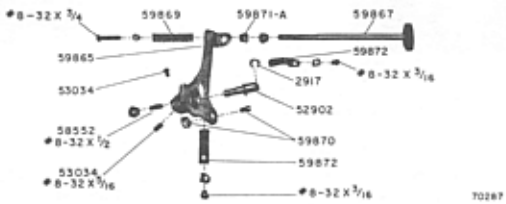
1. WITH THE AID OF A MAGNIFYING GLASS, SELECT A PIECE OF FILM ON WHICH THE TOP AND BOTTOM EDGES OF ADJACENT PICTURES ARE EQUALLY SPACED FROM THE CENTER OF THE SPROCKET HOLE AS SHOWN IN ILLUSTRATION BELOW.



2. PROJECT AND FOCUS PICTURE ON SCREEN.

3. TURN FRAMING KNOB UNTIL PICTURE IS CENTERED ON SCREEN VERTICALLY.

4. HOLD FRAMING KNOB TO PREVENT TURNING AND WITH SUITABLE WRENCH ROTATE NUTS "A" AND "B" TO OBTAIN SPACING CALLED FOR IN ILLUSTRATION ABOVE.

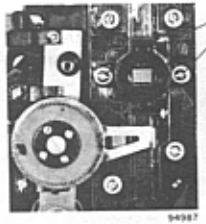


PARTS

Stock No.	Drawing No.	Description
		FRAMING DEVICE ASSEMBLY
2917	61933-1	Washer, "C" for eccentric & framing arm pivot pin
59865	8876231-501	Arm, framing arm and bushing assembly
52902	8851762-1	Eccentric, claw eccentric pivot pin
59871-A	486019-6	Nut, framing arm shaft stop nut, 10-32
58552	56442-108	Screw, eccentric pin adjusting screw, 8-32 x 1/2
53034	8888539-144	Screw, framing arm bushing setscrew
59870	8876083-1	Screw, framing arm pivot screw and nut
59867	148367-501	Shaft, framing shaft and knob assembly
59869	8853059-10	Spring, framing arm tension spring
59872	8876089-1	Spring, framing arm clamp spring

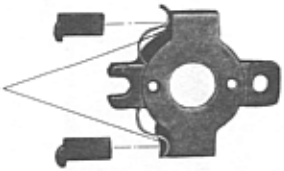
APERTURE PLATE ASSEMBLY

TO REPLACE SIDE PRESSURE SHOES



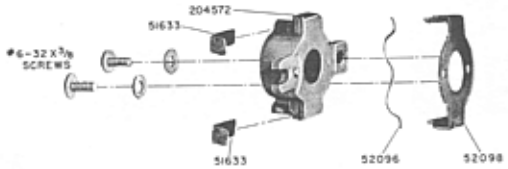
REMOVE THESE TWO SCREWS TO REMOVE FLARE ASSEMBLY.

2. SLIP SHOES FROM UNDER SPRING AND OUT OF SLOTS.



SIDE PRESSURE SHOES SHOULD BE REPLACED IF EVIDENCE OF GROOVING IS APPARENT. MOVEMENT OF NEW SHOES SHOULD BE PERFECTLY FREE IN A HORIZONTAL PLANE, WITH SHOE SPRING EXERTING AN EVEN PRESSURE.

FLARE ASSEMBLY

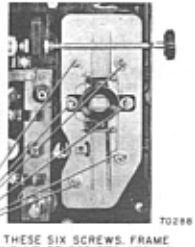


PARTS

Stock No.	Drawing No.	Description
		APERTURE PLATE
52098	188807-1	Clip, light flare
204572	142537-2	Flare, light
51642	189436-1	Guide, film guide, stationary
53017	143663-501	Plate, aperture plate & rail assembly
38605	57454-205	Screw, film guide, 4-40 x 1/4, RH
51633	187598-1	Shoe, side pressure
52096	8878903-1	Spring, side pressure shoe

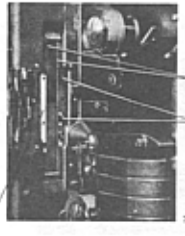
APERTURE PLATE ASSEMBLY

TO REMOVE APERTURE PLATE



70288

TAKE OUT THESE SIX SCREWS. FRAME CASTING SHOULD BE SCRIBED AROUND OUTLINE OF APERTURE PLATE BEFORE REMOVAL TO FACILITATE RELOCATING IT.



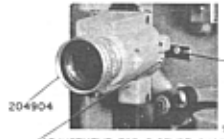
70268

1. INSPECT RAILS FOR EXCESSIVE WEAR.
2. CHECK SIDE SHOES FOR GROOVING AND FREE HORIZONTAL MOVEMENT.

INSPECT FIXED FILM GUIDE FOR GROOVING. IF NECESSARY TO REPLACE, ASSEMBLE NEW FIXED GUIDE SNUGLY AGAINST APERTURE PLATE. PROJECT FILM ON SCREEN—PREFERABLY A TITLE FILM. MOVE FIXED GUIDE SLIGHTLY TOWARDS APERTURE OPENING IF SOUND TRACK IS VISIBLE ON SCREEN. MOVE FIXED GUIDE SLIGHTLY AWAY FROM APERTURE OPENING IF SPROCKET HOLES ARE VISIBLE ON THE SCREEN. MAKE CERTAIN FULL LENGTH OF FIXED GUIDE IS PARALLEL TO RAIL ON APERTURE PLATE BEFORE TIGHTENING TWO HOLDING SCREWS.

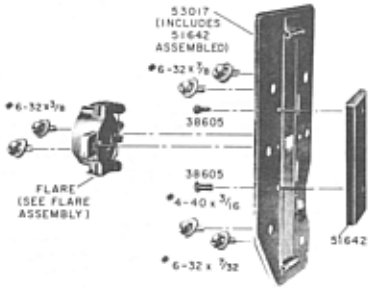
TO REPLACE APERTURE PLATE

PLACE NEW PLATE IN APPROXIMATE CORRECT POSITION AND REPLACE THE SIX HOLDING SCREWS, LEAVING THEM SLIGHTLY LOOSE. CLOSE PICTURE GATE ASSEMBLY AND CAREFULLY CENTER APERTURE IN APERTURE OF FILM SHOE. TIGHTEN THE SIX HOLDING SCREWS. CHECK ALL CLAW ADJUSTMENTS AFTER REPLACING APERTURE PLATE.



ADJUSTMENT FOR PICTURE SHARPNESS

WITH THE AID OF A GOOD TITLE FILM PROJECTED ON THE SCREEN, ADJUST LENS GATE WITH THIS SETSCREW IN ORDER TO OBTAIN EQUAL PICTURE SHARPNESS ON RIGHT AND LEFT SIDE OF SCREEN. READJUST LOCK SPRING IF NECESSARY TO HOLD GATE SECURELY IN CLOSED POSITION.



FILM GATE ASSEMBLY

TO REMOVE FILM GATE

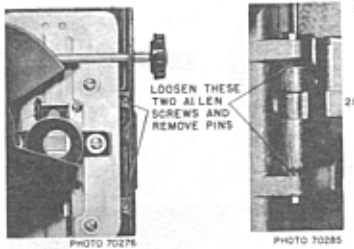
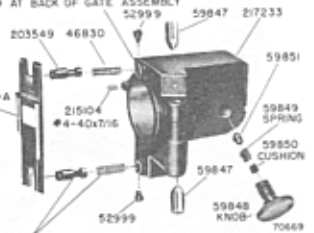


PHOTO 70276 PHOTO 70285

TO REMOVE FILM SHOE ONLY, OPEN GATE AND REMOVE TOP AND BOTTOM SCREW 52999 AT BACK OF GATE ASSEMBLY



CLEAN THESE PARTS AND LUBRICATE WITH ONE DROP OF LIGHT OIL BEFORE REASSEMBLING. FILM SHOE PLUNGERS MUST MOVE IN AND OUT VERY FREELY.

INSPECT FILM RAILS OF SHOE FOR EXCESSIVE WEAR. THEY MUST BE PERFECTLY SMOOTH.

TO RECENTER GATE

1. REPLACE GATE BETWEEN HOLDING PINS 59847
2. REMOVE LENS AND CLOSE GATE
3. CAREFULLY SIGHT THROUGH LENS HOLDING BRACKET AND MOVE GATE ASSEMBLY UP OR DOWN TO LINE UP APERTURE OF FILM SHOE WITH APERTURE OF APERTURE PLATE
4. TIGHTEN PIN-HOLDING ALLEN SETSCREW WHILE SQUEEZING PINS TOGETHER TO AVOID ENDPLAY

NOTE: IF APERTURE PLATE IS NOT IN PLACE ASSEMBLY LENS GATE EQUALLY SPACED BETWEEN HINGE LUGS ON BACK PLATE

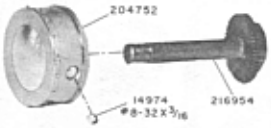
PARTS

Stock No.	*Drawing No.*	*Description*
		FILM GATE AND PROJECTION LENS ASSEMBLY
57928	8874976-1	*Spring, film gate latching
59850	985465-28	Cushion, lens-locking pin cushion
217233	148385-5	Gate, film gate assembly
59848	8875966-1	Knob, lens-locking knob
204904	472146-3	Lens, projection lens
59847	182837-5	Pin, film gate hinge pin
203549	182292-4	Pin, film shoe pin
59851	8876268-1	Pin, lens-locking pin
52999	8850645-1	Screw, shoe pin retaining screw
46830	180444-9	Spring, film shoe spring
59849	8853059-9	Spring, lens-locking pin spring
215092-A	474093-2	Shoe, film shoe
215104	844378-16	Screw, film gate setscrew

* illus. on page 26 (with Guide Roller)

SPROCKET, SHAFT AND GEAR ASSEMBLY
UPPER AND LOWER

PHOTO 70397



SPROCKET SHOE ASSEMBLY

TO REMOVE SHOE ASSEMBLY

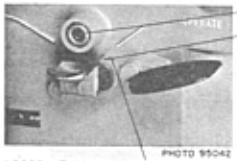


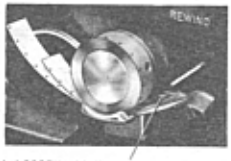
PHOTO 95042

LOOSEN THIS ALLEN SETSCREW AND PULL OUT BRACKET ASSEMBLY

KEEP THIS AREA CLEAN

PHOTO 87049

TO ADJUST SPROCKET SHOE

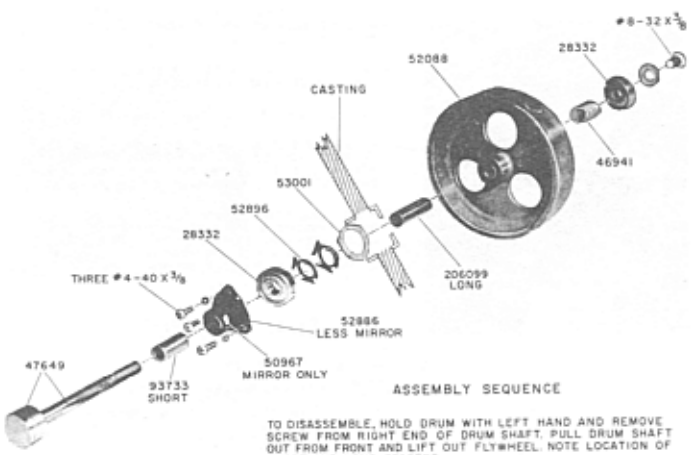


1. LOOSEN ALLEN SETSCREW
2. PLACE TWO THICKNESSES OF FILM BETWEEN SPROCKET AND SHOE
3. PUSH SHOE UP EVEN AND SNUG AGAINST SPROCKET. CENTER SHOE SO THAT IT DOES NOT RUB AGAINST EITHER SIDE OF THE SPROCKET.
4. TIGHTEN ALLEN SETSCREW.

PARTS

Stock No.	*Drawing No.*	*Description*
	SPROCKET, SHAFT AND GEAR ASSEMBLY UPPER AND LOWER	
51613	182051-19	Bushing, upper & lower sprocket shaft
216954	8954274-501	Gear & shaft assembly, upper & lower
14974	8888539-142	Screw, sprocket setscrew, 8-32 x 3/16 stl.
204752	465648-1	Sprocket, film sprocket with setscrew
	SPROCKET SHOE ASSEMBLY	
52874	8850021-503	Bracket, sprocket shoe bracket assembly
204041	8862335-1	Pin, sprocket shoe mounting
92410	8887072-403	Screw, bracket pin set, 10-32 x 3/16
213246	749703-1	Shoe, film sprocket, nylon resin
51655	8850022-1	Spring, film sprocket shoe
204043	93605-6	Washer, "C" shoe pin

DRUM SHAFT, MIRROR BRACKET AND FLYWHEEL ASSEMBLY



ASSEMBLY SEQUENCE

TO DISASSEMBLE, HOLD DRUM WITH LEFT HAND AND REMOVE SCREW FROM RIGHT END OF DRUM SHAFT. PULL DRUM SHAFT OUT FROM FRONT AND LIFT OUT FLYWHEEL. NOTE LOCATION OF SHORT AND LONG SPACERS.

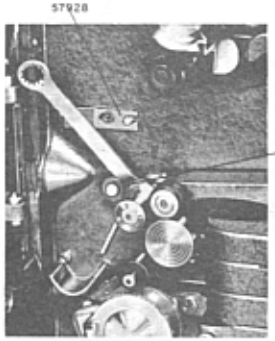
AFTER REASSEMBLY, THE DRUM AND FLYWHEEL SHOULD ROTATE WITH NO EVIDENCE OF ROUGHNESS IN THE BALL-BEARINGS.

PARTS

Stock No.	*Drawing No.*	*Description*
	DRUM SHAFT, MIRROR BRACKET AND FLYWHEEL ASSEMBLY	
28332	8874348-11	Bearing, drum shaft ball bearing
52886	142645-2	Bracket, mirror bracket, less mirror (magnesium)
52088	143768-1	Flywheel, drum shaft
50967	181306-1	Mirror, optical system
53001	8852935-2	Retainer, drum shaft bearing
47649	141135-504	Drum, sound drum and shaft assembly
93733	8876680-1	Spacer, drum shaft spacer, short
206099	8876680-3	Spacer, drum shaft spacer, long
46941	183734-2	Spring, drum shaft coil spring
52896	825283-4	Washer, spring, drum shaft

GUIDE ROLLER ASSEMBLY

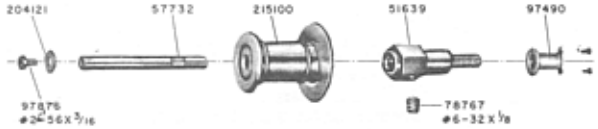
LATERAL ADJUSTMENT OF SOUND TRACK



1. CONNECT SPEAKER AND POWER CORDS TO PROJECTOR – AMPLIFIER.
2. THREAD LOOP OF S.M.P.T.E. Z 22-57-1947 BUZZ TRACK FILM IN PROJECTOR.
3. TURN AMPLIFIER "ON", SET VOLUME CONTROL AT 5.
4. PLACE 5/16" END-WRENCH OVER HEX NUT AT REAR OF GUIDE ROLLER. DO NOT LOOSEN SETSCREW IN THIS NUT. THIS SETSCREW IS ONLY USED TO ADJUST END PLAY-0.002 – WHEN NEW ROLLER IS INSTALLED.
5. START PROJECTOR. TURNING HEX NUT CLOCKWISE WILL PRODUCE A LOW FREQUENCY NOTE. TURNING IT COUNTERCLOCKWISE WILL PRODUCE A HIGH FREQUENCY NOTE. WHEN PROPERLY ADJUSTED NEITHER NOTE WILL BE HEARD.

CLEANING AND LUBRICATING

1. REMOVE PHILLIPS – HEAD SCREW, WASHER AND ROLLER FROM SHAFT
2. CLEAN THE ROLLER WITH CARBON TETRACHLORIDE INSIDE AND OUTSIDE
3. APPLY ONE DROP OF LIGHT OIL TO SHAFT HOLE IN ROLLER



PARTS

Stock No.	Drawing No.	Description
		GUIDE ROLLER ASSEMBLY
97490	8850656-32	Nut, anchor nut for roller shoulder screw
215100	188822-503	Roller, guide roller assembly
51639	189351-1	Screw, shaft shoulder screw
78767	8888539-121	Screw, roller shaft setscrew, 6-32 x 1/8 long
57732	8874872-2	Shaft, guide roller
97876	990072-603	Screw, roller shaft, 2-56 x 3/16 stl.
204121	89799-614	Washer, guide roller

SOUND PRESSURE ROLLER ASSEMBLY

ADJUSTMENT

ROLLER SHOULD JUST LEAVE SOUND DRUM AT AN 8 OZ. PULL. PRESSURE IS CONTROLLED BY SPRING IN BACK OF ROLLER ARM. BEND SPRING TO GIVE CORRECT PRESSURE. TO REMOVE ROLLER ARM, REMOVE THIS SCREW.

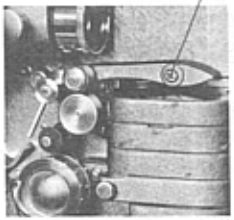


PHOTO 70395

PHOTO 70409

TO REMOVE ROLLER FOR CLEANING, REMOVE SCREW FROM ROLLER. DO NOT LOOSEN SETSCREW. THIS SETSCREW IS USED ONLY TO ADJUST ENDPLAY WHEN A NEW ROLLER IS INSTALLED. ROLLER SHOULD ROTATE FREELY WITH MINIMUM ENDPLAY.

CAUTION:- IF PRESSURE ROLLER FAILS TO ENGAGE SOUND DRUM, PHOTO CELL SHIELD MAY HAVE SPRUNG OUT OF NORMAL POSITION AND BE OBSTRUCTING ROLLER ARM. PUSH SHIELD BACK INTO PLACE.

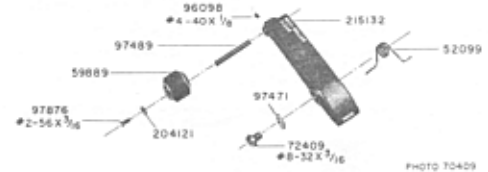


PHOTO 70409

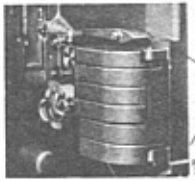
PARTS

Stock No.	Drawing No.	Description
		SOUND PRESSURE ROLLER ARM ASSEMBLY
215132	143189-5	Arm, pressure roller
96098	8888539-1	Screw, roller shaft setscrew, 4-40 x 1/8
72409	82289-403	Screw, roller arm, 8-32 x 3/16
97876	990072-603	Screw, roller retaining screw, 2-56 x 3/16
97489	8875967-1	Shaft, pressure roller
52099	8851714-1	Spring, pressure roller arm
59889	188808-502	Roller, pressure roller assembly
97471	868141-17	Washer, roller arm pivot
204121	89799-614	Washer, roller retaining
52888	188806-3	Stud, pressure roller arm

SOUND OPTICAL BRACKET ASSEMBLY

CENTERING SOUND SCANNING LIGHT BEAM

1. LOOSEN ALLEN SETSCREWS HOLDING OPTICAL BRACKET HINGE PINS ALLOWING SOUND OPTICAL BRACKET TO BE MOVED UP OR DOWN. TO REACH SETSCREWS REMOVE METAL SHIELD.



#14974
TWO #8-32 x 3/16 ALLEN SETSCREWS HOLDING HINGE PINS ARE IMMEDIATELY BEHIND MAIN FRAME AT THESE POINTS.

PHOTO 70268

2. REMOVE FLYWHEEL AND WITHDRAW SOUND DRUM
3. REMOVE MIRROR BRACKET
4. REPLACE SOUND DRUM SHAFT UNTIL IT JUST ENGAGES BACK BEARING
5. TURN AMPLIFIER "ON" AND CLOSE SOUND OPTICAL BRACKET.
6. MOVE COMPLETE OPTICAL BRACKET UP OR DOWN UNTIL ENLARGED IMAGE OF SCANNING LIGHT BEAM IS EXACTLY CENTERED ON DRUM SHAFT – 5/16 DIAMETER. SQUEEZE HINGE PINS TIGHTLY TOGETHER TO AVOID ENDPLAY.

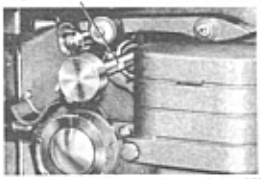


PHOTO 70591

7. RETIGHTEN OPTICAL BRACKET HINGE PIN SETSCREWS
8. REMOVE SOUND DRUM AND REINSTALL MIRROR BRACKET, LEAVING SCREWS SLIGHTLY LOOSE
9. CENTER SCANNING BEAM ON PHOTOCELL CATHODE BY TURNING MIRROR BRACKET TO RIGHT OR LEFT, SO THAT ALL OF THE REFLECTED LIGHT WILL ENTER PHOTOTUBE SHIELD WINDOW
10. TIGHTEN MIRROR BRACKET SCREWS
11. REPLACE SOUND DRUM AND FLYWHEEL

FOCUSING THE SOUND OPTIC AND ADJUSTING ITS AZIMUTH POSITION

THESE TWO ADJUSTMENTS ARE MADE SIMULTANEOUSLY AND ARE CRITICAL, REQUIRING THE USE OF SPECIAL TOOLS AND EQUIPMENT. SEE "TOOLS" (ON "THREADING LAMP" PAGE.)

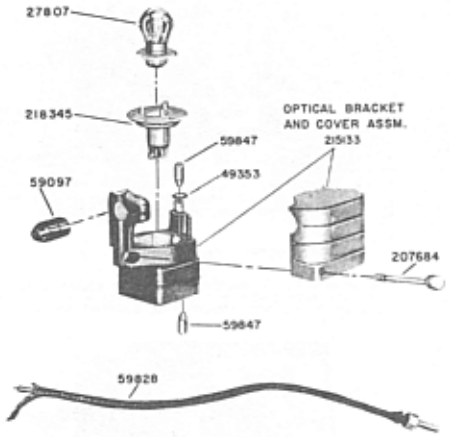
1. THREAD A 5-FT. LOOP OF 5000 CYCLE FREQUENCY FILM (S.M.P.T.E. Z 22.42-1946) IN PROJECTOR, EMULSION SIDE TOWARDS SCREEN.
2. CLIP THE LEADS OF A LOW READING A.C. VOLTMETER ACROSS THE SPEAKER VOICE COIL IN THE SPEAKER CASE, WHICH SHOULD BE ON TEST BENCH.
3. BREAK RCA SEAL IN SOUND OPTIC BRACKET AND LOOSEN SETSCREW JUST SUFFICIENTLY TO PERMIT MOVEMENT OF SOUND OPTIC.

INSERT #49101 FOCUS ADJUSTMENT WRENCH HERE.

INSERT #49108 AZIMUTH ADJUSTMENT PIN HERE

4. INSERT SPECIAL OPTIC ADJUSTMENT TOOLS AS ILLUSTRATED
5. TURN AMPLIFIER "ON". SET VOLUME CONTROL FOR A CONVENIENT METER READING AND START PROJECTOR, TONE CONTROL ON "10"
6. SIMULTANEOUSLY ADJUST OPTIC AZIMUTH (ROTATIONAL) AND FOCAL ADJUSTMENTS FOR MAXIMUM VOLTAGE READING
7. CAREFULLY TIGHTEN OPTIC SETSCREW CHECKING METER THAT OUTPUT DOES NOT DROP, WHICH WOULD INDICATE A CHANGE OF OPTIC ADJUSTMENT.
8. RESEAL OPTIC SETSCREW WITH SEALING WAX.

SOUND OPTICAL BRACKET



PARTS

Stock No.	*Drawing No.*	*Description*
	SOUND OPTICAL BRACKET ASSEMBLY	
215133	8876200-504	Cover, optical bracket & cover assembly
59828	144252-3	Cable, exciter lamp, single contact
59097	174619-1	Optical, Sound Unit
27807	180599-2	Lamp, exciter
59847	182837-5	Pin, optical bracket pivot pin
207684	185794-6	Screw, exciter lamp cover thumbscrew
14974	8888539-142	Screw, set hinge pin, 8-32 x 3/16
218345	8976903-1	Socket, exciter lamp
49353	286391-21	Washer, bracket shaft
49101	185142-501	Wrench, sound optical focusing wrench
49108	180001-9	Pin, sound optical azimuth adjusting wrench

PHOTOTUBE BRACKET ASSEMBLY

THE PHOTOTUBE IS HELD IN PLACE IN ITS BRACKET BY A SPRING CONTACTOR PRESSING DOWN FROM THE TOP

TO REMOVE PHOTOTUBE

1. TURN OFF POWER
2. RAISE THE SOUND PRESSURE ROLLER; INSERT A SMALL SCREWDRIVER IN WINDOW IN PHOTOTUBE COVER AND PULL OUTWARD.
3. HOLD PHOTOTUBE ENVELOPE WITH LEFT HAND.

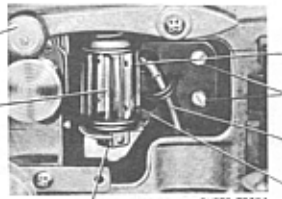
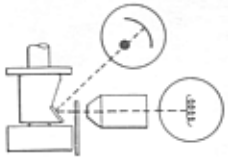


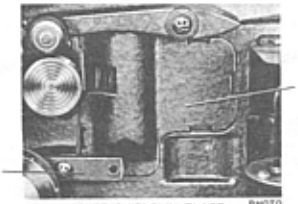
PHOTO 70394



4. WITH RIGHT FOREFINGER, PRESS UP ON SQUARE BASE CONTACTOR AND LIFT PHOTOTUBE OUT TO THE RIGHT. NOTE POSITION OF PHOTOTUBE CATHODE WHEN PHOTOTUBE IS CORRECTLY INSTALLED.

TO INSTALL PHOTOTUBE

PRESS UPPER SPRING CONTACTOR UP WITH TOP OF PHOTOTUBE AND SLIP SQUARE BASE CONTACTOR INTO POSITION IN ITS RECEPTACLE. REPLACE TUBE COVER BY PRESSING FIRMLY INTO PLACE MAKING SURE IT DOES NOT INTERFERE WITH OPERATION OF PRESSURE ROLLER ARM. CORRECT POSITION OF PHOTOTUBE CATHODE IS SHOWN IN ILLUSTRATION ABOVE.



COVER SHIELD IN PLACE PHOTO 70393

PARTS

Stock No.	Drawing No.	Description
	PHOTOTUBE BRACKET ASSEMBLY	
59829	144766-1	Bracket, phototube bracket assembly, includes clip and rivet
31048	82373-4	Connector, male 2 contact
59830	148415-501	Cable, shielded phototube
215134	173080-4	Cover, phototube
29407	57456-107	Screw, bracket mounting, phototube
215130	8850647-3	Plate, optical bracket

TENSION ROLLER ASSEMBLY

THIS ROLLER CONTROLS "FLUTTER AND WOW" (HIGH AND LOW FREQUENCY SOUND VARIATIONS) THE ROLLER AND ARM ARE HELD IN CORRECT POSITION BY A SHAFT ATTACHED TO A FLAT SPRING BEARING AGAINST A FELT PAD LOCATED IMMEDIATELY BEHIND THE CASTING THROUGH WHICH THE ARM SHAFT PASSES. IT IS REACHED THROUGH THE REAR OF THE PROJECTOR.

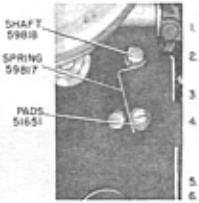
TO ADJUST TENSION ROLLER

1. LOOSEN THIS ALLEN SETSCREW
2. HOLD ARM UP AGAINST STOP
3. RETIGHTEN SET-SCREW

WHEN CORRECTLY ADJUSTED, FILM IN MOTION WILL BE APPROX. HORIZONTAL LEAVING SOUND DRUM

"A" PHOTO 70396

TO REPLACE SPRING 59817



"B" PHOTO 70392

1. LOOSEN ALLEN SET-SCREW (FIG."A")
2. PULL OUT SPRING AND SHAFT WITH LONG NOSE PLIERS
3. INSTALL NEW SPRING ON SHAFT ASSEMBLY
4. HOLD WITH PLIERS AND CAREFULLY GUIDE FLAT SPRING AGAINST FELT PAD AND INTO CASTING HOLE
5. PUSH FIRMLY INTO PLACE
6. ADJUST TENSION ARM, FIG."A"

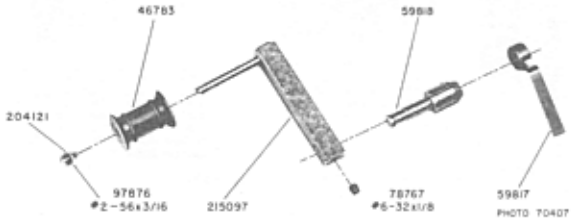
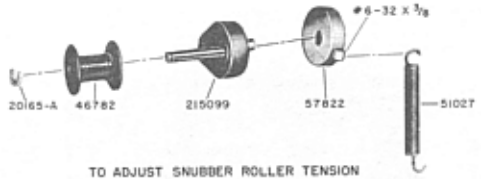


PHOTO 70407

PARTS

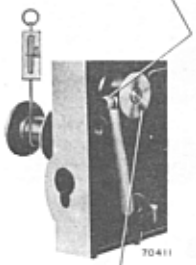
Stock No.	Drawing No.	Description
	TENSION ROLLER ASSEMBLY	
215097	189898-503	Arm, tension roller arm and shaft assembly
51651	189915-1	Pad, tension roller spring
46783	182370-1	Roller, tension
97876	990072-603	Screw, roller shaft 2-56 x 3/16" lg.
59817	8876294-1	Spring, roller arm shaft
59818	8876292-1	Shaft, roller arm
78767	8888539-121	Screw, set, roller arm shaft 6-32 x 1/8" lg.
204121	89799-614	Washer, guide roller

SNUBBER ROLLER ASSEMBLY

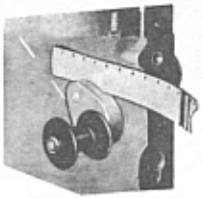


TO ADJUST SNUBBER ROLLER TENSION

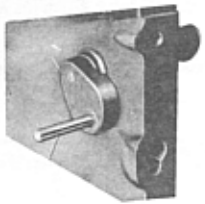
1. LOOSEN THIS SET SCREW



2. ROTATE COLLAR (WHICH CONTROLS SPRING TENSION) UNTIL A POSTAL SCALE, HOOKED OVER SNUBBER ROLLER, INDICATES A PULL OF 17 TO 18 OUNCES TO RAISE IT OFF ITS STOP



3. INSERT 3 THICKNESS OF FILM BETWEEN ROLLER ARM AND FRAME TO ADJUST END-PLAY.



IF ROLLER STICKS OR SQUEAKS REMOVE 20165-A RETAINING WASHER AND 46782 ROLLER AND POLISH THIS SHAFT. LUBRICATE BY RUBBING WITH SOFT LEAD PENCIL OR MICROFINE GRAPHITE. CLEAN SHAFT HOLE IN ROLLER.

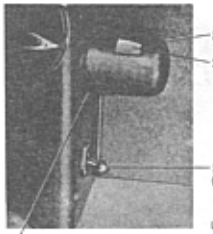
4. BEFORE TIGHTENING COLLAR SET SCREW, PRESS COLLAR AND ROLLER ARM SNUG AGAINST FRAME. FILM STRIPS WILL SUPPLY CORRECT END PLAY SPACING (.015 TO .020). ARM MUST ROTATE FREELY. SNUBBER ROLLER SHOULD ROTATE FREELY WHEN FILM IS IN MOTION.

PARTS

Stock No.	*Drawing No.*	*Description*
	SNUBBER ROLLER ASSEMBLY	
215099	189841-504	Arm, snubber roller arm and shaft assembly
57822	8874709-1	Collar, snubber arm tension spring
46782	182370-2	Roller, snubber
51027	189850-1	Spring, snubber roller arm
20165-A	60503-3	Washer, "C" snubber roller, retaining

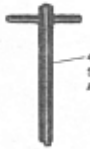
THREADING LAMP ASSEMBLY AND TOOLS

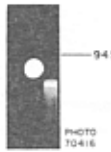
THREADING LAMP



TO REPLACE LAMP, SQUEEZE SIDES OF SHIELD NEAR BASE AND PULL OUT. UNSCREW LAMP

TOOLS (SERVICE)





CLAW PROTRUSION GAUGE

CLAW TRAVEL GAUGE

PARTS

Stock No.	*Drawing No.*	*Description*
	THREADING LAMP FOR MI-1338-C, -CF	
36728	849546-2	Lamp, threading
207305	983541-7	Nut, speed nut for threading lamp socket
215108	8874766-2	Shield, threading lamp
59852	8876217-1	Socket, threading lamp
28322	8976882-1	Switch, threading lamp
59813	8872221-40	Plug button, tumbler switch hole MI-1345-C only
	TOOLS (SERVICE)	
49237	184682-2	Brush, aperture plate, cleaning
94565	8877523-1	Gauge, claw travel
94566	146860-2	Gauge, claw protrusion
49108	180001-9	Pin, sound optical azimuth, adj. wrench
49101	185142-501	Wrench, sound optical focusing wrench

TAKEUP AND REWIND MECHANISM

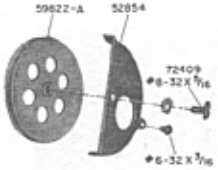
"OPERATE"—"REWIND"

TO DISASSEMBLE

REMOVE THESE FOUR SCREWS TO REMOVE BELT GUARDS, LARGE PULLEY GUARD AND PULLEY.

REMOVE 3 SHIELD MTG. SCREWS

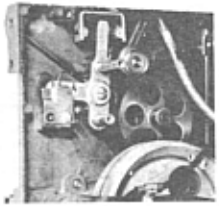
LARGE PULLEY AND GUARD REMOVED. PULLEY MUST ROTATE FREELY AFTER ASSEMBLY.



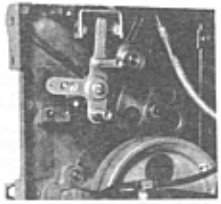
SPRING BELTS

215671 LOWER

215670 UPPER

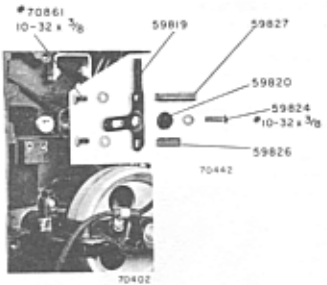


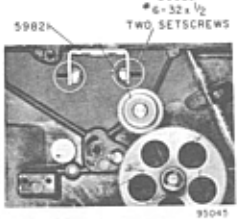
REMOVE SMALL PULLEY AND GEAR ASSEMBLY. PULLEY MUST ROTATE FREELY AFTER ASSEMBLY.



REMOVE SPRINGS AND BRACKET.

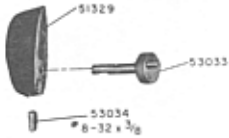
TAKEUP AND REWIND MECHANISM

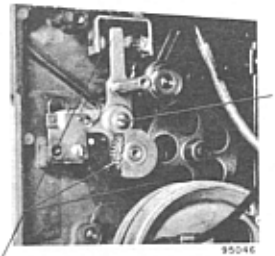




#6 BRISTO WRENCH FOR SETSCREWS 59825

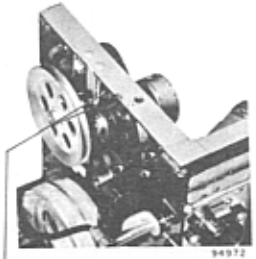
WHEN ASSEMBLING KNOB ALLOW TWO THICKNESSES OF FILM BETWEEN MAIN FRAME AND KNOB





TAKEUP REWIND BRACKET MUST MOVE FREELY WHEN THIS SCREW IS TIGHTENED

WITH SHIFT KNOB IN "OPERATE" POSITION, ADJUST THIS SCREW TO ALLOW A SMALL AMOUNT OF BACKLASH BETWEEN THESE TWO GEARS



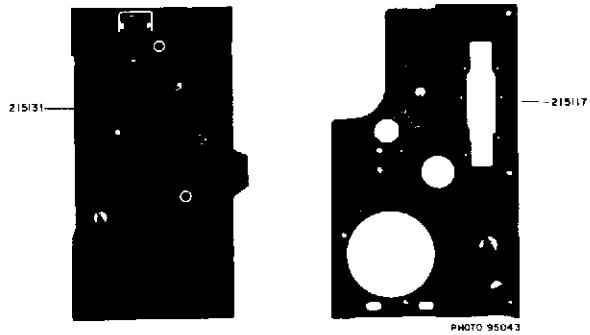
WITH SHIFT KNOB IN "REWIND" POSITION, ADJUST THIS SCREW TO ALLOW A SMALL AMOUNT OF BACKLASH BETWEEN THIS GEAR AND LARGE PULLEY GEAR

AN ADDITIONAL HALF-TURN "IN" OF THE ADJUSTING SCREWS AFTER THE GEARS JUST BECOME FREE WILL PROVIDE THE CORRECT BACKLASH

PARTS

Stock No.	Drawing No.	Description
	TAKEUP AND REWIND ASSEMBLY	
59819	8854540-2	Arm, pulley shift
215670	184261-8	Belt, rewind spring belt, upper
215671	184261-9	Belt, take-up spring belt, lower
59820	8876298-1	Bearing, pulley arm, oilite
59821	8876234-501	Bracket, arm stop bracket assembly
204321	184536-503	Guard, assembly small pulley
52854	8850527-2	Guard, large pulley
57663	147035-2	Guard, belt, lower section
57664	147036-2	Guard, belt, upper section
52329	142738-501	Knob, take-up & rewind, shift
204060	187555-2	Plate, take-up & rewind
59822-A	184307-504	Pulley, and gear asseably, large
59823-A	8853177-504	Pulley, and gear assembly, small
59824	57460-115	Screw, pulley arm, shoulder
53033	184291-503	Shaft, shift knob and pin assembly
54051	184300-3	Spring, take-up and rewind bracket
53034	8888539-144	Screw, shift knob, S.S.
59825	189195-16	Screw, stop bracket adj. 6-32 x 1/2" lg.
59826	8876222-1	Shaft, stud, small pulley, 0.700" lg.
59827	8876222-2	Shaft, large pulley, 1.22" lg.
70861	90445-105	Screw, pulley stud
72409	990318-107	Screw, pulley

MAIN FRAME AND BACK PLATE

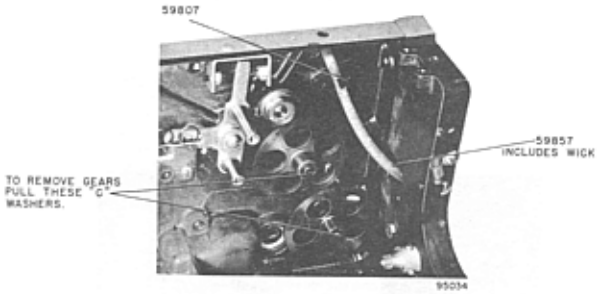


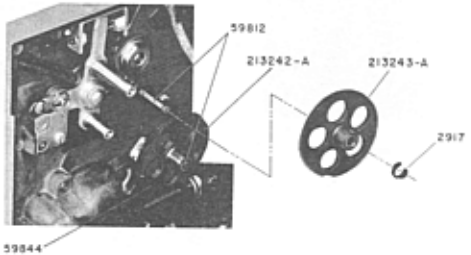
MAIN FRAME BACK PLATE

PARTS

Stock No.	Drawing No.	Description
	MAIN FRAME AND BACK PLATE	
215131	175461-504	Frame, main frame assembly with shafts and oilite bearings
215117	166545-2	Plate, back

IDLER GEAR ASSEMBLIES, UPPER AND LOWER

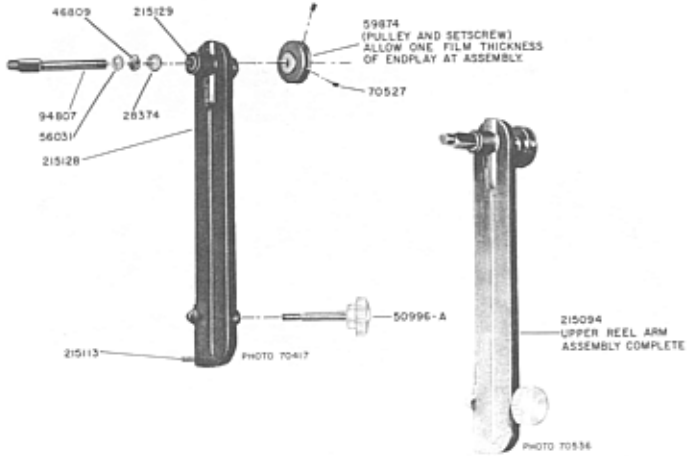




PARTS

Stock No.	Drawing No.	Description
		IDLER GEAR ASSEMBLIES
213242-A	177687-501	Gear, idler gear powder iron lower
213243-A	177687-502	Gear, idler gear powder iron upper
59807	990502-8	Nut, oil pipe speed nut
59857	8876081-502	Pipe, oil pipe (includes wick)
59812	8875968-1	Shaft, upper and lower idler gear shaft
2917	61933-1	Washer, idler gear, spring

REEL ARM ASSEMBLY, UPPER

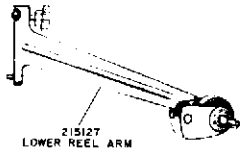


PARTS

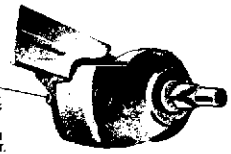
Stock No.	Drawing No.	Description
		REEL ARM – UPPER
215113	184720-70	Pin, groove, upper reel arm,positioning
215094	148300-503	Arm, upper reel arm, complete
215128	8875945-502	Arm, upper reel arm, with bushing and pin assembly
215129	8876243-3	Bushing, upper reel arm
59874	8875943-1	Pulley, drive and setscrew
70527	8888539-122	Screw, pulley setscrew, 6-32 x 3/16" lg. cup point
50996-A	8434454-2	Screw, upper reel arm thumb screw
94807	185986-506	Shaft, reel shaft assembly, upper
56031	899534-32	Washer, 1/2" OD x 1/4" ID x 0.20 thick
28374	286391-45	Washer, flat, 1/2" OD x 1/4" IDX .002 thick
46809	183750-1	Washer, spring, 7/16" OD x 1/4" IDX .0065 thick

REEL ARM ASSEMBLY (LOWER)

TO SERVICE LOWER REEL ARM ASSEMBLY



215127
LOWER REEL ARM
ASSEMBLY COMPLETE

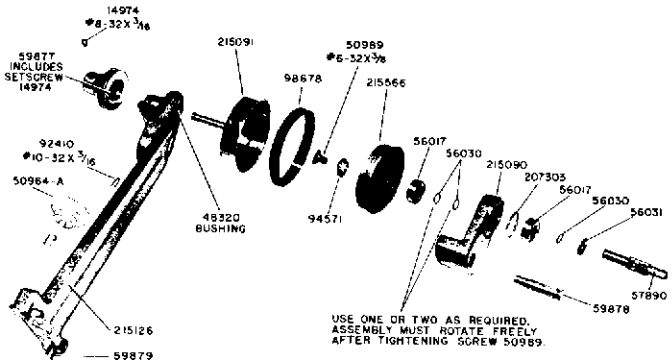


LOOSEN THIS SETSCREW (#10-32 x 3/16) TO REMOVE FRICTION CLUTCH ASSEMBLY WHEN REINSTALLING USE TWO THICKNESSES OF FILM FOR ENDPLAY ADJUSTMENT.

CLUTCH SURFACE SHOULD BE SMOOTH. REEL SHAFT SHOULD ROTATE FREELY.

FELT SHOULD BE SLIGHTLY NARROWER THAN CLUTCH GROOVE AND ENDS SHOULD BE APPROXIMATELY 1/8" APART WHEN WRAPPED AROUND CLUTCH.

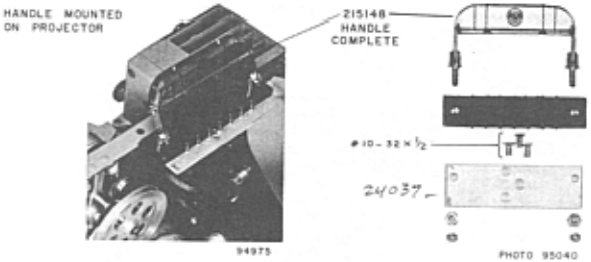
INNER SURFACE SHOULD BE SMOOTH AND UNDENTED. FLANGE MUST NOT WOBBLE ON SHAFT



PARTS

Stock No.	Drawing No.	Description
		REEL ARM – LOWER
215127	175460-503	Arm, lower reel arm, complete
215126	148307-502	Arm, reel arm with bushing and pin assembly
56017	8800619-2	Bearing, ball
215090	188647-9	Bracket, lower reel arm clutch
48320	887623-4	Bushing, lower reel arm, oilite
215091	187588-505	Flange, drive flange and shaft assembly
59879	8853169-2	Pin, reel arm positioning pin
59877	188637-3	Pulley, belt drive and setscrew
215566	148102-7	Pulley, clutch
207303	142510-104	Ring, bearing retaining
98678	187551-3	Ring, felt clutch drive
92410	8888539-182	Screw, set clutch pivot shaft, 10-32 x 3/16" lg.
14974	8888539-142	Screw, pulley setscrew
50964-A	8434454-1	Screw, lower reel arm thumbscrew
94571	8875665-1	Lockwasher, dished, type No. 6, reel shaft screw
50989	888547C-4	Screw, reel shaft binder head, 6-32 x 3/8
59878	188582-2	Shaft, clutch pivot
57890	185987-506	Shaft, reel shaft assembly, lower
56030	92237-31	Washer, flat 5/16" O.D., stl.
56031	889534-32	Washer, flat 1/2" O.D.

HANDLE

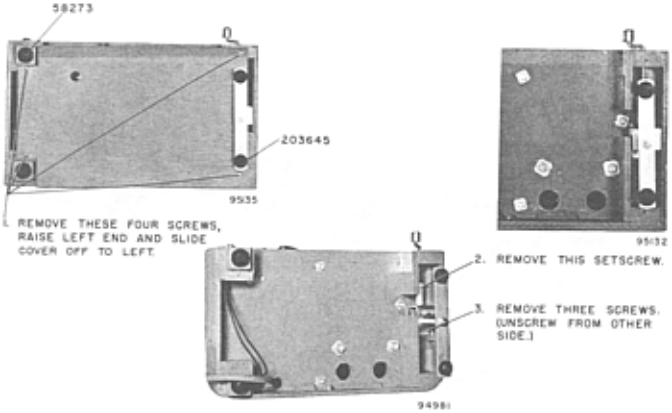


PARTS

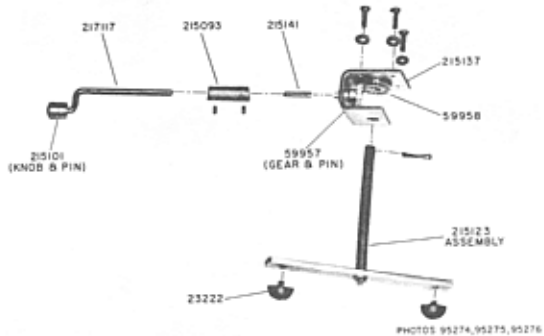
Stock No.	Drawing No.	Description
		HANDLE
215148	8943888-501	Handle Assembly, projector, speaker case

TILT MECHANISM

TO DISASSEMBLE TILT MECHANISM



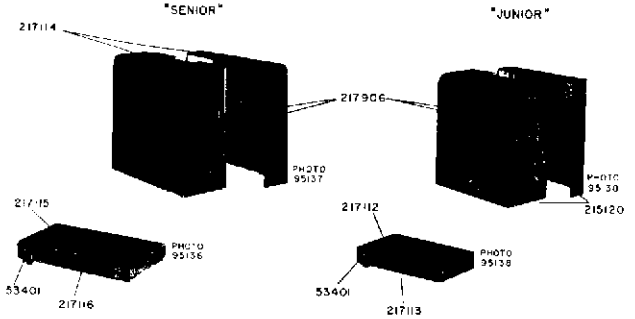
TILT MECHANISM FOR RCA 400 JUNIOR AND SENIOR



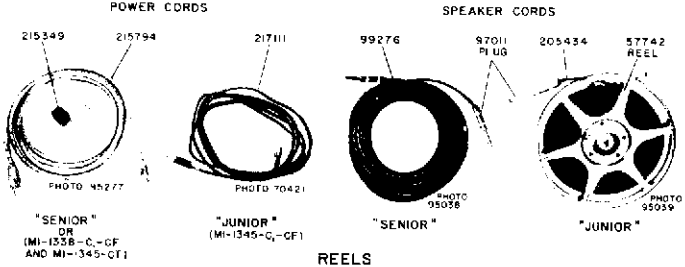
PARTS

Stock No.	Drawing No.	Description
		TILTING MECHANISM
215137	8412490-2	Bracket, tilt mechanism
215093	8943873-1	Coupling, crankshaft, and setscrew
217117	8943877-501	Crank, shaft tilt assembly
215125	8876396-502	Foot, and tilt shaft assembly
23222	8853143-2	Foot, elastic tip
59957	8876006-3	Gear, crank shaft bevel gear and pin
59958	8876006-2	Gear, tilt shaft bevel gear
215101	8943874-1	Knob, crank & pin
215141	8943872-2	Shaft, drive gear

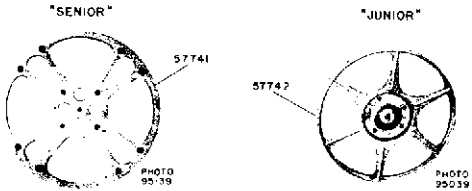
PROJECTOR CASES



CORDS



REELS



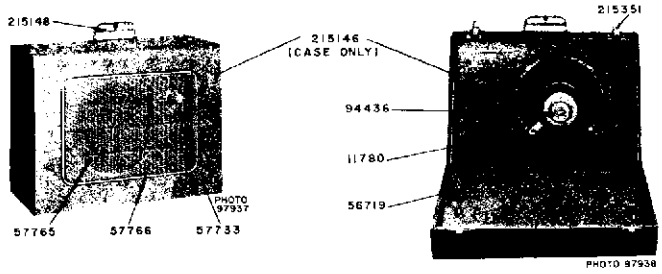
PARTS

Stock No.	Drawing No.	Description
PROJECTOR CARRYING CASE FOR MI-1338-C,-CF "SENIOR"		
217115	166669-501	Base, projector base only
217114	8942564-501	Case; carrying, case, complete
217906	8973664-2	Catch, cover with rivets (bright finish)
217116	177350-501	Cover, bottom, Sr.
58273	8874690-2	Foot, elastic tip
215148	8943688-501	Handle, carrying
53401	8876524-1	Jack, sound output (on base)
59975	990303-6	Nut, speed 8-32 rear cover screw retaining
217817	8967494-1	Plate, carrying handle, plastic
204037	8976326-4	Plate, carrying handle, support
219114	990108-613	Screw, Phillips Hd. No. 8-32 x 1/2
219115	990108-619	Screw, Phillips Hd. No. 8-32 x 7/8
59981	175545-1	Shield, projector, left hand
94839	175487-0	Shield, projector, right hand
PROJECTOR COVER AND SPEAKER HOUSING FOR MI-1345-C,-CF,-CT "JUNIOR"		
217112	166670-501	Base, projector
215124	8876040-504	Bracket, lower reel arm storage bracket
205389	8876520-3	Cable, speaker cable only, bulk
217906	8973664-2	Catch, cover with rivets, bright finish
205434	8876521-503	Cable, speaker cable and connectors 50 ft.
97011	8876516-2	Connector, male, 2 contact, speaker cable plug
217113	177346-501	Cover, carrying case, bottom cover
215120	8942555-504	Case, carrying case junior
58273	8874660-2	Foot, elastic tip
59969	148400-1	Grille, speaker
53401	8876524-1	Jack, speaker, sound output (on base)
59975	990303-6	Nut, speed, No. 8-32, rear cover screw retaining
59976	8876514-1	Nut, speed, No. 8-32, clamp type
57742	141983-8	Reel, speaker cable mounting film, 400 feet (not used in 1338-C)
59966	8887774-3	Screw, No. 8-32 x 3/8 Phillips Hd.
59974	8876035-1	Shaft, reel storage
59978	175488-1	Shield, projector, left hand
94838	175487-8	Shield, projector, right hand
215806	177498-1	Speaker, 8" P.M. - V.C.
218385	8876003-4	Spacer, speaker
219114	990108-613	Screw, Phillips Hd. No. 8-32 x 1/2
219115	990108-619	Screw, Phillips Hd. No. 8-32 x 7/8

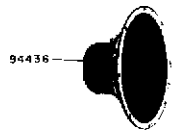
PARTS

Stock No.	Drawing No.	Description
		SPEAKER AND ACCESSORY CARRYING CASE, MI-1312-C
56719	8872118-1	Angle, lid hinge, rubber
97470	8876511-1	Bracket, speaker jack mounting
96276	8875517-502	Cable, speaker cable & connector
215146	8874808-505	Case, speaker carrying case
215351	8874659-5	Catch, speaker case
97011	8870516-2	Connector, 2 contact, male, grounding speaker cable (plug)
57733	8874660-1	Foot, rubber
57766	8874874-1	Gasket, grille
57765	147810-2	Grille, rectangular, speaker
215148	8943888-501	Handle assembly carrying case
53401	8876524-1	Jack, speaker
57741	141983-12	Reel, film, 1600 feet
94436	165437-1	Speaker, 10" P.M. Speaker, 6-8 V.C. imp.
		POWER CABLE AND ADAPTOR FOR MI-1338-C, -CF AND MI-1345-CT
215349	8943815-1	Adapter, 3 conductor to 2 conductor
215794	8946155-2	Cable, power, 3 conductor with 3 contact male connector, 10 feet lg., 15 amp, 125 V 16 GAUGE
		POWER CABLE FOR MI-1345-C, -CF
217011	8946159-2	Cable, power, 2 conductor with 2 contact male connector, 10 feet lg. 16 GAUGE

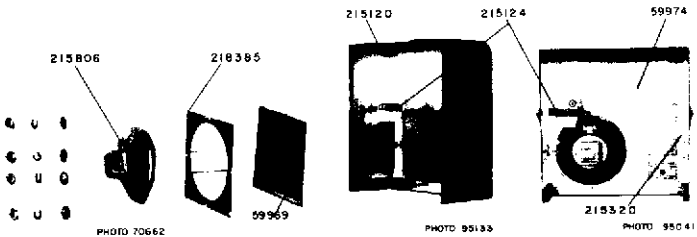
MI-1312-C SPEAKER AND ACCESSORIES CARRYING CASE AND MI-12453 AUXILIARY SPEAKER



MI-12453 SPEAKER MECHANISM (10-INCH) FOR MI-1312-C



ASSEMBLY OF RCA 400 JUNIOR SPEAKER



CLEANING AND LUBRICATION

Inspect all bushings, bearings, and other parts for cleanliness.
Thoroughly clean all parts before reassembly with carbon tetrachloride or other solvent to avoid abrasive action of dirt on moving parts.
Apply four or five drops of light oil such as Socony Vacuum "Vactra Light X" (RCA Stock 25367) to all shafts and bushings prior to their reassembly.
Lightly apply lubriplate 110 to the teeth of all gears after their reassembly.
Place a few drops of light oil in motor oil holes once every 1000 hours.
Felt oil pads and wicks in oiling tubes should be saturated with "Sta-Put 370 Oil" (E. F. Houghton Co.).
Lubricate shafts carrying plastic rollers with micro-fine graphite or a soft lead pencil.
Do not use carbon tetrachloride or other solvent to clean coated lens surfaces. Breathe on lens and clean with lens tissue.
Do not force the assembly of parts. It should not be necessary to alter any parts by operations such as filing, tapping, drilling, scraping, etc., to enable them to be assembled.
Always use the proper tool designed to do the job.

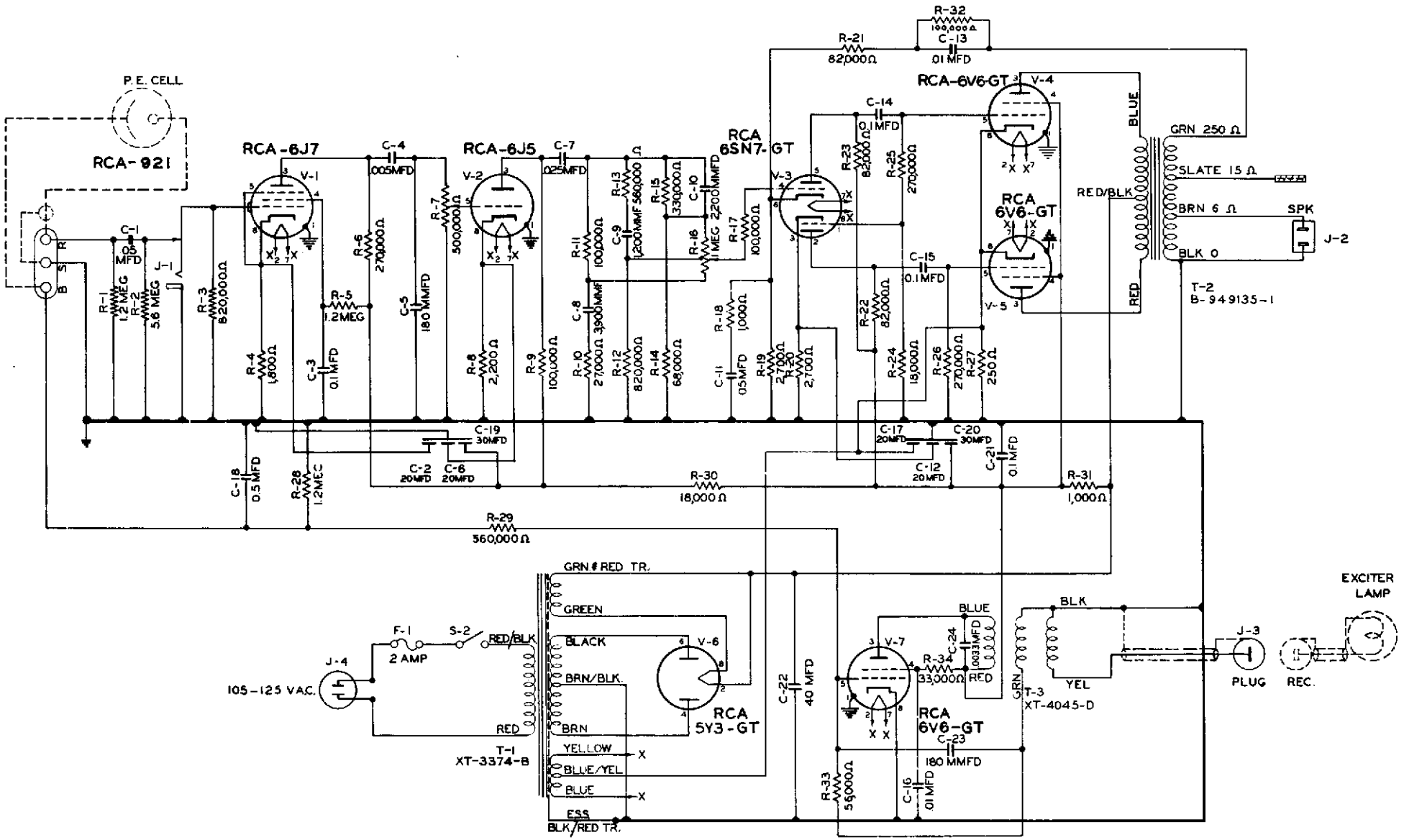
SERVICE AIDS

These notes have been prepared to aid the 16mm technician to quickly localize the cause of a given effect when its symptom is apparent and to suggest the required corrective action.

SOUND SYSTEM

Symptom	*Probable Cause*	*Correction*
Weak or no sound, projection lamp lighted.	AMPL switch off.	Turn switch on.
	Volume control off.	Adjust control.
	Blown amplifier fuse.	Replace with 2 amp. fuse only. If recurrent, determine cause.
	Loudspeaker not connected.	Plug in.
	Plug out of back of projector.	Plug in.
	Power cord not connected to proper source of supply.	Check frequency and voltage.
	Exciter lamp out.	Replace. If new exciter lamp does not light, replace Oscillator tube 6V6GT.
	Defective Oscillator coil.	Replace.
	Weak rectifier tube 5Y3GT.	Replace.
	Open speaker voice coil circuit.	Replace cone after first checking speaker connections.
	Sound optic dirty or out of adjustment.	Clean, See Page 24.
	Sound mirror dirty or out of adjustment.	Clean, See Page 21.
	Phototube installed incorrectly.	Install in correct position, see page 26.
Sound on MIC—no sound on FILM.	Microphone plug in jack.	Remove plug from jack.
	Exciter lamp out.	Replace—Check Oscillator tube.
	Sound optic dirty or out of adjustment.	Clean, See Page 24.
	Sound mirror dirty or out of adjustment.	Clean, See Page 21.
	Photocell defective or installed incorrectly.	See Page 26.
Sound on FILM—no sound on MIC.	Microphone plug not in jack.	Insert plug in jack.
	Microphone plug or receptacle defective.	Repair or replace.
	Microphone defective.	Replace.
Sound microphonic (Ringing noise)		
(a) With Volume control on.	Phototube loose or hitting cover.	See Page 26.
	Defective 6J7 tube.	Replace.
(b) With Volume control off.	Defective 6J5 or 6SN7GT tube.	Replace.
Tone unsteady. (High or low frequency variations in pitch)	Film threaded under tension roller.	Thread over tension roller.
	Sound drum, shaft or bearings.	See Page 21.
	Pressure roller incorrectly adjusted.	See Page 23.
	Pressure roller dirty or binding.	Clean, See Page 23.
	Tension roller incorrectly adjusted.	See Page 27.

Symptom	*Probable Cause*	*Correction*
Tone unsteady (continued)	Sound drum dirty.	Clean.
	Guide roller sticking.	See Page 22.
	Phototube cover interfering with pressure roller arm.	Install cover correctly, see page 26.
	Erratic takeup tension.	See Page 34.
Motor "hash" in sound.	Open capacitor across governor control, 1 mfd.	Replace.
	Open capacitor from power line to frame .01 mfd or 2200 mfd (inside motor).	Replace.
	Defective governor or governor brushes.	Repair or replace.
	Commutator brushes not seated.	Repair.
	Lock washers missing from screws holding amplifier cover.	Replace.
Sound but no picture.	Lamp switch off.	Turn on.
	Projection lamp missing or burned out.	Replace.
Loses both film loops.	Upper sprocket shoe out of adjustment.	Adjust, See Page 33.
Loses lower loop.	Broken sprocket holes.	Cut out and splice film.
	Bad splices.	Resplice.
	Film binding in gate.	Check for thick splices.
		Check side pressure shoes.
	Claw out of adjustment.	Adjust, See Pages 13, 14 and 15.
	Dirty claw.	Remove dirt and emulsion from claw.
Improper tapeup operation.	Takeup bearing sticking.	See Page 34.
	Excessive takeup tension.	See Page 34.
Projector mechanism noisy.	Claw travel excessive.	See Page 15.
Tears sprocket holes.	Upper reel arm shaft binding.	See Page 33—Adjust end play.
	Under-cut claw.	See Page 13.
	Under-cut film sprocket teeth.	See Page 20.
	Excessive takeup tension.	See Page 34.
Travel ghosts. White streaks above or below white areas on screen image)	Shutter out of adjustment.	See Page 12.
Picture motion unsteady.	Unsteadiness present in picture print.	
	Claw travel too short.	See Page 32.
	Improper threading.	Check loops for proper length.
	Claw undercut.	See Page 13.
	Side pressure shoe springs on aperture plate too weak.	See Page 18.
	Picture gate not latched securely.	Bend latch spring, See Page 19.
Picture indistinct or illumination low.	Projection lens dirty.	Clean, See Page 3.
	Condenser lens dirty.	Clean, See Page 7.
	Condenser lens incorrectly assembled.	See Page 7.
	Reflector dirty or damaged.	Clean or replace, See Page 7.
	Projection lamp black or blistered.	Replace lamp.
	Low line voltage.	Use a Voltage Booster.
Film scratched.	Film pressure shoe dirty or damaged.	Clean or replace, See Page 19.
	Sound drum pressure roller dirty or damaged.	Clean, See Page 23.
	Emulsion hardened on film-gate shoe.	Remove emulsion.
	Aperture plate dirty or damaged.	Clean or replace, See Page 18.
	Guide roller dirty or sluggish.	Clean, See Page 22.
	Snubber roller damaged.	See Page 28.



RCA 400 AMPLIFIER SCHEMATIC

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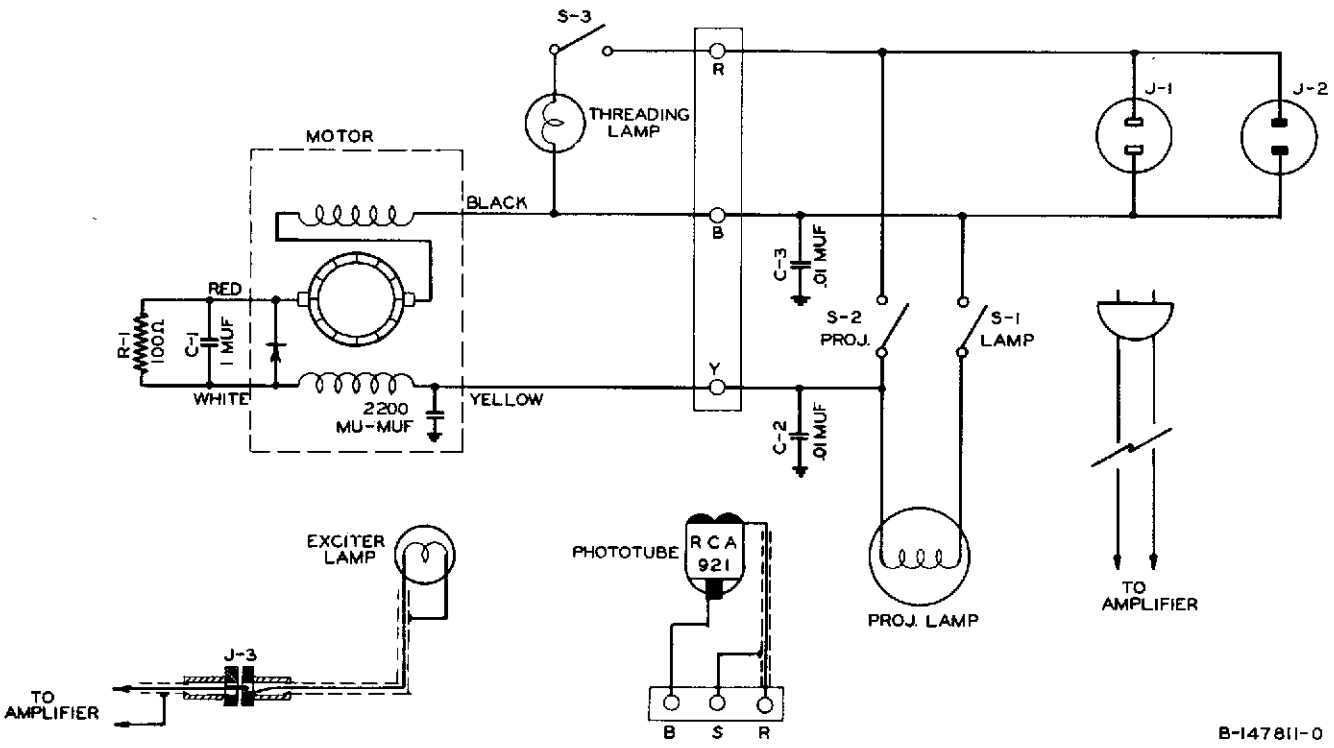


RCA 400 PROJECTOR CIRCUITS

REPLACEMENT PARTS

The following parts list is included to provide identification when ordering replacement parts. RCA 16MM Dealers will be glad to quote on genuine factory-tested parts. Replacement parts supplied may be slightly different in form or size from the original parts but will be completely interchangeable with them.

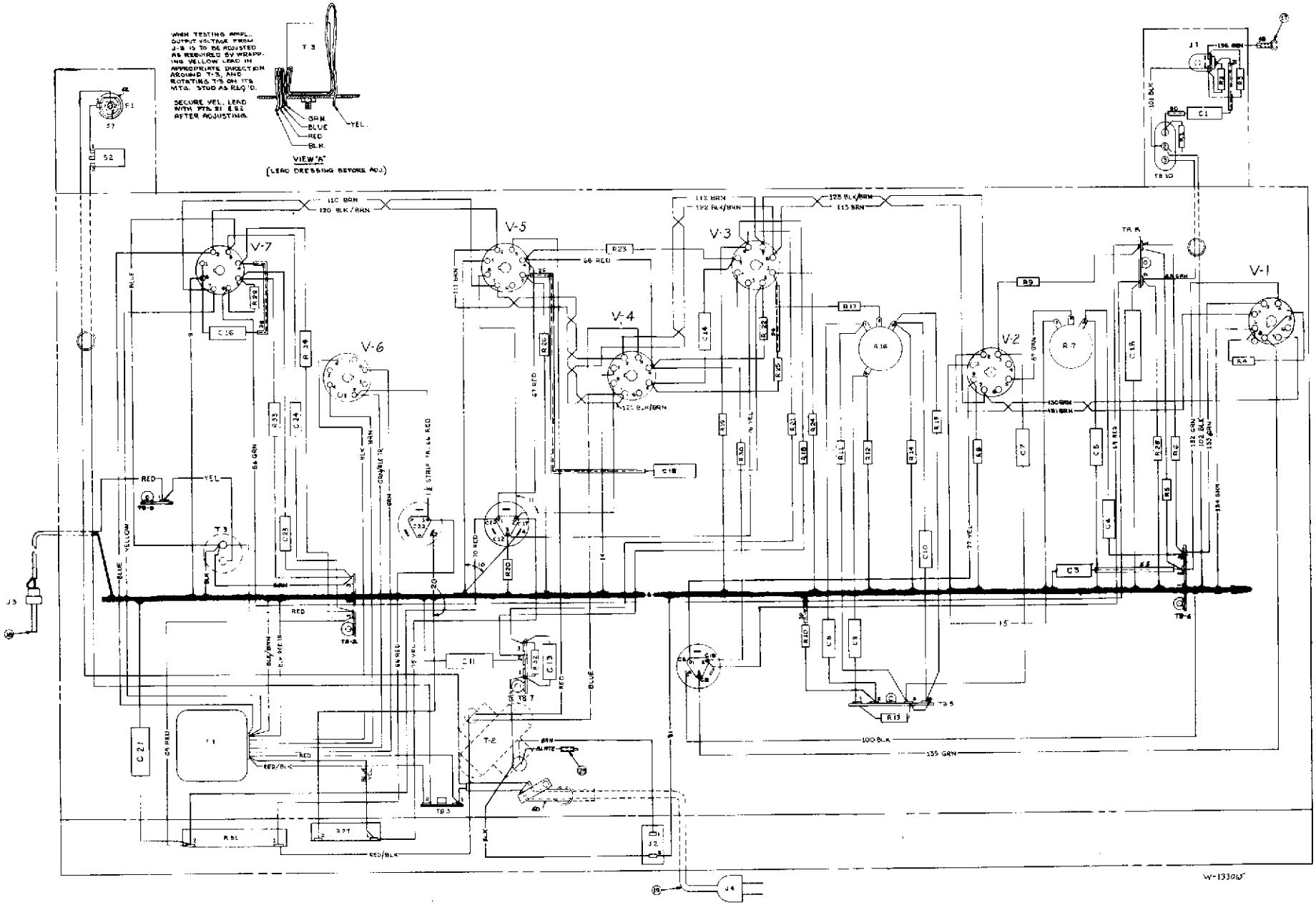
For your convenience, this parts list has been arranged alphabetically by name of the sub-assembly and also by name of the part associated with each sub-assembly. After the part number has been determined from the exploded view of the sub-assembly, its name and purpose may be readily found by checking the part numbers listed under the sub-assembly involved.

For example, to ascertain the name of a part associated with the intermittent mechanism, turn alphabetically to "Intermittent Assembly," under which all parts associated with this mechanism are also alphabetically listed.

The exploded assembly views show the mechanical assembly sequence of the parts making up the sub-assembly as well as their stock number, and will prove a ready reference and a positive check when the stock number or name of part is in doubt.

LIST OF AMPLIFIER PARTS

Symbol No.	DESCRIPTION	Stock No.
C-1	Capacitor, 0.05 mfd., 400 v.	70615
C-2	Capacitor, 20-20-30 mfd.	51339
C-3	Capacitor, 0.1 mfd., 400 v.	70617
C-4	Capacitor, 0.005 mfd., 400 v.	70606
C-5	Capacitor, 180 mmf., 500 v.	68541
C-6	Part of C-2	
C-7	Capacitor, 0.025 mfd., 400 v.	70612
C-8	Capacitor, 3900 mmf., 500 v.	68738
C-9	Capacitor, 1200 mmf.	68495
C-10	Capacitor, 2200 mmf.	39660
C-11	Same as C-1.	
C-12	Same as C-2.	
C-13	Capacitor, 0.01 mfd., 400 v.	70610
C-14, 15	Same as C-3.	
C-16	Same as C-13.	
C-17	Part of C-12.	
C-18	Capacitor, 0.5 mfd., 100 v.	70619
C-19	Part of C-2.	
C-20	Part of C-12.	
C-21	Same as C-3.	
C-22	Capacitor, 40 mfd., 450 v.	37308
C-23	Same as C-5.	
C-24	Capacitor, .0033 mfd., 500 v.	39664
F-1	Fuse, 2 amperes	3883
	Holder, fuse	52097
J-1	Jack, microphone	47613
J-2	Connector, speaker, 2 contact, female	57756
J-3	Connector, exciter lamp cable, single contact male	31048
J-4	Connector, power cable, 2 contact male	4577
R-1	Resistor, 5.6 meg., ½ w.	
R-2	Resistor, 100,000 ohms, ¼ w.	
R-3	Resistor, 470,000 ohms, ½ w.	
R-4	Resistor, 1800 ohms, ½ w.	
R-5	Resistor, 1.2 meg., ½ w.	
R-6	Resistor, 270,000 ohms, ½ w.	
R-7	Control, volume control, 0.5 meg.	
R-8	Resistor, 2200 ohms, ½ w.	
R-9	Resistor, 100,000 ohms, ½ w.	
R-10	Resistor, 27,000 ohms, ½ w.	
R-11	Same as R-2.	
R-12	Resistor, 820,000 ohms, ½ w.	
R-13	Resistor, 560,000 ohms, ½ w.	
R-14	Resistor, 68,000 ohms, ½ w.	
R-15	Resistor, 330,000 ohms, ½ w.	
R-16	Control, tone control, 1.0 meg.	53029
R-17	Same as R-2.	
R-18	Resistor, 1000 ohms, ½ w.	
R-19	Resistor, 2700 ohms, ½ w.	
R-20	Same as R-19.	
R-21	Resistor, 82,000 ohms, ½ w.	
R-22	Resistor, 82,000 ohms, 1 w.	
R-23	Same as R-22.	
R-24	Resistor, 18,000 ohms, ½ w.	
R-25, 26	Same as R-6.	
R-27	Resistor, 250 ohms, 7.4 w.	51340
R-28	Resistor, 1.2 meg., ½ w.	
R-29	Same as R-13.	
R-30	Same as R-24.	
R-31	Resistor, 1000 ohms, 10.9 w.	52938
R-32	Resistor, 1200 ohms, 2 w.	
R-33	Resistor, 56,000 ohms, 1 w.	
R-34	Resistor, 33,000 ohms, 2 w.	
R-35	Same as R-2.	
S-2	Switch, toggle switch	43503
T-1	Transformer, power transformer	53030
T-2	Transformer, output transformer	57828
T-3	Coil, oscillator coil	52939
	Board, terminal, for phototube	54113
	Cable, shielded, exciter lamp current, with single contact male connector	57642
	Cover, amplifier cover	57740
	Cushion, tube socket	37396
	Knob, volume or tone control	32116
	Socket, tube socket	31319
	Socket, cushioned tube socket	52937
	Plate, mounting, for C-2, C-12, C-22	28452
	Screw, amplifier cover screw, No. 10-32 x ¼" bd. hd.	56508



RCA 400 AMPLIFIER WIRING DIAGRAM