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U.S. Army  
WAR DEPARTMENT  
TECHNICAL MANUAL  
**PROJECTOR EQUIPMENT**  
**PH-398**  
APRIL 24, 1943

SITY OF CALIFORNIA  
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**WAR DEPARTMENT**

**WASHINGTON, D. C., APRIL 24, 1943**

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TECHNICAL MANUAL)  
No. 11-406 }

WAR DEPARTMENT,  
WASHINGTON, APRIL 24, 1943

## PROJECTOR EQUIPMENT PH-398

Prepared under direction of the Chief Signal Officer.

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**SAFETY NOTICE**

**THE VOLTAGES EMPLOYED IN THIS EQUIPMENT ARE SUFFICIENTLY HIGH TO ENDANGER HUMAN LIFE AND EVERY PRECAUTION MUST BE TAKEN TO AVOID BODILY HARM THROUGH CONTACT WITH HIGH VOLTAGE CIRCUITS. WHEN WORKING ON THE EQUIPMENT ALWAYS GROUND EVERY PART BEFORE TOUCHING IT.**

**IMPORTANT**

*Projector equipment PH-398 should be handled with care. Rough handling, abuse, and misuse of the equipment will materially decrease its life and may in time require extensive repairs, remember—equipment carefully handled will project better pictures for a longer time.*

*Repairs and adjustments to this equipment should be attempted only by personnel who have been specially trained for this work.*

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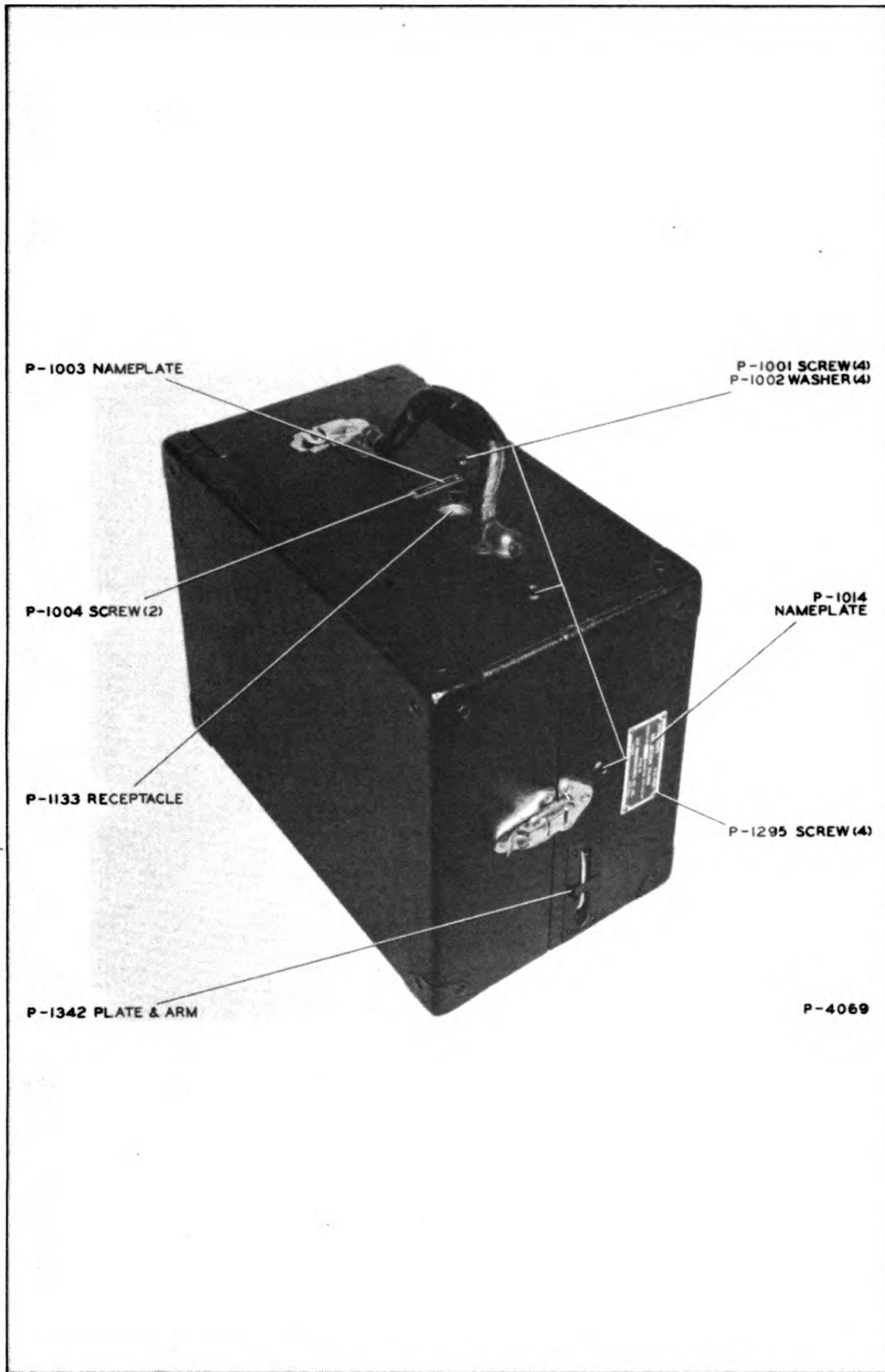


Figure 1-A—16 mm. Projector in Carrying Case

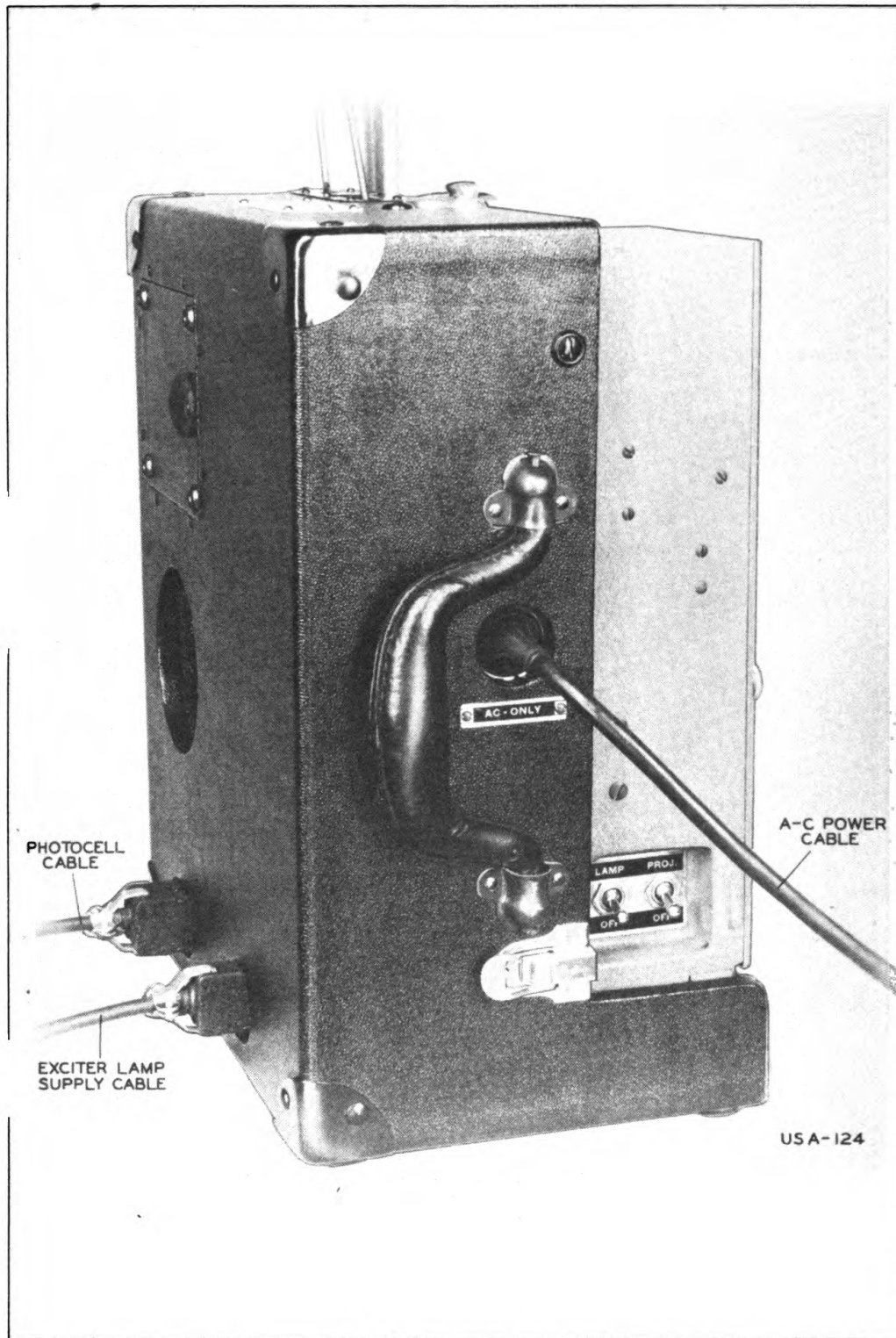
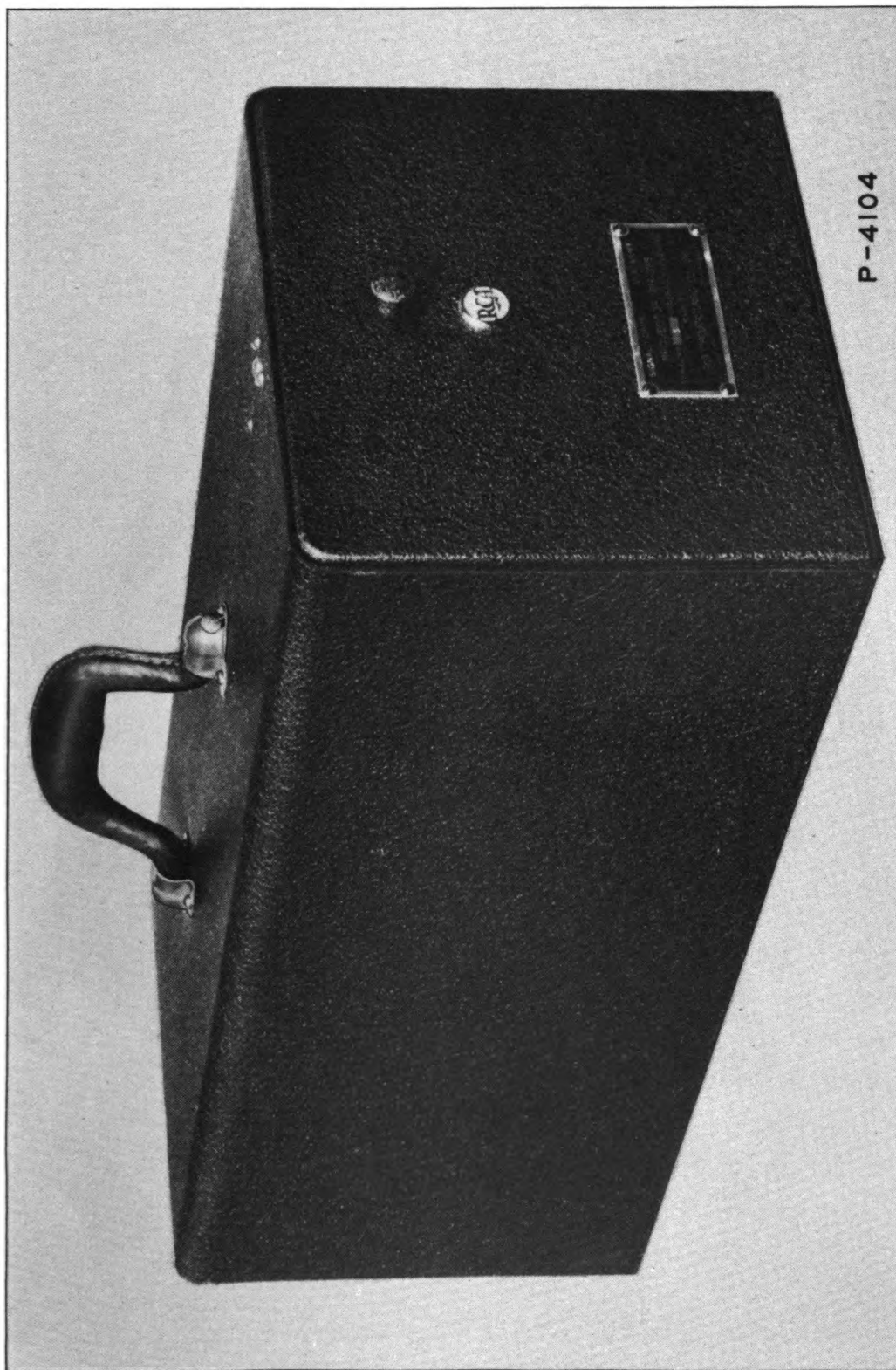


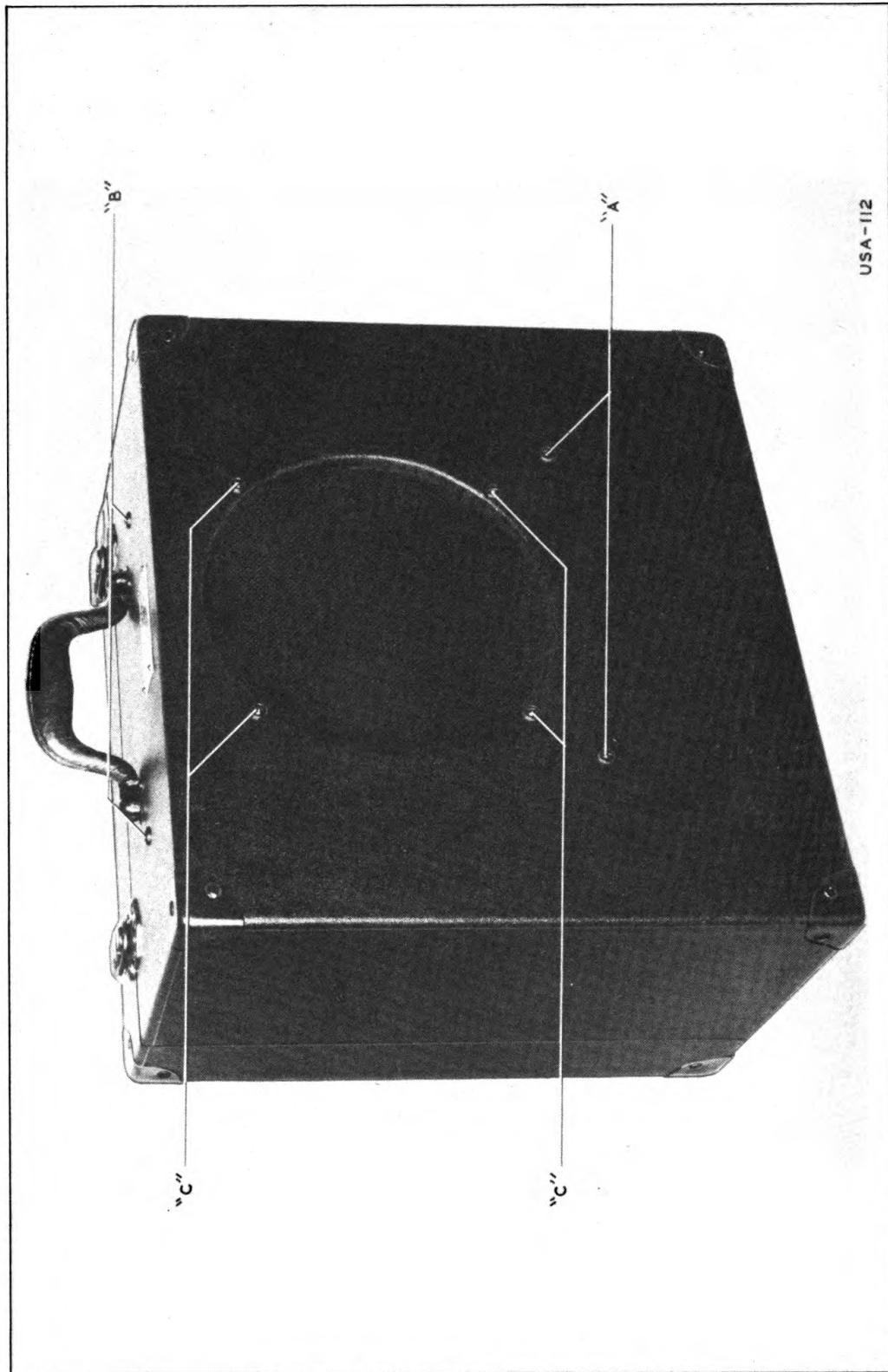
Figure 1B—16 mm. Projector—Rear View Showing Cables Connected



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*Figure 2—16 mm. Amplifier in Case*



*Figure 3-A—16 mm. Loudspeaker in Case*

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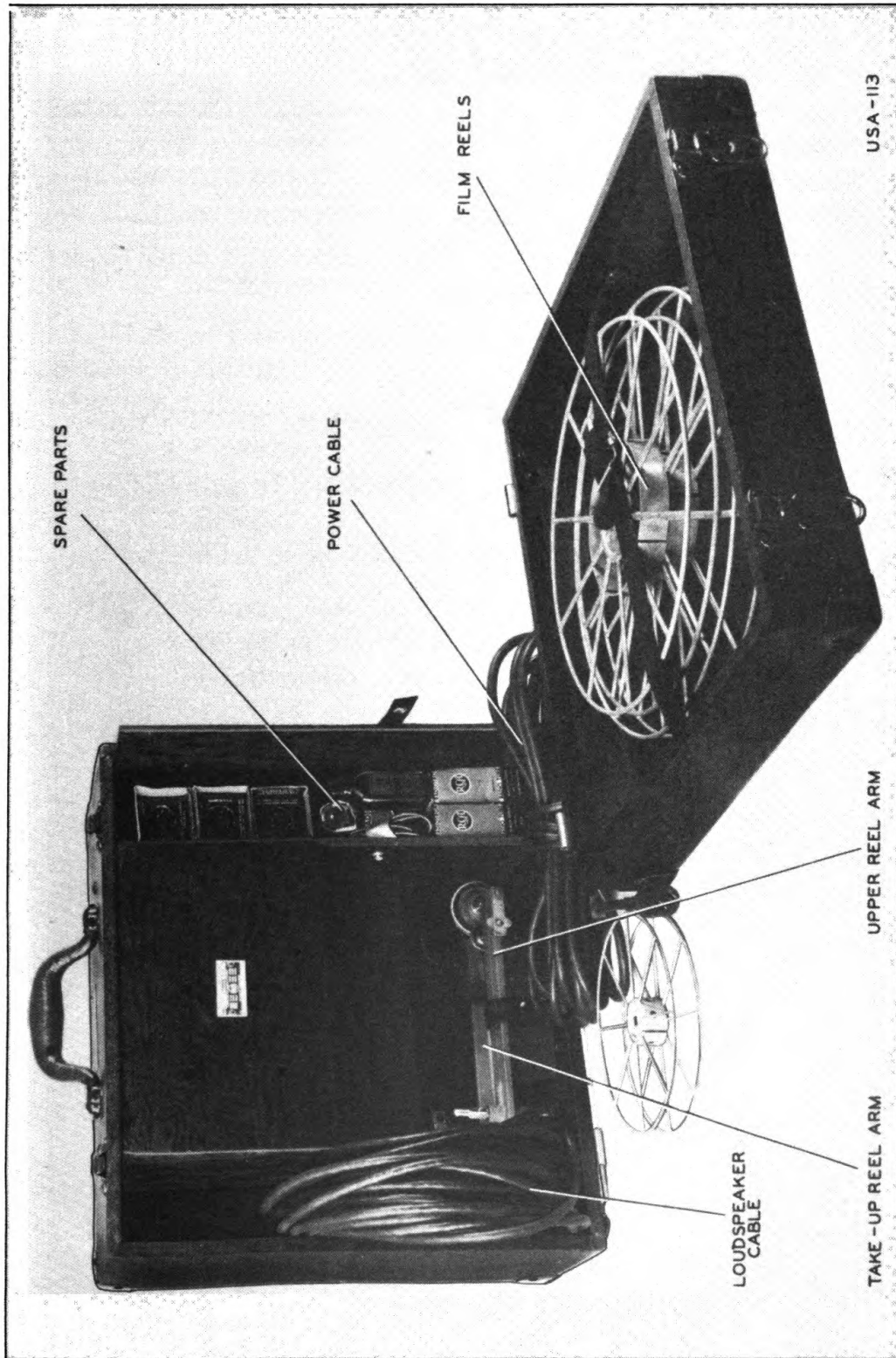


Figure 3-B—Loudspeaker Case Opened Showing Accessory Compartments

## SECTION 1—GENERAL CHARACTERISTICS

**1. General Description and Application.**—The U. S. Army Signal Corps Projector Equipment PH-398 for sound motion pictures from 16 mm film has been designed for educational purposes. It has sufficient illumination and sound volume for any ordinary classroom or for auditoriums of moderate size.

**CAUTION: THIS EQUIPMENT IS DESIGNED FOR OPERATION FROM AN A-C POWER SOURCE OF 105-125 VOLTS 60 CYCLES ONLY.**

**2. List of Components.**—The equipment is contained in three portable carrying cases and includes the following items:

*a. Projector Case*

- 1 Projector
- 1 Can of lubricating oil
- 1 Brush
- 2 Wire belts (short and long)

*b. Amplifier Case*

- 1 amplifier with attached power, photocell, and exciter lamp supply cables.

*c. Loudspeaker Case*

- 1 Loudspeaker
- 2 Projector lamps (1 spare)
- 1 Exciter lamp
- 5 Fuses (1 box)
- 2 Sets of amplifier tubes (1 spare)
- 1 Bottle lubricating oil with applicator
- 1 400 foot film reel
- 1 1200 foot film reel
- 1 1600 foot film reel
- 1 Power cable
- 1 Upper reel bracket
- 1 Lower reel bracket
- 1 Loudspeaker cable (attached)
- 1 TM 11-406
- 2 Wire belts (spares)
- 1 Screen PH-358

*d.* A suitable projection screen is also needed for proper operation of equipment. (Screen PH-358 is furnished with each projector.)

**3. Technical Data.***a. Projector*

Power Supply Required

105-125 volts a-c, 60 cycles, 900 watts

Projection Lens

2" focal length  $f: 1.65$ 

The lenses supplied with this equipment have been coated which considerably improves the light transmission of the lenses and gives higher definition and contrast to the projected image.

Film Speed 24 frames per second (36 ft. per minute)

Motor Speed 3520 rpm.  $\pm 1\%$  (Actual)

Tube and Lamp Complement

Photocell—RCA 927

Projection Lamp—750 watt, 115 volt, or 750 watt,  
120 voltExciter Lamp— $\frac{3}{4}$  ampere, 4 volt prefocused

Pilot Lamp—110 volt clear

*b. Amplifier*

Power Supply Required

105-125 volts a-c, 50-60 cycles, 180 watts

Power Output

With 117 volts on 120 volt tap of power trans-  
former—5% max. R.M.S. Harmonic distortion at  
400 cycles—18 watts

Tube Complement

Input	RCA 6J7
Voltage amplifier	RCA 6J5
Amplifier-Phase Inverter	RCA 6N7
Output	2 RCA 6L6
Rectifier	RCA 5U4G
Field Supply Rectifier	RCA 5U4G
Oscillator	RCA 6F6

*NOTE: "G" or "GT" type tubes may be substituted for the metal tubes in which case the RCA 6J7-G or 6J7-GT tube used in the input stage of the amplifier must be shielded.*

Amplifier Fuse

3 ampere

Available Amplifier Load Impedance 4, 8, or 15 ohms

*c. Loudspeaker*

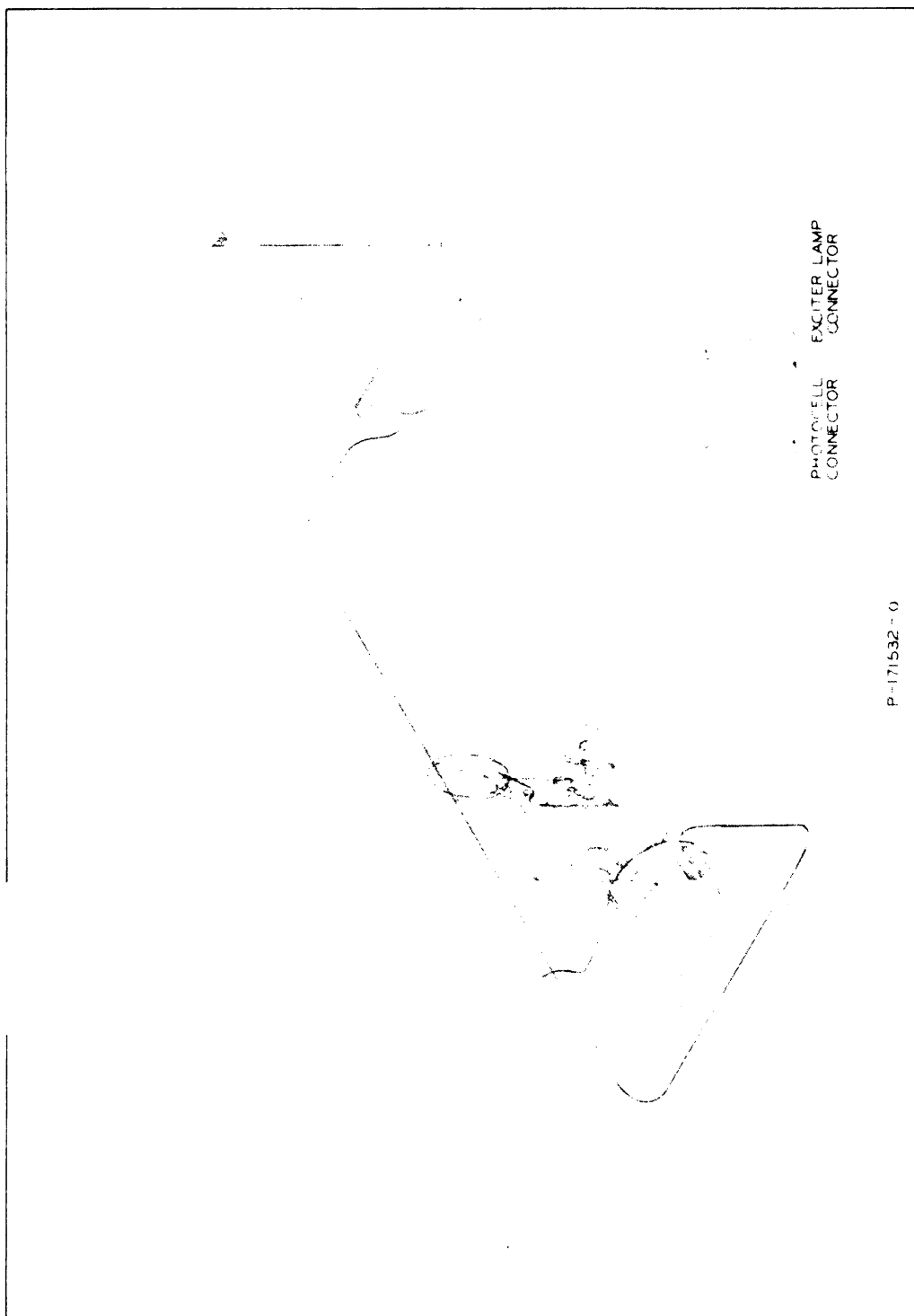
Electro-dynamic type	10 inch cone
Voice Coil	8 ohms
Field Coil	115 V.D.C.

**4. Physical Specifications.**

<i>a. Data</i>	Projector	Amplifier	Loudspeaker
Width (Overall)...	15½"	9⅛"	18¼"
Depth (Overall)...	9	20¼"	10⅝"
Height (Overall)..	15⅞"	8⅛"	20
Weight.....	38 pounds	40 pounds	36 pounds

(including accessories packed in place)

*b.* The projector and loudspeaker cases are constructed of heavy plywood suitably reinforced, and covered on the outside with a fine grain, black Fabrikoid. The amplifier case is made of steel and finished in black crackle to match the other units. Figures 1-A, 2, and 3-A show views of the three units in their respective carrying cases.



*Figure 4—Cable Connections and Typical Installation of 16 mm. Equipment*

**SECTION II—EMPLOYMENT****5. Initial Procedure.**

**a. CAUTION: BEFORE ATTEMPTING TO SET UP OR OPERATE THIS EQUIPMENT PLEASE READ THESE INSTRUCTIONS CAREFULLY.**

**b. Remove all packing material from the following places:**

(1) *Projector Case*

(a) Projector Lamp Housing

(b) Film Gate and Aperture

(c) General Surfaces on Projector

(2) *Loudspeaker Case*

(a) Accessories Compartment

(b) Loudspeaker Cable

(c) Power Cable

**6. Installation.**

**a. Arrange the equipment as shown in Figure 4, with the projector near the front edge of a substantial table or other support in such a position that the lower reel will clear the front of the table. The amplifier should be placed so that the controls may be reached easily from the operating side of the projector.**

**b. Place a suitable screen in a position for best viewing by the entire audience.**

**c. Place about five drops of the heavy oil supplied with the equipment in each of the two oil pipes.**

**d. Remove all dust and foreign matter from the following points with a clean, soft, lint-free cloth or equivalent.**

(1) Reflector

(2) Condenser Lens (See Figure 8)

(3) Picture Aperture

(4) Projection Lens

(5) Sound Optical Mirror

(6) Photocell

(7) Exciter Lamp

(8) Sound Optical Unit

**NOTE: Optical bracket, which holds the exciter lamp and the sound optical unit, swings out of operating position for cleaning, etc.**



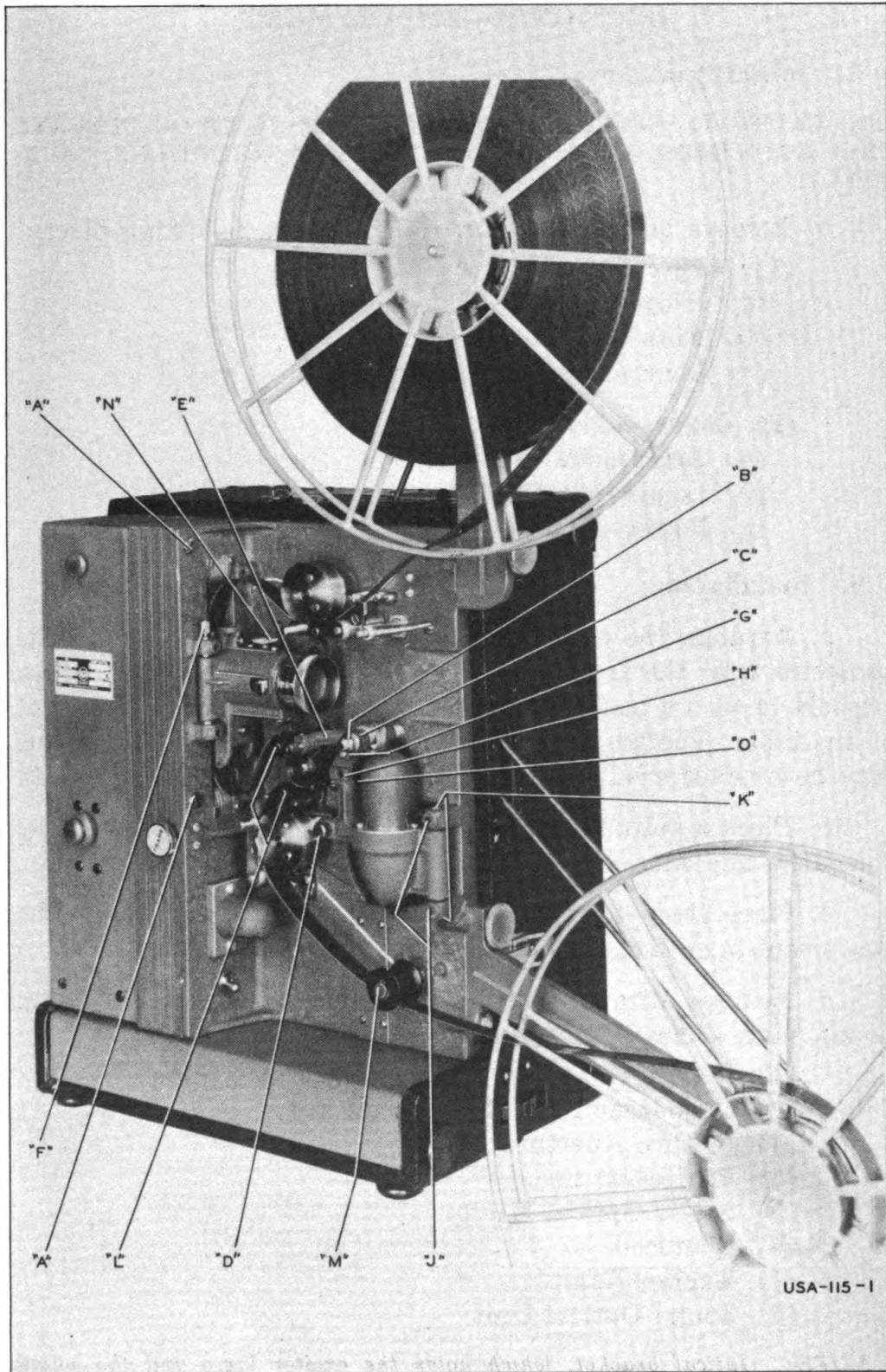


Figure 5—Projector—Operating Side

*e.* Make sure that all switches and controls are in the “off” position.

*f.* Make certain that all interconnecting cables are connected as shown in Figure 4.

**CAUTION: NEVER TURN “ON” THE AMPLIFIER UNLESS THE LOUDSPEAKER CABLE HAS BEEN CONNECTED TO THE AMPLIFIER, OTHERWISE DAMAGE MAY RESULT.**

*g.* Install the upper and lower reel arms on the projector as shown in Figure 5.

*h.* Open the latches that hold the spring belts inside the case, pull the belts out and place in position around the reel pulleys on the respective reel arm. See Figure 5. Check that belts are seated properly in the pulleys. Test for freedom of movement by rocking each belt gently back and forth. If tight, trip take-up rewind lever and try again. If still tight, investigate and correct threading.

## **7. Preparation For Use.**

*a.* Connect the main power cord to an electrical outlet of the frequency and voltage specified on the nameplate.

*b.* Turn “on” the “Proj.” and “Lamp” switches and adjust the projection lens rotating it to the position that gives the sharpest image of the picture aperture on the screen.

*c.* Center the image of the picture aperture on the screen. The image is moved vertically by adjusting the movable foot on the front of the projector as shown in Figure 6.

It is a good projection practice for the image to overlap the screen by a small amount.

*d.* Turn lamp and projector switches off.

*e.* Check the film that is to be used to see that it is properly rewound. Hold the reel so that as the film unwinds the reel turns in a clockwise direction. The sprocket holes should be on the near side of the film. The emulsion or dull side of the film should be on the outside (toward the screen), and the pictures and titles should be upside down. If the film is not in this position, rewind as described in paragraph 8j.

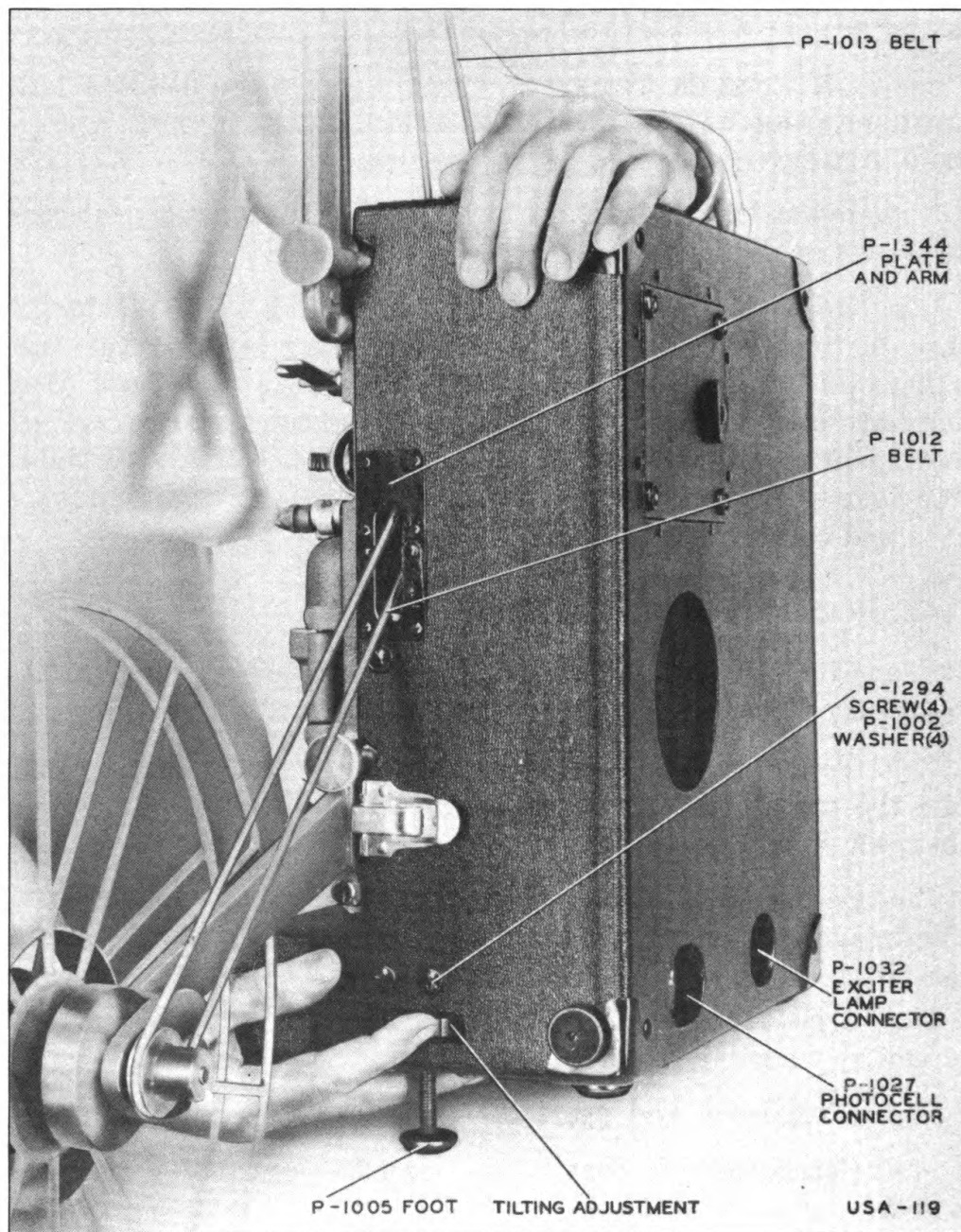


Figure 6—Projector—Tilting Adjustment

*f.* Set the "Take-up and Rewind" lever in the "Take-up" position. See Figure 5.

**8. Operation.**—After the items enumerated under "Preparation for Use" have been performed, the equipment will be in readiness for operation after the film is threaded.

*a. Threading Film*

(1) Place the reel to be projected on the upper reel arm with the sprocket holes toward the operator, and unwind about four feet of film.

(2) Open the upper and lower sprocket shoes, and the film gate.

(3) Thread the film, following exactly the white threading guide line on the projector frame keeping in mind the following points.

(*a*) See that the teeth on the upper feed sprocket engage the sprocket holes in the film, then close the upper sprocket shoe.

(*b*) Lay the film flat on the aperture plate between the side pressure shoes with a definite loop in the film above the film gate as indicated by the white threading guide, and close the film gate.

(*c*) Lift the sound drum pressure roller arm and pass the film around the sound drum, threading over each of the guide rollers as indicated in Figure 5. Be sure to leave a loop of film of the size indicated by the white line between the lower part of the film gate and the upper sound drum guide roller. Lower the pressure roller arm in place, take care that it does not "snap" against the sound drum.

*NOTE:* Failure to have a loop below the film gate may prevent the intermittent claw from engaging the sprocket holes in the film, resulting in a continuous motion of the film and jumping of the picture, and will prevent proper synchronization of the sound and the picture.

(*d*) Pass the film around the lower sprocket and after making sure that the sprocket teeth engage the film sprocket holes, close the sprocket shoe.

(*e*) Place an empty film reel of the proper capacity on the lower reel arm.

(f) Pass the film under the lower film guide roller and over the hub of the take-up reel where the end may be placed in the slot in the reel hub, fastened to the hub with a small piece of adhesive tape or other means, and the take-up reel turned by hand to take up any slack in the film.

(g) Turn the "Proj." switch "on" for a few seconds, then turn it "off" and check the film threading. If the film is not running properly, correct the threading. The projector should now be ready for operation.

b. Make sure that the amplifier volume control is turned to its lowest (counter-clockwise) position, then turn "on" the amplifier power switch.

c. After about fifteen seconds and after the exciter lamp comes on, turn "on" the "Proj." and "Lamp" switches.

d. Frame the picture on the screen by adjusting the knob marked "Frame."

e. If the image on the screen is not sharply in focus, rotate the projection lens until the sharpest focus is obtained.

f. Turn up the amplifier volume control (clockwise rotation) to obtain the desired volume level of the sound.

g. Adjust the tone control for the most pleasing quality of sound.

h. When the reel has been concluded, turn "off" the "Lamp" and "Proj." switches and turn "down" or "off" the amplifier, depending upon whether additional reels are to be shown.

i. If additional reels are to be shown proceed as follows:

(1) Remove the empty reel from the upper arm and place it on the lower arm.

(2) Place the new reel and film on the upper reel arm and rethread the film.

(3) Proceed with operation in the same manner outlined above.

j. To rewind a reel of film proceed as follows:

(1) Assuming that the film was run completely through the projector and that all of the film is on the lower reel, un-

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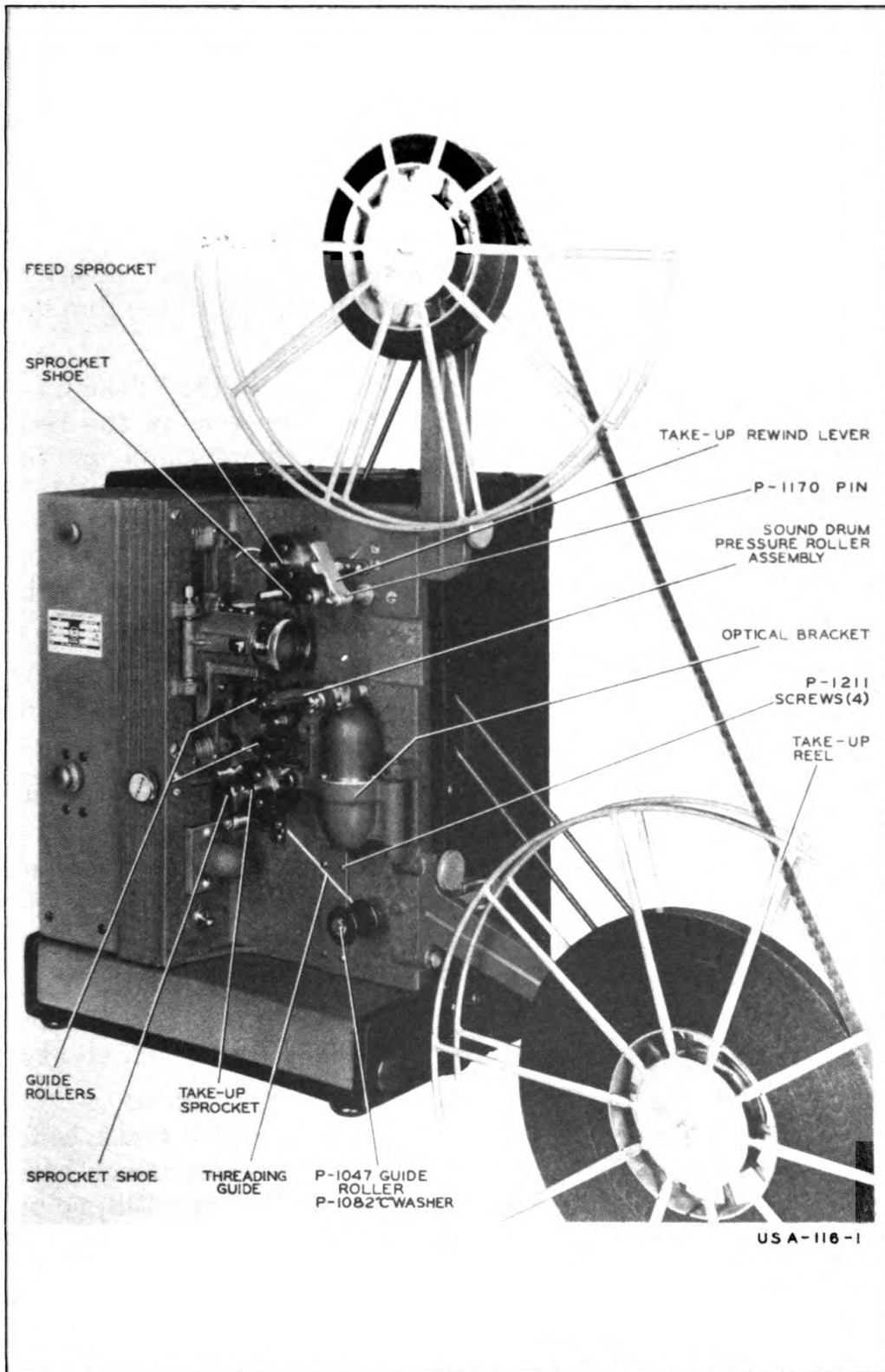


Figure 7—Projector—Showing Film Rewind

wind about three feet from this reel and pass it over the hub of the upper reel and place the end in the slot in the hub. See Figure 7.

(2) Turn the upper reel a few turns counter-clockwise by hand.

(3) Place the "Take-up-Rewind" lever in the "Rewind" position (Figure 7).

(4) Leaving the "Lamp" switch in the "off" position, turn "on" the "Proj." switch, and leave it "on" until the film has been rewound.

*k.* After the film has been rewound, return the "Take-up—Rewind" lever to the "Take-up" position and remove the reels from the spindles. Additional reels may be rewound in the same manner.

### 9. Precautions During Operation.

*a.* In order to present a successful performance, set up the equipment, connect it, check it for operation, and have reel No. 1 threaded and ready to show when the audience arrives.

*b.* The screen should be set up also prior to the arrival of the audience.

*c.* The table or stand supporting the projector and amplifier should be sufficiently rigid to prevent vibration or movement of the projector which would be reflected in the image on the screen.

*d.* Place the loudspeaker cable in such a position that the audience will not kick it or trip over it. A loop around a table leg or other support at each end of the cable may prevent disturbance of the sound and possible damage to the loudspeaker and amplifier in case someone trips over the cable.

*e.* Make sure that a complete spare set of tested tubes, belts, projection lamp, exciter lamp, phototube, fuses, etc., are on hand at all times. Having the items on hand will prevent disappointment of the audience or delays in the show while replacements are obtained. Delays spoil a show.

*f.* Make certain that the projector is mounted high enough so that the audience will not interfere with the light beam when seated.

*g.* Readjust the volume and tone controls during the performance when necessary to compensate for variations in recording and acoustical conditions in the occupied auditorium. Whenever possible the projectionist should preview the picture to become acquainted with these adjustments.

*h.* When the end of the reel approaches turn "off" the "Lamp" switch before the film has entirely run through the projector,, making a white screen. A white screen creates an unfavorable impression.

*i.* Follow a definite routine in unpacking, setting up, and re-packing the equipment for each show. When this is done the chance of omitting important details of the operation is minimized and unforeseen difficulties largely eliminated.

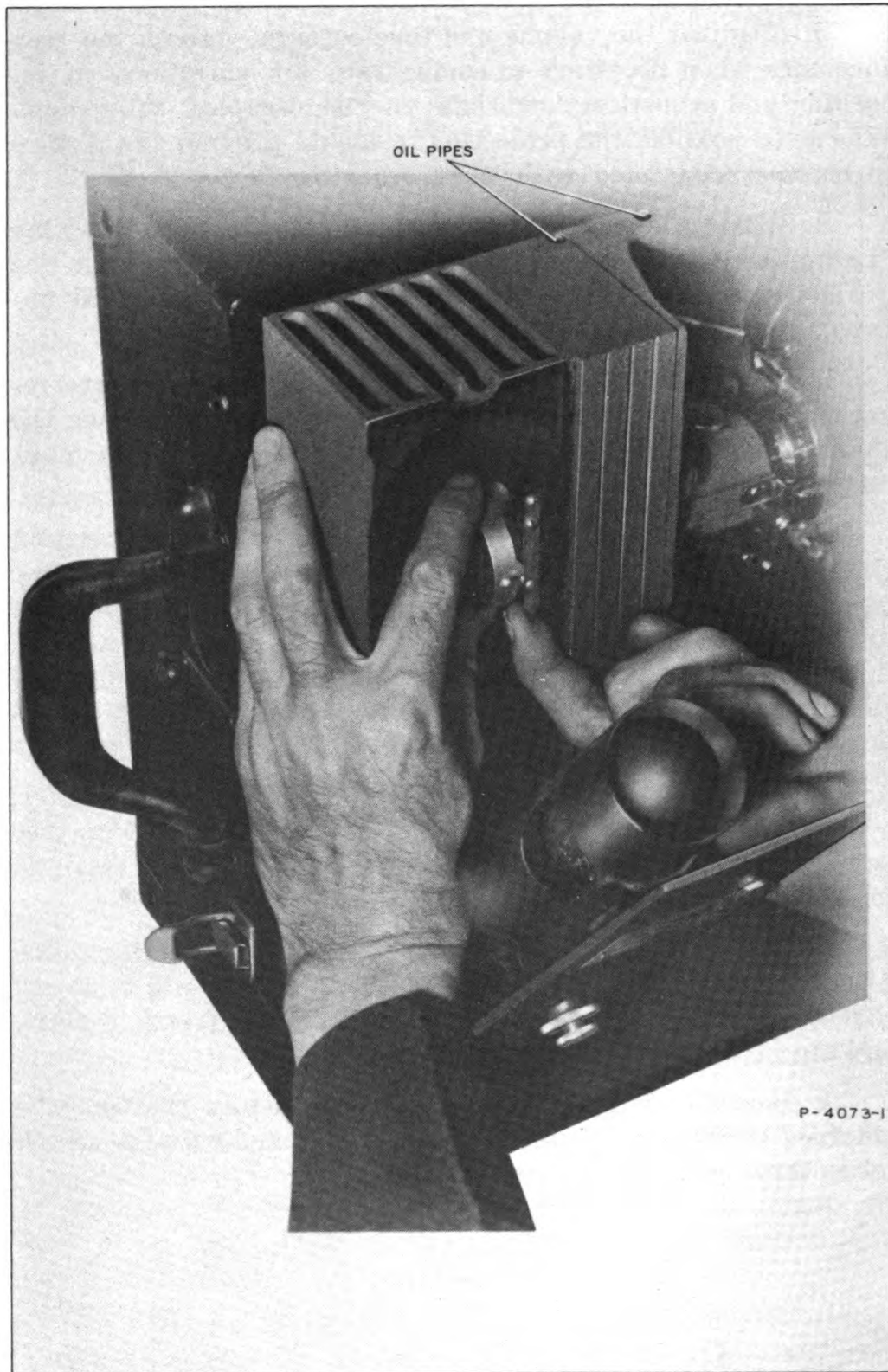
*j.* Occasionally after threading the film or during operation the intermittent pull down claw may fail to engage the sprocket holes in the film with the result that the film moves past the aperture with a continuous motion instead of with an intermittent motion, and the picture is blurred, out of frame, and jumps badly. This condition will be accompanied by a pronounced clicking from the projector. The situation may be remedied without stopping the machine as follows:

(1) Place a finger inside and above the film loop just below the film gate and press downward on the film loop so as to lengthen the loop.

(2) When the loop coincides with the threading guide line on the projector frame, remove the finger. It will be found that the clicking has ceased, the picture is now in frame, is clear, and the jumping has disappeared.

*k.* Below is a table showing the size picture that may be obtained with lenses of various focal lengths and with the screen set at varying distances from the projector.





*Figure 8—Removal of Condenser Lens From Lamp Housing*

PROJECTION TABLE

Projection Distance	Picture Width				
	1" Lens	1½" Lens	2" Lens Supplied	2½" Lens	3" Lens
10 Ft.....	3'9"	2'6"	1'10"	1'6"	1'3"
16 Ft.....	6'0"	4'0"	3'0"	2'4"	2'0"
20 Ft.....	7'6"	5'0"	3'9"	3'0"	2'6"
25 Ft.....	9'4"	6'3"	4'8"	3'9"	3'1"
32 Ft.....	11'11"	8'0"	6'0"	4'9"	4'0"
40 Ft.....	14'11"	10'0"	7'5"	6'0"	5'0"
50 Ft.....	—	12'6"	9'4"	7'6"	6'3"
64 Ft.....	—	—	11'11"	9'7"	8'0"

l. Most 16 mm film is printed from 35 mm negatives and because of the inherent processes required in reducing the image from a 35 mm frame to a 16 mm frame, a certain amount of jumpiness is introduced, and will be noticed in the projected image. If a critical test is desired to determine if jumpiness in the picture is due to the film or to incorrect adjustment of the projector, it is recommended that an especially perforated picture jump film be used for the test.

10. **Adjustments For Field Upkeep.**—The design of this equipment is such that adjustments and maintenance are kept to a minimum throughout the life of the equipment.

a. *Oiling Procedure*

(1) Before each show place five (5) drops of oil in each of the two oil pipes on the top of the projector. See Figure 8. (This was also covered under Section II, paragraph 6-c, Installation.)

b. *Cleaning*

As explained in Section II, paragraph 6-d, Installation, remove all dust and foreign matter from the following points with a soft, lint-free cloth immediately before each performance.

- (1) Reflector
- (2) Condenser Lens (See Figure 8.)
- (3) Picture Aperture
- (4) Projection Lens
- (5) Sound Optical Mirror
- (6) Photocell
- (7) Exciter Lamp
- (8) Sound Optical Unit

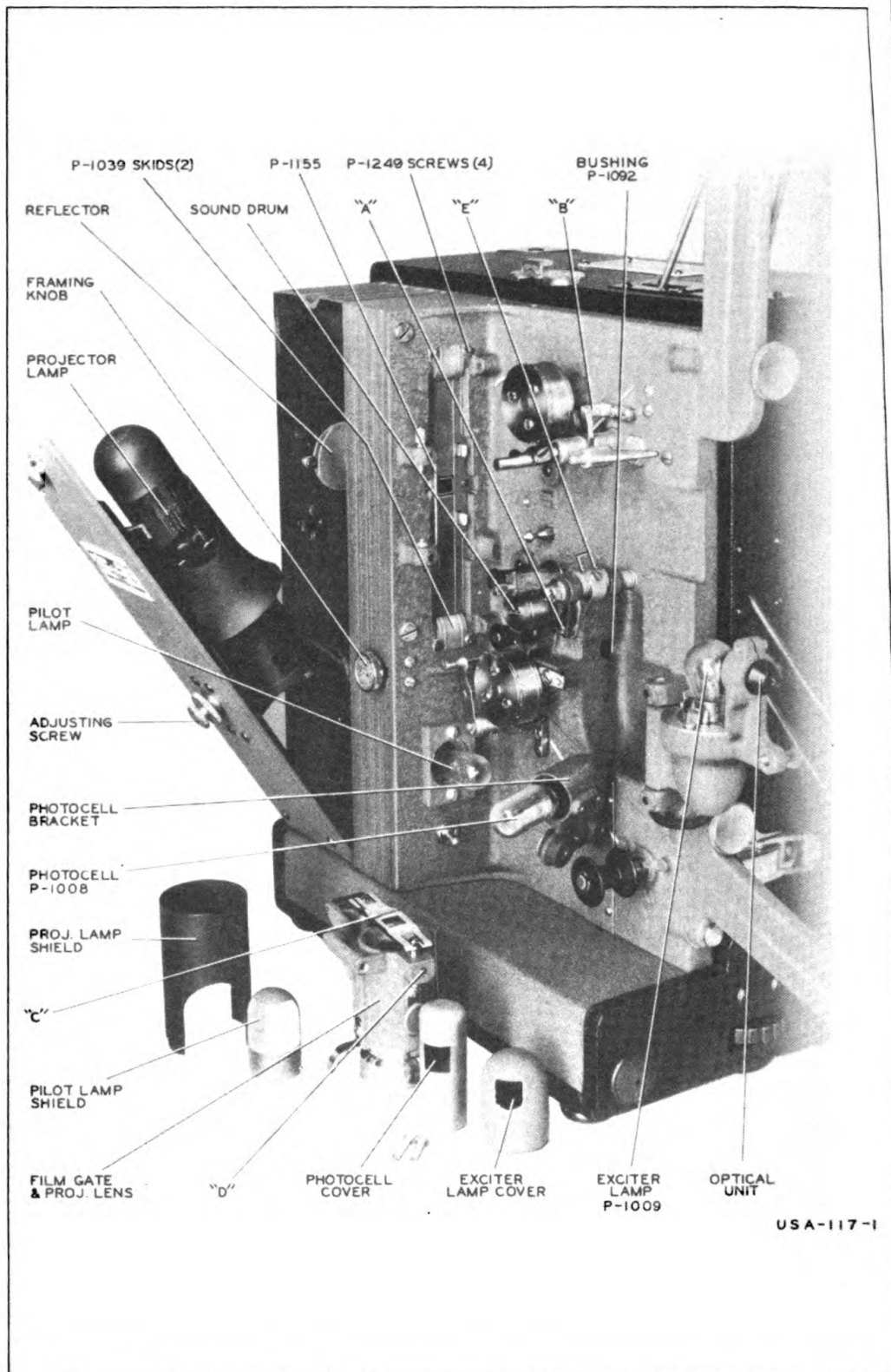


Figure 9—Projector—Operating Side—Partially Disassembled

*c. Replacement of Lamps, Fuses, and Tubes*

(1) **Exciter Lamp**—The exciter lamp is of the pre-focused type and when seated properly in its socket no further adjustment is necessary. To replace the exciter lamp: (See Figure 9.)

(a) Unscrew the thumb bolt that holds the sound bracket to the projector frame, and swing the sound bracket out from the frame being careful not to damage any film which may be threaded.

(b) Lift off the exciter lamp shield by tilting it slightly away from the sound optical unit.

(c) Turn and lift the exciter lamp in a counter-clockwise direction until the holes in the flanges on the lamp base line up with the pins in the lamp socket. The lamp may then be lifted from the socket.

(d) Insert a new lamp into the socket with the holes in the base flange over the pins in the socket and the slot in the base coinciding with the locating pin on the socket. Twist the lamp in a clockwise direction until it locks in place.

(e) Clean the lamp envelope and replace the shield.

(2) **Projection Lamp**—The projection lamp is mounted inside a properly ventilated housing. Forced cooling is provided by means of a blower mounted on the projector motor shaft. Never open the lamp housing while the lamp is burning as damage to the lamp may result. To replace the lamp: (See Figure 9.)

(a) Lift off the lamp shield.

(b) Press down hard on the lamp and turn counter-clockwise until the lamp is released from the bayonette type socket.

(c) Lift out the lamp.

(d) Insert a new lamp in the socket with the fan shaped flanges on the lamp matching the openings in the socket.

(e) Press down hard and twist it one-fourth turn in a clockwise direction where it will lock in place.

(f) Before replacing the lamp shield, clean the glass envelope carefully with a soft, lint-free cloth. Fingerprints will bake into the glass if not removed.

(g) Clean the lamp reflector and the condenser lens then close the lamp housing.

(h) Ordinarily replacement of a projection lamp will not require any further adjustment, however, should the screen illumination not be uniform after the installation of a new lamp, proceed as follows:

(1) Remove all film from the projector.

(2) Hold a white card or sheet of paper (about 8½" x 11") in the front of the projector at arms length and focus the projector until a sharp image of the aperture is seen on the card.

(3) By means of the thumb adjusting screw on the lamp housing door, move the projection lamp back and forth until a position is found where the illumination on the card appears uniform within the aperture image. If moved too far to either side, a shadow or band of lower brilliancy will be observed along the side of the aperture image on the card.

(4) When the position of the lamp that gives uniform illumination has been determined, lock the lamp in that position by tightening the locking nut on the thumb adjusting screw.

(5) If it is impossible to obtain uniform illumination by means of this adjustment, another projection lamp should be tried.

(3) Photocell—It is seldom necessary to replace the photocell. When this is required the following procedure should be followed:

(a) Loosen the knurled thumb screw that holds the sound optical bracket in place and swing the bracket away from the frame and out of the way of the photocell.

(b) Remove the two round-head machine screws and washers that hold the photocell bracket in place. (See Figure 9.)

(c) Pull the photocell bracket away from the projector frame far enough that the photocell cover can be removed.

(d) Remove the photocell cover and the photocell by lifting each straight up from the photocell bracket. The photocell has a three prong tube type base. Spacing of the prongs is such that the cell can be inserted in the socket in only one position.

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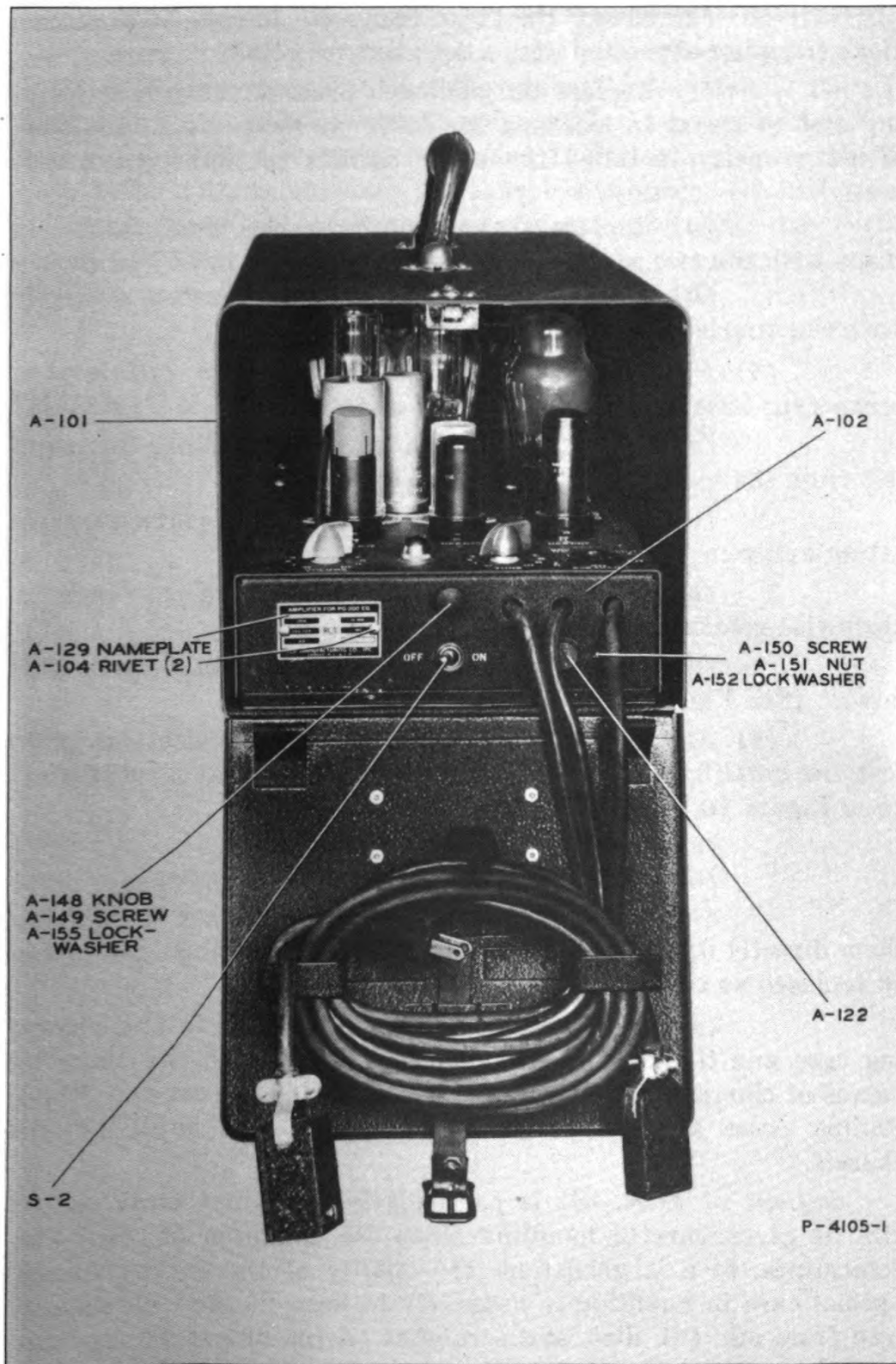


Figure 10—Amplifier—Cover Open

(e) Insert the new photocell in the socket and clean the glass of the cell with a soft, lint-free cloth.

(f) Replace the photocell cover which has a locating slot to assist in locating the cover in the correct position. When properly installed the cover admits the light rays correctly.

(g) Replace the photocell bracket and fasten in place with the two screws and washers removed in (b) above.

(h) Close the optical bracket and fasten securely with the knurled thumbscrew.

(4) Pilot Lamp—The pilot lamp has a candelabra screw type base and may be replaced as follows: (See Figure 9.)

(a) Lift off the lamp cover by pulling straight out from the socket.

(b) Unscrew the lamp with counter-clockwise rotation and remove.

(c) Insert the new lamp and tighten in place by clockwise rotation.

(d) Replace the lamp cover with the open side down. (See Figure 5.)

(5) Amplifier Tubes—When it becomes necessary to test the amplifier tubes or to replace tubes proceed as follows: (See Figure 10.)

(a) Open the door of the amplifier case.

(b) Pull the chassis forward out of the case.

(c) Remove tubes in the usual manner by lifting them directly upward from the socket. They may then be tested or replaced as required.

(d) When the chassis is pushed back in the carrying case and the door closed, it is held in place in the case by means of clamps on the back of the case and on the cover. These clamps press against flanges on the front and back of the chassis.

*d. Care of Film.*—It is particularly important that sound film be given careful handling since the condition of the film determines, to a large extent, the quality of the performance. Special care in handling is necessary to keep the film clean and free from oil. Oil, dirt, and scratches on the film seriously impair the quality of the sound reproduction by introducing ex-

traneous background noises. Proper care of film requires that any damage should be repaired immediately, even though slight. This will prevent further, and possibly more serious damage. When it becomes necessary to splice a film, use a reliable splicer and follow the directions carefully. If not spliced correctly the film will not run through the machine properly. Before using the splicer see that it is clean, otherwise a poor splice may result.



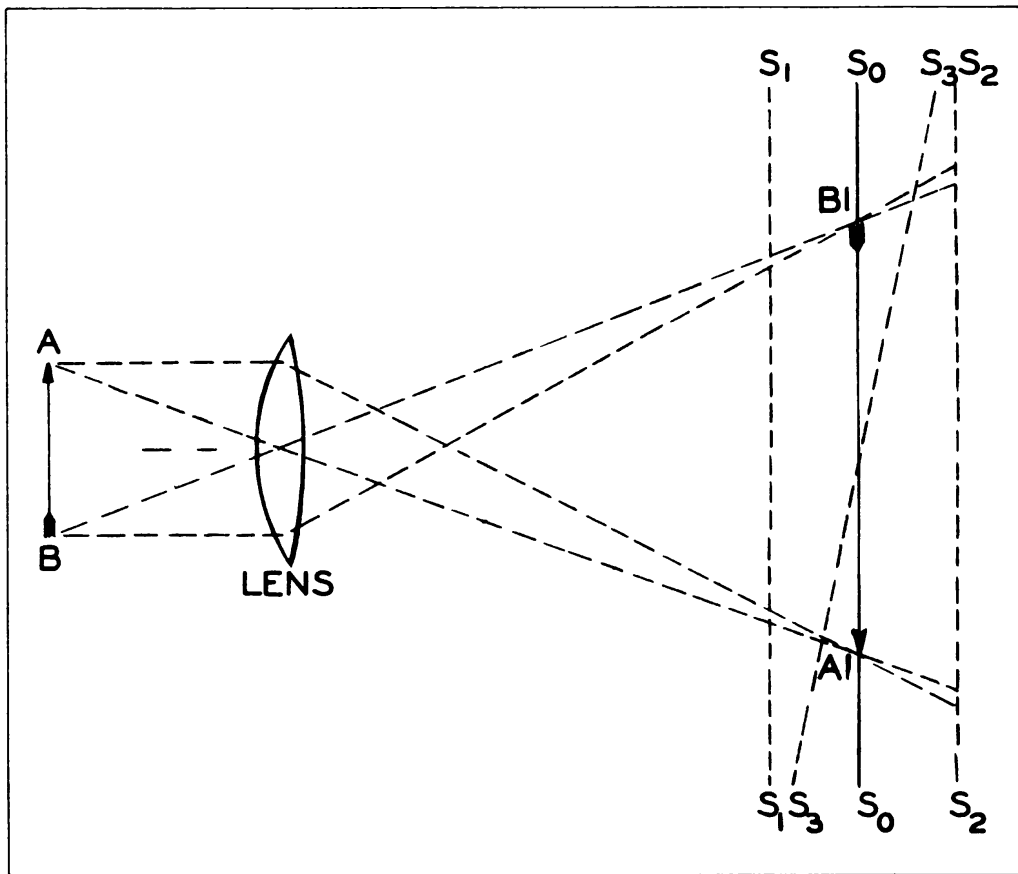


Figure 11—Image Projection

## SECTION III—FUNCTIONING OF PARTS

### 11. General

*a.* This equipment is composed of three units, a projector, an amplifier, and a loudspeaker. These three units, when connected properly and operated with a motion picture film of the proper type, create the illusion of a moving image and reproduce the sound associated with the action of such image.

*b.* The illusion of an image in motion is possible because the visual nerve centers in the human brain are unable to adapt themselves completely to rapid changes in the object viewed by the eyes. A motion picture is actually a presentation of a series of snapshots, taken by a motion picture camera in very rapid succession, covering a period of action by the subject. Each of these snapshots differs from the preceding one by a very small amount.

When such a series of snapshots is viewed by the eye, the brain retains an impression of each image for a short period and blends it with the following image, thus creating the illusion of motion. This effect is known as "persistence of vision".

*c.* The addition of sound to motion pictures gives added life and realism since the sound is synchronized with the picture in such a way that the reproduced sound corresponds at all times with the action of the picture.

### 12. Projection of Images

*a.* Images of an object may be projected upon a screen by means of a lens if the distances can be adjusted so that all of the light radiated from each point on the object is brought to a focus at corresponding points on the screen. Figure 11 illustrates the formation of an image  $A_1 B_1$  of an object  $AB$ , on the screen  $S_0 S_0$  by a converging lens.

*b.* For purposes of illustration consider only the light rays coming from the two points  $A_1$  and  $B_1$ , one at each end of the object. One of the rays coming from  $A$  will pass through the optical center of the lens and strike the screen at  $A_1$ . Another ray from  $A$  parallel to the axis of the lens will be refracted by the lens and also fall on the screen at point  $A_1$ . Any other ray from  $A$ , incident upon the lens, will also strike the screen at point  $A_1$ . Likewise all the rays from  $B$  will strike the screen at  $B_1$ , and in the same manner, light from all the points of the

object will be brought to a focus at corresponding points on the screen and thus an image of the object will be formed on the screen.

c. The process of adjusting the distance between the object and the lens to form an image upon the screen is called focusing. By referring to Figure 11 again it may be seen that, if the screen was located at  $S_1 S_1$  instead of at  $S_0 S_0$ , the light from point A would not be brought to a point on the screen but would cover a small area causing the image to be blurred, etc. Likewise, if the screen was at  $S_2 S_2$  the image would be blurred because the rays would have diverged before striking the screen.

d. From the above it can be seen that if the screen was in the position  $S_3 S_3$  it would be impossible to obtain a sharp focus of the image over the entire screen. *It is, therefore, extremely important that the screen be mounted perpendicular to the line of projection.*

### 13. Projection of Motion Pictures

a. Motion pictures are projected in much the same manner as the simple object illustrated in Figure 11, with the exception that the motion picture film is the "object" and light rays pass to the lens through the film (object) instead of being reflected from it. Figure 12 illustrates schematically the theory of operation of a motion picture projector.

b. In order to illuminate the screen with sufficient light for comfortable vision it is necessary to illuminate the picture on the film to a very high intensity. This would scorch the film were it not that the film moves past the aperture very rapidly.

c. To obtain the illusion of motion the pictures are projected onto the screen in rapid succession. (At the rate of 24 per second.) This is accomplished by means of an intermittent mechanism, the operating part of which is a pull-down claw. This claw has an oscillatory motion so that it operates to pull the film down the height of one picture (or frame) each time it operates. During the return part of the claw operating cycle the film is held stationary.

d. If the image of the film were projected on the screen while the film was in motion, the picture on the screen would be blurred and streaked. To avoid this, a shutter mechanism is

provided that cuts off the light from the film while the film is in motion. This shutter revolves once for each complete cycle of the intermittent mechanism. The shutter consists of a circular disc with segments cut out leaving three blades, which results in the light beam being interrupted three times for each frame, once while the frame is moved into position, and twice while it is held stationary. This rapid interruption of the light beam is not apparent to the eye which sees a constant illumination of the screen. The shutter blade that interrupts the light beam while the film is moving is known as the "pull-down" blade, and the other two blades are called "anti-flicker" blades. It is important that the shutter be timed accurately, otherwise the picture will have white streaks, known as "travel ghosts" running up and down.

**14. The Motion Picture Projector.**—Figure 12 shows a schematic diagram of the projector mechanism.

*a.* The projection lamp is the source of illumination for the picture. The reflector back of the lamp reflects the light emitted from the back of the lamp, so that the direct light is reinforced, thus increasing the effective light of the lamp.

*b.* The condenser lens in front of the lamp concentrates the light on the aperture.

*c.* The aperture is a metal plate with a rectangular opening slightly smaller than the film picture, and limits the light beam to the proper size required for the illumination of the film picture.

*d.* The shutter is used to prevent streaking, blurring, and flicker as explained above.

*e.* The upper reel holds the roll of film that is to be run through the projector.

*f.* The upper or feed sprocket unwinds the film from the upper reel and maintains a loop of film above the picture gate. This sprocket runs at a constant speed.

*g.* The film gate holds the film flat and in focus against the aperture and consists of a swinging lens barrel assembly and a flat pressure shoe with a rectangular hole larger than the aperture. The shoe holds the film against the aperture plate and maintains a constant pressure on the film.

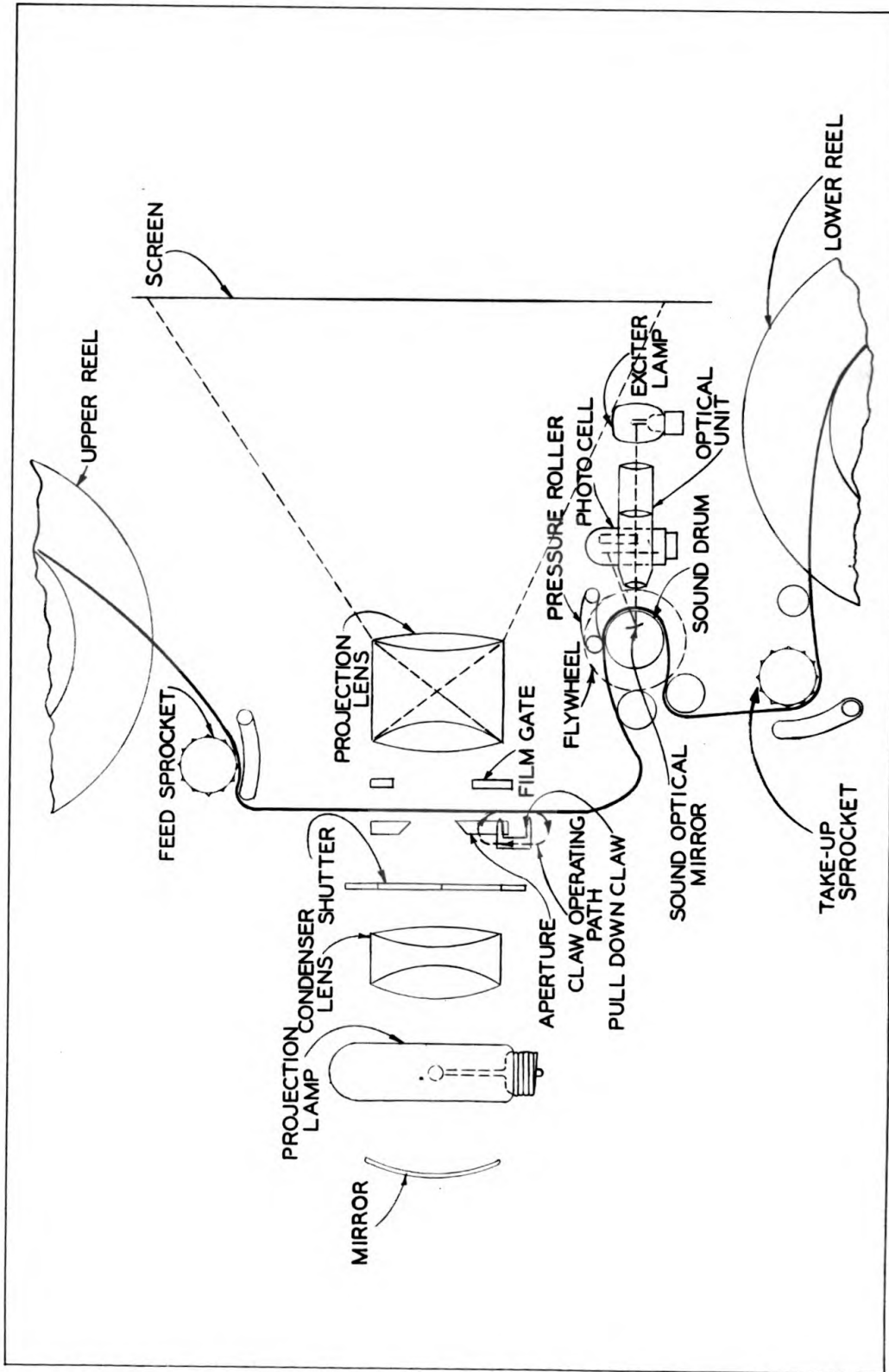


Figure 12—Schematic Diagram of Sound Motion Picture Projector

*h.* The pull down claw pulls the film past the aperture exactly the height of one picture frame at a time, at the rate of 24 times a second. The motion of the claw is such that the picture is permitted to remain stationary during the interval when it is being projected on the screen.

*i.* The sound drum revolves at a constant speed and assists in translation of the film sound track into sound as will be explained later under "Sound Reproduction."

*j.* The lower, or hold-back sprocket also runs at a constant speed and serves to maintain the proper loop below the film gate and keep the lower film moving at a constant speed.

*k.* The lower, or take-up reel is driven through a friction clutch which permits slippage between the reel and drive mechanism so as to keep a constant pull on the film regardless of the diameter of the roll of film on the reel.

*l.* The projection lens projects the highly illuminated film picture to the motion picture screen, as was described in paragraphs 12 and 13.

**15. Sound Reproduction.**—Refer again to Figure 12 which shows the equipment necessary for the translation of the sound track on the film into electrical impulses.

*a.* The sound track on the film consists of a narrow path near the edge of the film opposite the sprocket holes. This path has been exposed over part or all of its width depending upon the variations in the sound that was recorded. The exposed portions of the path are light, while the unexposed portions are dark. See Figure 13 for a pictorial representation of the sound track. A sound track of this type is known as a variable area track.

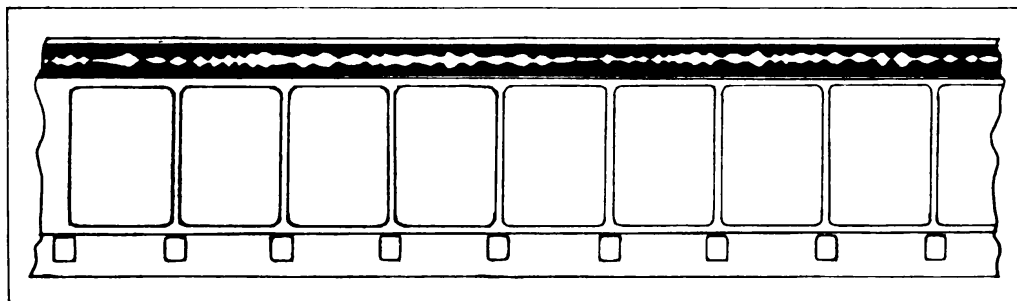


Figure 13—Sound Track on 16 mm. Film

*b.* Light from an exciter lamp is concentrated into a very small line by the optical unit. This line is slightly wider than the sound track. The optical unit is adjusted so that this line comes to a focus exactly at the emulsion side of the film, and that the center of the line coincides with the center of the sound track.

*c.* Constant position of the film is obtained by means of the guide and pressure rollers. The sound drum functions to maintain a constant speed of the film past the scanning point. This is accomplished by means of a damped flywheel which causes the drum to rotate at a constant speed. Friction of the film against the drum holds the film to the same speed as the drum surface.

*d.* The film is wider than the sound drum and the portion of the film that overlaps the drum carries the sound track. It will be seen, therefore, that the width of the narrow light beam after passing through the film will vary exactly in accordance with the variations in the width of the exposed portion of the sound track.

*e.* Mounted directly behind the portion of the film that overlaps the drum, and just inside the drum itself, is the sound optical mirror. This mirror is adjusted to an angle so that the light rays passing through the sound track are reflected into the photocell. The amount of current flowing through the photocell varies with the amount of light striking it, therefore, the current through the cell will vary in accordance with the variations in the sound track.

*f.* The output of the photocell is connected to the input of the vacuum tube amplifier where the current variations are amplified to a point sufficient to operate the loudspeaker which converts the electrical impulses into sound waves.

**SECTION IV—SERVICING AND REPAIR**

**16. General.**—In order to obtain the best results from this equipment, it should be inspected at regular intervals and such adjustments made as may be necessary to restore it to its original operating condition. A number of adjusting points are provided in order to enable the service engineer to make proper adjustments. Various views of the projector showing adjusting points and parts, are included in these instructions.

**17. List of Tools.**—The following is a list of tools that will be required for proper servicing of the projector unit.

- |  |   |
|--|---|
| 1 open end wrench $\frac{3}{8}$ "            | 1 Allen wrench No. 6                            |
| 1 open end wrench $\frac{1}{4}$ "            | 1 Allen wrench No. 8                            |
| 1 small screw driver $\frac{1}{8}$ " blade   | 1 Allen wrench No. 10 (Long)                    |
| 1 medium screw driver $\frac{3}{16}$ " blade | 1 eccentric wrench (For adjusting optical unit) |
| 1 medium screw driver $\frac{1}{4}$ " blade  | 1 high frequency 5,000 cycle film               |
| 1 pair long nose pliers                      | 1 buzz track film                               |
| 1 adjusting pin (for adjusting optical unit) |   |

In addition to the above an output meter is required for adjusting the sound optical unit, and a volt-ohm-millimeter, having a sensitivity of 1,000 ohms per volt, will be necessary for checking the amplifier.

**18. Trouble Location and Remedy Chart.**

DESCRIPTION	POSSIBLE CAUSE	REMEDY
a. Loses both film loops	Upper feed sprocket shoe out of adjustment	See paragraph 25 for shoe adjustment
b. Loses lower loop	Dirty claw	Clean claw—Remove dirt and emulsion
	Broken sprocket hole	Remove and splice film
	Film binding in gate	Check for thick splices Check side pressure springs
	Bad splices	Repair film



DESCRIPTION	POSSIBLE CAUSE	REMEDY
	Claw out of adjustment	Adjust claw, paragraph 27
c. Loses upper loop	Film pressure shoe too loose	See paragraph 25
	Pressure roller too tight	See paragraph 29
d. Projector noisy	Claw out of adjustment	Adjust claw, see paragraph 27
	Loose shutter bearing	Replace bearing
	Projector belt frayed	Replace belt
	Claw not engaging sprocket holes	Check to see if lower loop lost. Restore as in Pgh. 9j
e. Tears sprocket holes	See a and b above	
f. Travel ghost	Shutter out of adjustment	See paragraph 28 for adjusting
g. Picture motion unsteady See Pgh. 9-l	Improperly threaded	Check loops for proper length
	Side pressure springs on aperture plate weak	Replace springs
h. Picture indistinct or low illumination	Projection lens dirty	Clean
	Condenser lens dirty	Clean
	Mirror dirty or damaged	Clean or replace
	Projector lamp blackened, blistered, etc.	Replace lamp
	Low voltage	Use a booster transformer
i. Film scratched	Film shoe	Clean or replace
	Sound drum roller	Clean
	Aperture Plate	Clean or replace
	Emulsion hardened on film gate shoe	Clean—See paragraph 21
	Emulsion hardened on aperture plate	Clean—See paragraph 20

DESCRIPTION	POSSIBLE CAUSE	REMEDY
	Dirty and sluggish guide rollers	Clean—See paragraph 20
j. Picture—but low or no sound	Amplifier not turned “On”	Turn switch “On”
	Power cord not connected to proper power source	Connect to power source designated on nameplate
	Fuse in amplifier burned out	Replace fuse
	Loudspeaker not connected	Connect to amplifier
	Improper volume control adjustment	Adjust control
	Defective photocell	Replace photocell
	Defective radiotrons	Replace radiotrons
	Burned out exciter lamp	Replace lamp
	Photocell not properly seated in its socket	Remove and re-insert until it is well seated
	Low voltage	Use booster transformer
	Defective voice coil in loudspeaker mechanism	Replace voice coil—See paragraph 34
	Burned out oscillator coil	Replace coil
	Defective transformer	Replace transformer
	Improperly adjusted optical system	Adjust—See paragraph 22
	Dirty optical system	Clean
	Improperly adjusted or dirty sound mirror assembly	Clean or adjust—See paragraph 23
	Defective connector plug in loudspeaker or defective connections to plug	Replace plug or repair connectors—See paragraph 34
	Defective field coil in loudspeaker	Replace field coil—See paragraph 34

DESCRIPTION	POSSIBLE CAUSE	REMEDY
<i>k.</i> Sound—No picture	Projector lamp burned out	Replace lamp
	Lamp switch “off”	Check and turn “on”
<i>l.</i> Tone wavy or “wows”	Sound drum shaft or bearings	Replace
	Pressure roller, tension	Adjust or replace spring
	Pressure roller, dirty	Clean—See paragraph 20
	Damaged drum	Replace
	Damaged flywheel	Replace
	Dirty drum	Clean—See paragraph 20
	Sticky guide rollers	Clean—See paragraph 20
<i>m.</i> Tone distorted	Sticky bearings	Replace
	Amplifier defect	Check and replace defective parts
<i>n.</i> Sound intermittent	Exciter lamp, plug, and socket	Check connections
	Photocell, plug and socket	Check connections
	Oscillator tube	Replace
	Oscillator coil	Replace
<i>o.</i> High hum level	Amplifier—Open grid or open filter capacitors	Check and replace defective parts
<i>p.</i> Reproduction noisy	Tubes	Replace
	Switches	Replace
	Volume control	Replace
	Loose connections in amplifier	Repair
	Loose connections in sockets and plugs	Repair
<i>q.</i> Microphonic	Amplifier tubes	Replace
	Dirty contacts in plugs, sockets, etc.	Clean or replace

## 19. Lubrication

*a.* The projector motor has been lubricated sufficiently for about 1,000 hours of operation. Apply several drops of S. A. E. No. 20 oil (good grade) in each motor oil hole after each 1,000 hours of operation.

*b.* Lubricate the projector through the two oil pipes on the top of the case. Apply about 5 drops of the MI-1331 oil supplied with the projector to each oil pipe before each performance.

*c.* No oil is required on the two guide rollers near the sound drum or on the idler roller near the take-up reel.

*d.* Clean and apply one drop of oil to each bearing of the sound pressure roller after each 1,000 hours of operation.

*e.* Clean all shafts and bearings before oiling and apply a few drops of light oil (S.A.E. No. 20) when replacing. All shafts and bearings should be checked, cleaned, and oiled at the end of each 1,000 hours of operation. Remove any excess oil with a clean, lint-free cloth.

**CAUTION: NEVER PERMIT EXCESS OIL TO REACH PARTS OF THE MACHINE OTHER THAN THOSE DESIGNED FOR LUBRICATION. OIL IN THE WRONG PLACES MAY CAUSE DAMAGE AND INFERIOR RESULTS.**

*f.* Apply a light film of grease, (Lubriplate No. 130) to the teeth of all gears, to the worm gear, and to the working surface of the in-and-out and up-and-down cams.

**20. Routine Cleaning.**—Dependent upon the conditions under which the projector is being operated, but at intervals of not more than each 1,000 hours of operation, the projector should receive a careful cleaning. This can be done in conjunction with the lubrication mentioned in paragraph 19.

*a.* Remove all film from the projector.

*b.* Clean all guide rollers with Carbon Tetrachloride on a soft, lint-free cloth, or with a medium stiff bristle brush moistened with Carbon Tetrachloride.

*c.* Clean the two sprockets on the projector using a medium stiff bristle brush moistened with Carbon Tetrachloride. Be certain that all dust deposits or emulsion are removed from the sprocket teeth.

d. Remove the film gate (see paragraph 23 c) and inspect the aperture plate and the film gate shoe very carefully. Remove any accumulated emulsion with a soft cloth, or if necessary, use an orange stick or a flat pointed toothpick to clean the corners. After cleaning feel over the entire surface of both the aperture plate and the film gate shoe to be sure that nothing abrasive remains on the two parts.

e. Clean the sound drum with a soft cloth moistened with Carbon Tetrachloride. Do not touch the reflector mirror mounted beside the drum.

f. Clean the pressure roller with a soft cloth moistened with Carbon Tetrachloride.

*NOTE: Lower the roller carefully onto the drum. Never allow it to snap against the drum as the drum may be damaged.*

g. Open the lamp house door and remove the condenser lens. Remove the condenser lens by grasping the lens housing with the thumb and forefinger of the left hand, lifting the flat spring latch with the forefinger of the other hand, and pulling the lens directly to the rear of the lamp housing. (See Figure 8.). Clean both lenses carefully as follows:

(1) Remove lint, grit, etc., with a soft camel's hair brush.

(2) Clean with a chamois or soft cloth moistened in benzine.

*NOTE: Carbon tetrachloride may be used if benzine is not obtainable.*

(3) Polish by rubbing gently with a soft cloth or chamois.

(4) Remove any lint by means of a soft camel's hair brush.

See Figure 22 for order of assembly of lenses.

**CAUTION: THE USE OF GLASS CLEANERS OR SOLVENTS OTHER THAN BENZINE OR CARBON TETRACHLORIDE SHOULD BE AVOIDED SINCE DAMAGE MAY BE CAUSED TO THE SURFACE BY IMPROPER CLEANING.**

h. Polish the reflector mirror carefully with a soft, lint-free cloth, using glass cleaner if necessary. Inspect for flaws.

*i.* Remove the projector lamp and polish the glass envelope, using glass cleaner if necessary. See paragraph 10 *c* (2) (*f*).

*j.* Remove the projection lens from the jacket and brush off any dust with a soft camel's hair brush. If necessary clean as outlined in *g.* above, being very careful not to leave dust or lint on this lens. When replacing the lens in the jacket tighten securely by means of the screw "N" of Figure 5.

*k.* Remove the exciter lamp cover and clean the glass envelope of the lamp. Replace the cover with the opening in the correct position. (See Figure 5).

*l.* Brush the sound drum mirror and the photocell with a soft camel's hair brush to remove any dirt or lint. Be very careful of the mirror as it may be dislodged by rough handling.

*m.* Carefully remove any dust or dirt that has accumulated elsewhere on the projector frame or chassis. Take care that dust or lint is not brushed or thrown onto parts already cleaned.

## 21. Preparation for Servicing or Repair

*a.* If adjustments or mechanical replacements are to be made on the projector, it will be necessary in some cases to remove the projector from the carrying case. In this event, proceed as follows:

(1) Place projector in operating position and remove the cover.

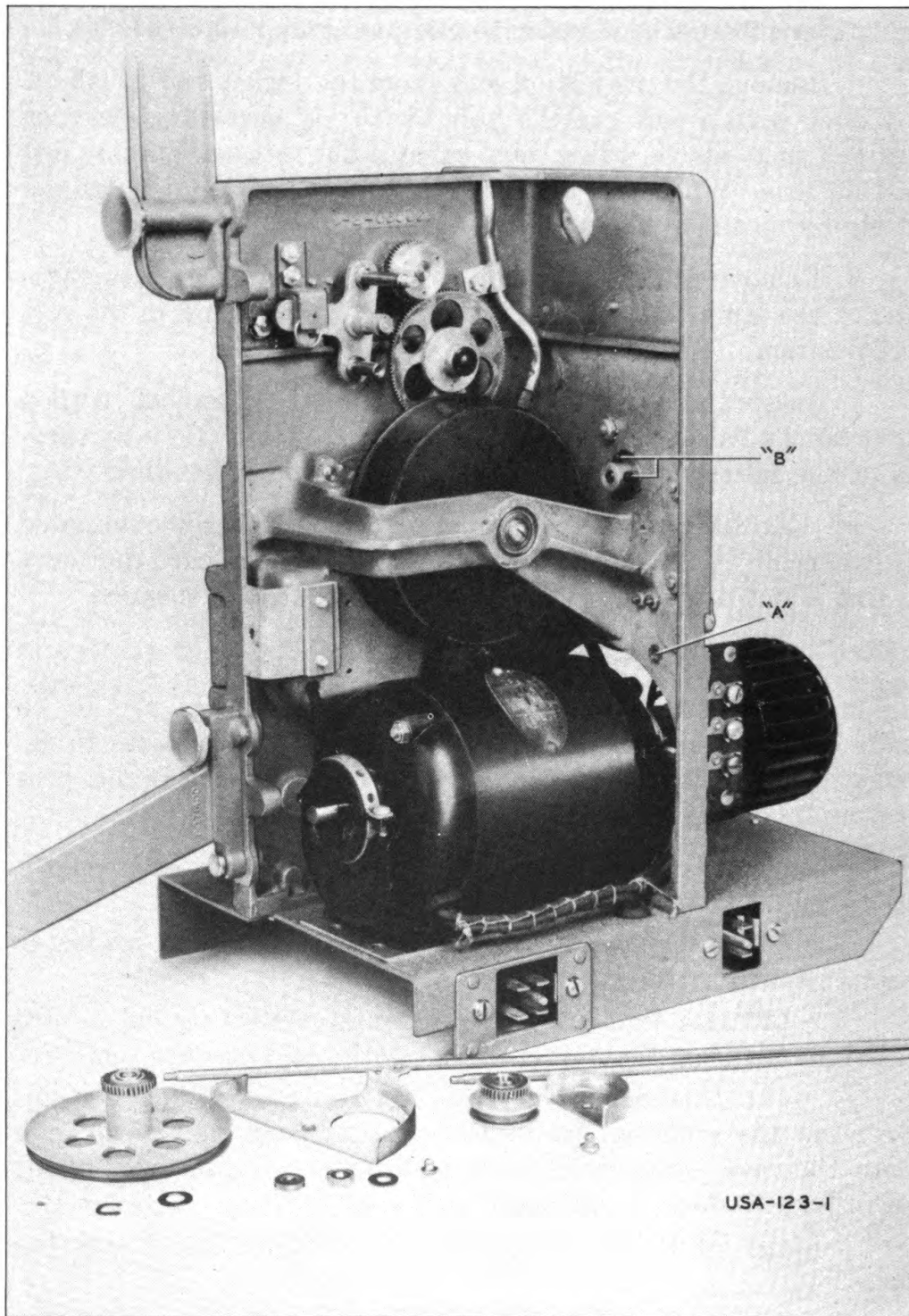
(2) Remove the four screws that hold the projector mechanism to the case.

(3) See that all power or interconnecting cables are disconnected from the unit, and that both reel arms are removed.

(4) Disassemble the take-up and rewind belts by unscrewing the ends at the junction point, then pull both belts from the case. (The belts must be twisted or unscrewed about seven turns before the ends will part.)

(5) Slide the mechanism outward until it clears the case.

*b.* When adjusting or replacing certain parts it is also necessary to remove the projection lamp housing. This is done as follows:



*Figure 14—Projector—Case Removed—Takeup and Rewind Pulleys and Belts Disassembled*

(1) Remove the two screws marked "A" in Figure 5 from the front of the lamp housing. These screws are located just to the left of the film gate.

(2) Remove the No. 10 round-head machine screw on the drive side of the projector just above the drive motor (see hole "A" of Figure 14). This screw fits a threaded hole in the post of the lamp housing casting.

(3) Remove lamp housing by pulling it gently toward the rear of the machine being careful not to damage the blower motor or the motor shaft.

(4) In most cases it will not be necessary to disconnect the leads from the terminal board, however, if it becomes necessary to do so, they may be replaced according to the color coding of the terminal board and the leads.

## 22. Adjustment of Optical Bracket Assembly

*a. Exciter Lamp and Socket.*—The exciter lamp is of the prefocused type and when seated properly in its socket no adjustment is necessary. Should an exciter lamp socket require replacing, remove the three flister-head mounting screws (also hold the light shield holding clips) and lift the socket out of the bracket. Disconnect the two leads from the socket, and connect them to the new socket. Replace socket in bracket and tighten in place with the three screws removed after checking to be sure that the insulation is in good condition and the wiring is not grounded against the bracket.

*b. Lateral Positioning of Sound Light Beam.*—To center the light beam on the film sound track proceed as follows:

(1) Thread a loop of buzz track film with the emulsion side of the film toward the exciter lamp.

(2) Operate the projector as though sound film were being run.

(3) Loosen the cap nut "B" of Figure 5, and adjust the knurled nut "C" until no sound is heard from the loud-speaker.

### *c. Focusing Light Beam on Sound Track*

*NOTE: This adjustment should not be attempted unless an output meter is available.*



In order to reproduce sound-on-film recording properly, it is essential that the optical system light beam be focused correctly on the sound track of the film. Incorrect focus causes loss of volume and reduced high frequency response.

To adjust this focus:

(1) Thread a constant frequency test film loop in the projector with the emulsion side toward the exciter lamp (5,000 or 6,000 cycles).

(2) Connect the output meter across the loudspeaker voice coil circuit.

**CAUTION: NEVER OPERATE THE AMPLIFIER WITHOUT A SUITABLE LOAD ACROSS THE OUTPUT TRANSFORMER.**

(3) Operate the projector as though a sound film were being run.

(4) Turn up the amplifier volume until a reading is obtained on the output meter. Break the seal and loosen clamping screw "G" (Figure 5) until the sound optical unit may be shifted with a slight drag against the bracket. Insert the eccentric wrench into hole "H" of the casting bracket, and insert a small pin in hole "O" of Figure 5. Adjust the horizontal position of the sound optical unit by turning the eccentric wrench, and the rotational position with the pin, simultaneously until maximum output is obtained as indicated by the meter. The unit is then in correct focus and screw "G" should be tightened carefully, making sure that the reading of the output meter does not change during the tightening process.

*d. Vertical Positioning of Sound Light Beam.*—This adjustment has been made in the factory and no further adjustment should be necessary. If required, the height of the optical bracket can be adjusted by means of the set screw "J" and pivot pins "K" until the sound optical system is in the same horizontal axis as the sound drum. (Figure 5.)

**23. Adjustment of Sound Mirror Assembly**—It is important that the sound light beam from the mirror be reflected directly onto the cathode element of the photocell. The mirror bracket assembly is designed so that, when assembled on the projector, this is accomplished. A slight adjustment for the mirror is provided by means of clearance between mounting screws "A" in Figure 9, and the respective mounting holes in the mirror

bracket assembly. Should the mirror become loosened and break away from the bracket, it is advisable to replace the entire mirror bracket assembly. Proceed as follows:

*a.* Remove the projector from the case as explained in paragraph 21 *a.* Do not remove the lamp housing.

*b.* Loosen thumb screw “D” of Figure 5 and swing optical bracket away from the projector frame.

*c.* Swing the projection lens and film gate open and remove it from the projector by holding it in the right hand while the hinge pin “F” is raised. (See Figure 5.) After this pin is raised, the lens and gate can be withdrawn from the machine.

*d.* Lift the pressure roller arm assembly “E” (Figure 5) and tie it securely to the upper sprocket shaft by means of a short piece of cord.

*e.* Hold the sound drum shaft from rotating by grasping the sound drum between the thumb and forefinger of the left hand and remove the round-head machine screw and washer (“A” of Figure 15) from the flywheel (rotary stabilizer) side of the sound drum shaft assembly.

*f.* Withdraw the sound drum shaft from the operating side of the projector, taking care not to damage or lose either of the spacers or the spring, or the bearings of the drum shaft assembly.

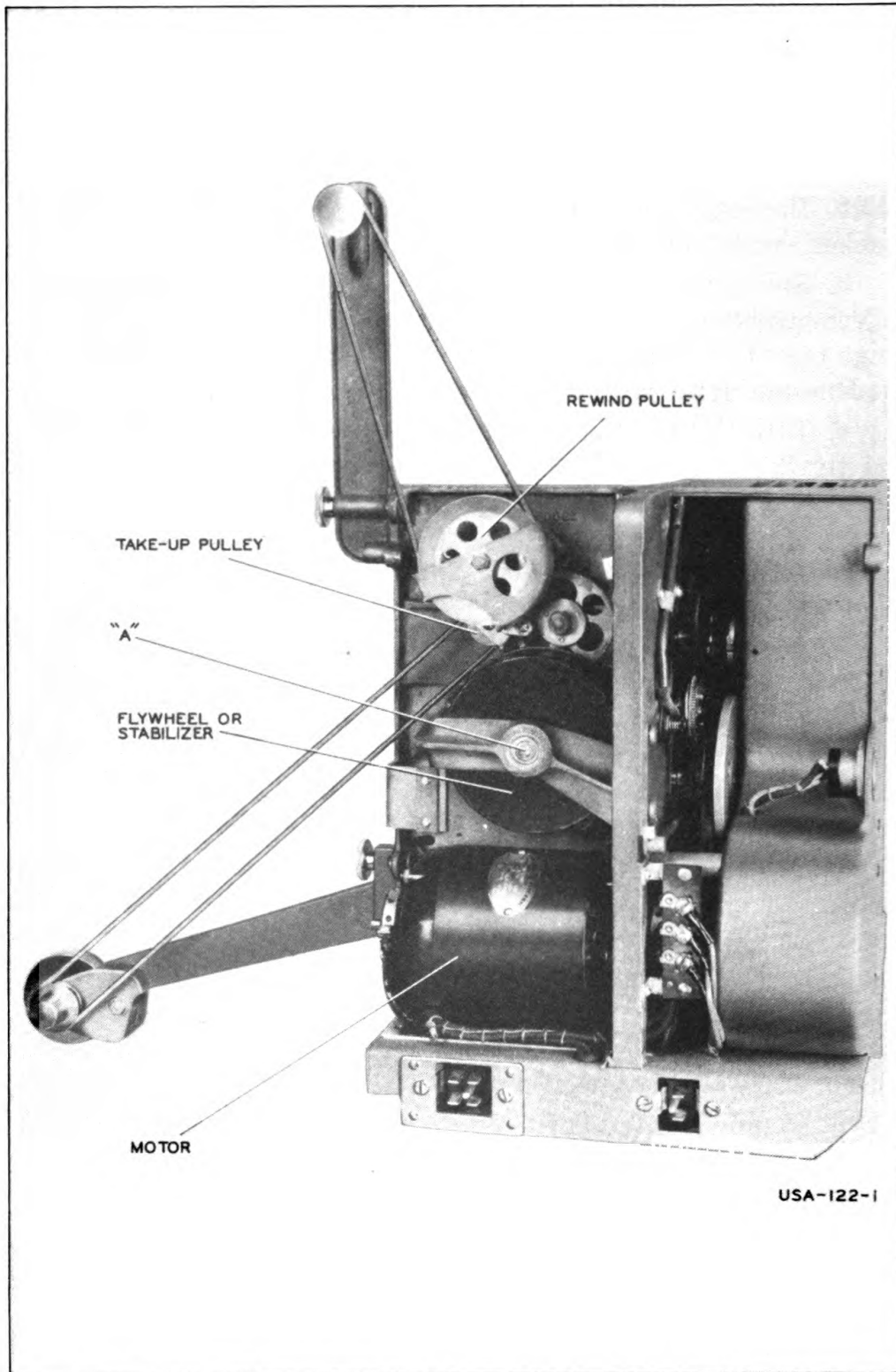
*g.* Remove the three screws “A” (Figure 9) while holding the mirror bracket assembly and remove the assembly from the projector.

*h.* Assemble the new sound mirror bracket with the three screws “A” (Figure 9) just engaged in the holes. This will provide the necessary clearance between the long spacer and flywheel, while the flywheel is inserted as described in *j* below.

*i.* Assemble the short spacer on the drum shaft, making sure that no particles of dirt are between the drum and the spacer.

*j.* Insert the drum shaft assembly through the front ball bearing, assemble in order the long spacer, the flywheel, the spring, and the back bearing.

*k.* Again holding the sound drum between the thumb and forefinger, lock the assembly in place with the retaining washer and the round-head machine screw removed in *e.*



*Figure 15—Projector—Case Removed—Showing Takeup and Rewind Belts Threaded*

*l.* Tighten the three screws (“A” of Figure 9) of the mirror bracket assembly evenly in place, leaving just loose enough that the bracket can be rotated slightly by hand. With the optical system turned “on”, rotate the bracket slightly to obtain the maximum reflected light on the photocell cathode. When this position is determined, tighten the three screws to hold the bracket in place.

*m.* Check to see that the adjustment was not disturbed by the tightening process.

**24. Adjustment of Film Sprocket Shoe Assembly** — In order that the film may pass smoothly around the sprockets and at the same time retain its proper position, it is necessary that the film shoes be adjusted properly, as follows :

*a.* With the shoe in place, there should be equal clearance between the shoe assembly and both sides of the sprocket.

*b.* Adjust the relative position of sprocket and shoe by means of steel washers on the sprocket shaft. However, if it is not possible to obtain clearance between the outside face of the sprocket and the shoe, move the shoe out by means of the spacer on the pivot shaft.

*c.* Tighten sprocket to shaft so that there is no end play, but that the sprocket is free to be rocked by hand without appreciable effort.

*d.* Tighten the set screw that holds the shoe in place on the pivot.

*e.* Adjust the film clearance between shoe and sprocket as follows :

(1) Place a double thickness of film between the sprocket and the shoe and close the shoe, allowing the spring to hold it in place.

(2) Place the angle bracket “B” (Figure 9) against the shoe stop nearest the sprocket and tighten the screws to hold in place.

(3) Open the shoe and remove one thickness of film.

(4) Close the shoe and check to see that the film is

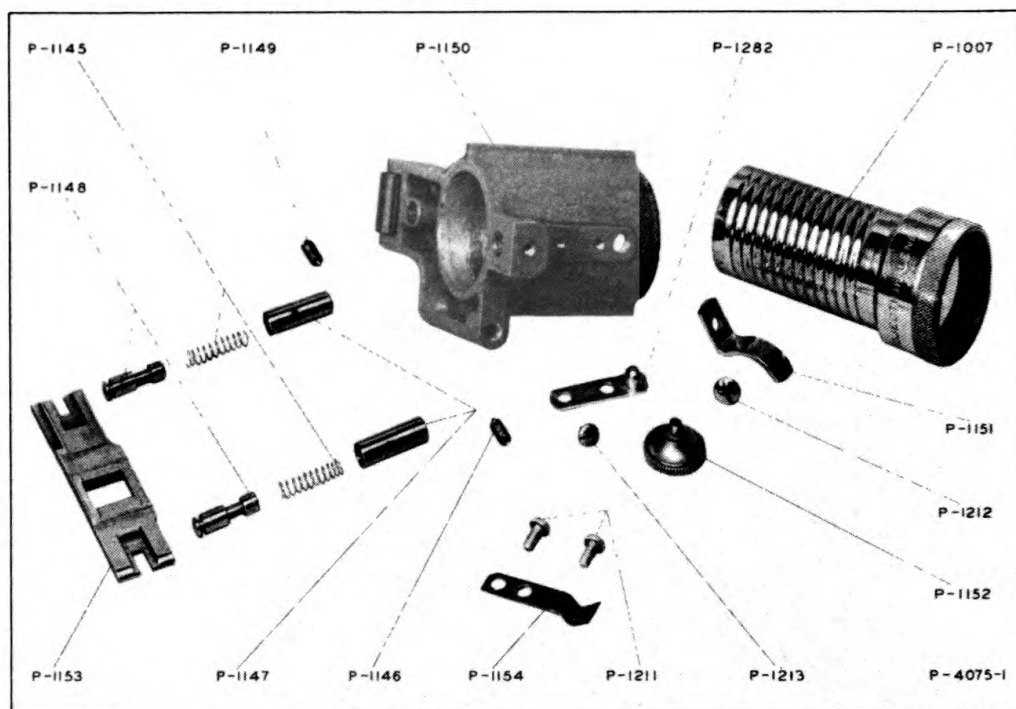


Figure 16—Film Gate—Disassembled

not damaged on the edges, and that the film is free on the sprocket. The shoe should hold the film in a position that the sprocket teeth engage the center of the sprocket holes.

**25. Adjustment of Film Pressure Shoe.**—In order that the film will be held in the proper position against the aperture plate, and that the required tension is maintained on the film, it is necessary that the film pressure shoe (C of Figure 5) exert the correct pressure on the film as it passes through the film gate. This pressure may be checked and adjusted as follows:

a. See that the pull down claw is in the withdrawn position so that it will not engage the sprocket holes in the film.

b. Place a section of regular film in the film gate with the emulsion side toward the film shoe. See that the gate is closed securely.

c. Using an eight ounce spring scale hooked through a sprocket hole, pull the film through the gate. The drag indicated by the scale should be from 4 to 5 ounces. If the reading differs greatly from this, remove the film gate (see paragraph 23c) and proceed as follows:

(1) Loosen the Allen head screws D of Figure 9 that hold each of the two plunger assemblies in place just enough to withdraw the shoe and the two plungers from the plunger bushings, without releasing the bushings. (About one turn.) (Also see Figure 16.)

(2) Remove the pressure springs from the plunger bushings.

(3) Insert new springs in each plunger bushing after making certain that the bushing and spring are free from dirt or grit.

(4) Apply one drop of oil on each shoe plunger.

(5) Assemble the plungers to the shoe and insert the plungers into the plunger bushings. Each plunger must move in and out *very freely*.

(6) Tighten the Allen head screws to hold the assembly in place.

(7) Check for freedom of movement. The film shoe must move in and out very freely. Apply finger pressure at any point on the shoe. The shoe must return to its original position by itself.

d. Replace the film gate on the projector.

## 26. Replacement of "V" Drive Belt

a. Remove projector from case.

b. Remove lamp housing.

c. Loosen the two Allen head set screws on the pulley and gear hub.

d. Turning the pulley by hand, force the belt off of the pulley on the side toward the motor, at the same time withdrawing the pulley and gear from the shaft.

The belt can then be lifted off over the blower rotor on the motor shaft without removing the blower.

e. Install the new belt in the reverse order to the steps listed above. Tighten the set screws in the pulley and gear assembly so that the drive shaft has 0.001 of an inch end play. Place a small screwdriver between the front bearing and the worm to assist in taking up the end play.

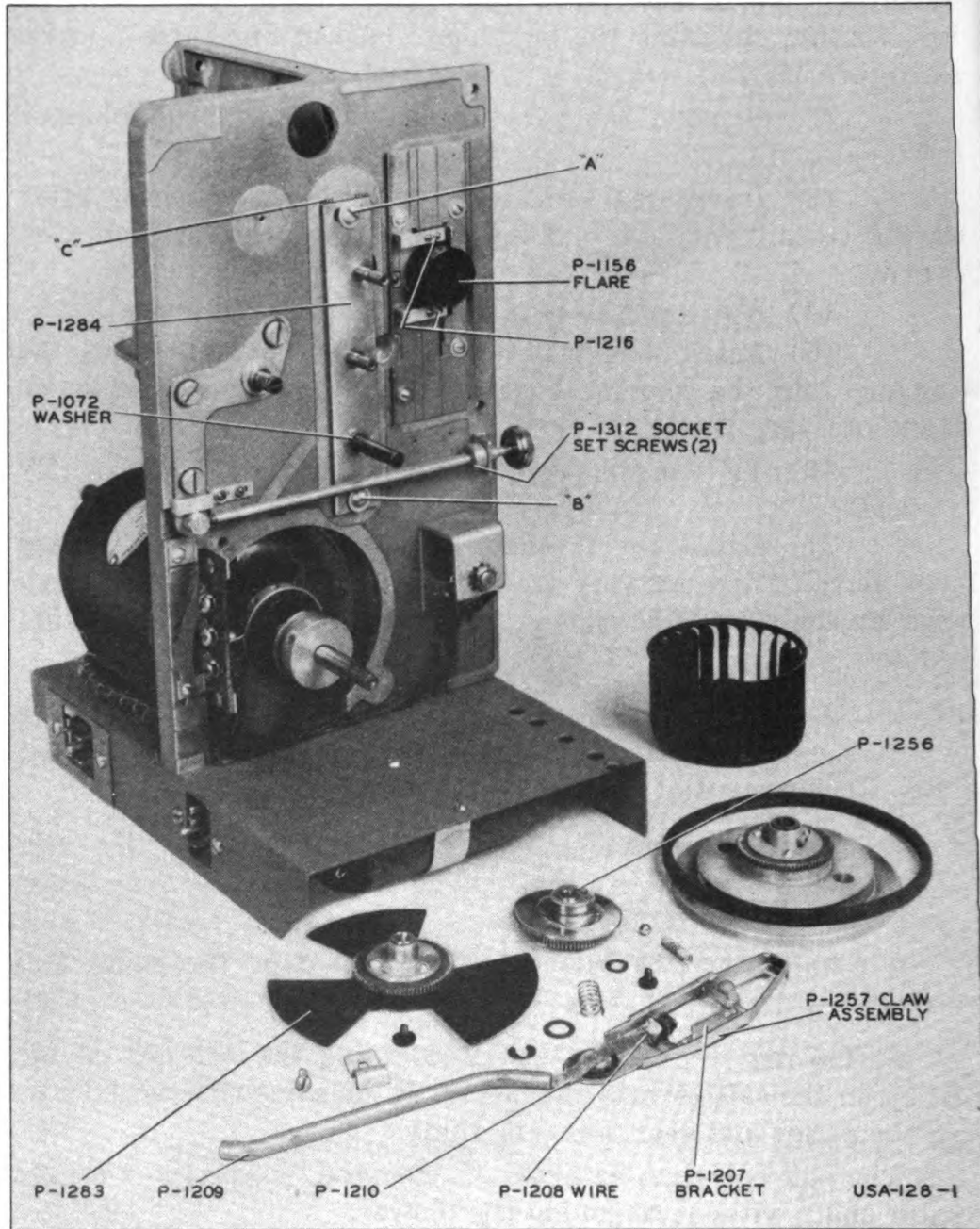


Figure 17—Projector—Rear View—Intermittent Mechanism Removed

f. Adjust the belt tightness by raising or lowering the motor. This is done by means of shims under the motor. The belt should be just tight enough to prevent slippage.

**27. Adjustment of Film Pull Down Claw.**—The film pull down claw imparts the intermittent motion to the film in synchronism with the operation of the shutter. The adjustment of this claw is very important and the finest quality picture cannot be obtained unless the claw operation is properly adjusted. Remove the projector from the case and remove the lamp housing. Make adjustments as follows:

a. *Positioning Intermittent Body.*—Line up the centers of the framing pivot, intermittent eccentric, cam shaft, and the adjusting screw for the in-and-out cam in a horizontal position. When all of these centers are lined up, the claw will be in the half way down position of the stroke. (See Figure 17.)

b. *Up and Down Motion.*

(1) Loosen screws “A” and “B” of Figure 17. Figure 18 shows parts in place and screw “A” may be seen between the shutter blades. The lower screw (“B” of Figure 17) may be reached through hole “B” (Figure 18) with a medium size screwdriver.

(2) Move gear plate (“C” of Figure 18) as far to the right as possible then tighten screw “A” temporarily.

(3) Place a strip of film in the gate and close the gate.

(4) Rotate the flywheel (“D” of Figure 18) by hand (clockwise) and observe the claw action to see if the claw moves the film down each time it moves downward.

(5) If not, again loosen screw “A” and move the gear plate to the left one division of the scale (“C” of Figure 17) which will be seen stamped into the frame just above the gear plate. Tighten screw “A” and again rotate the flywheel and check for movement of the film by the claw.

(6) If the claw still does not engage the sprocket holes in the film, move the gear plate another scale division to the left and repeat the test.

(7) When the position of the gear plate is found where the claw first engages the film sprocket holes, move the plate to the left an additional two and one-half scale divisions and tighten both screws to hold it securely in place.



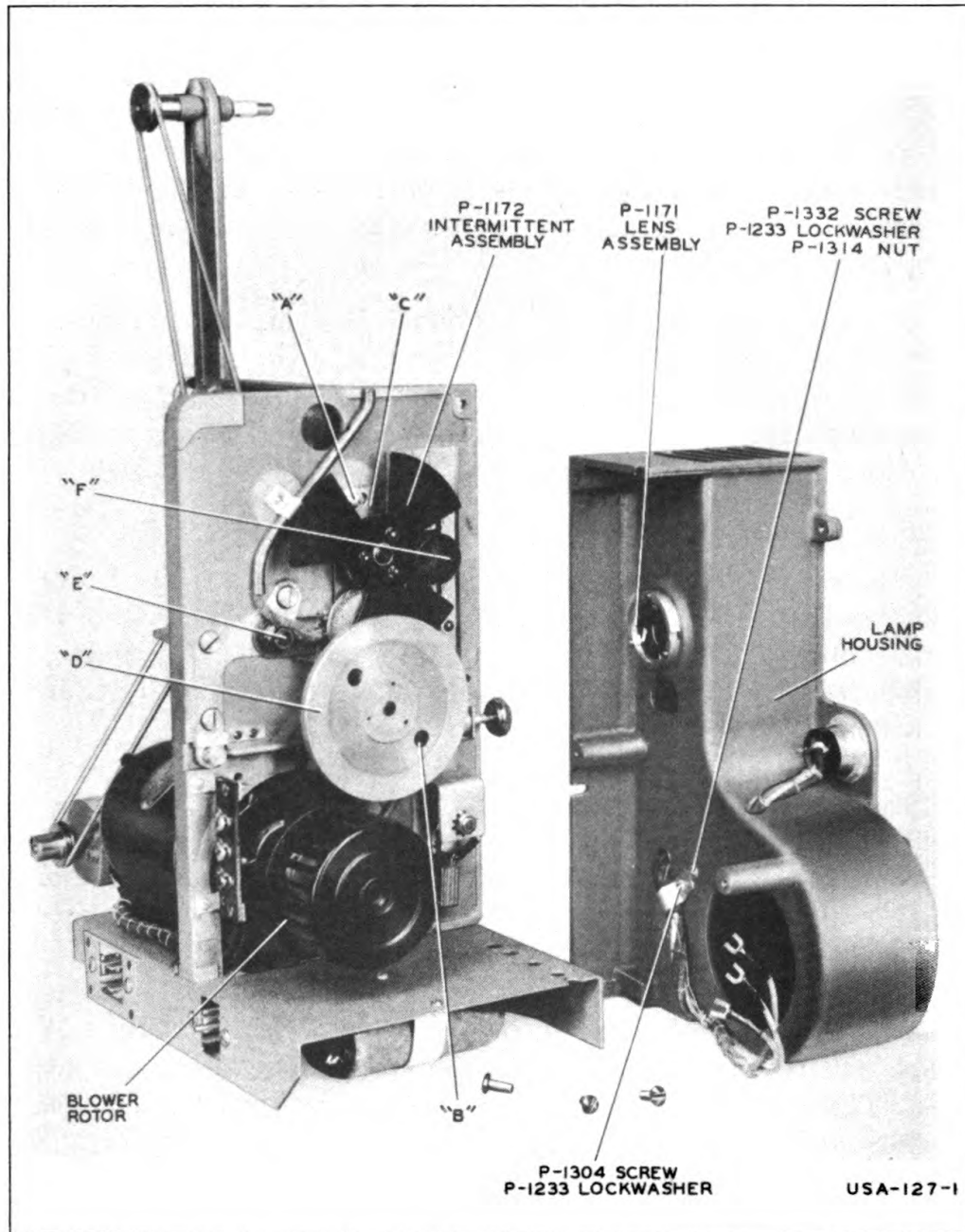


Figure 18—Projector—Rear View—Lamp Housing Removed

*c. Lateral adjustment of Claw.*—Adjust the lateral position of the claw when it is in the half way down position by means of the eccentric pivot “E” (Figure 18) (to permit adjustments of the eccentric pivot loosen the two set screws “B” of Figure 14) until the claw clears the outside edge of the sprocket holes in the film by about .012 of an inch. To aid in judging this distance, it may be helpful to know that the radius of the sprocket hole corners is .010 of an inch. Therefore the claw should be positioned so that it is just inside the straight portion of the sprocket hole and just clears the curved corner of the hole. *The eccentric pivot must be in its lowest position before starting this adjustment.* The pull down claw must engage the sprocket holes at all times during the downward travel and the film must run smoothly when using the framing adjustment in any position.

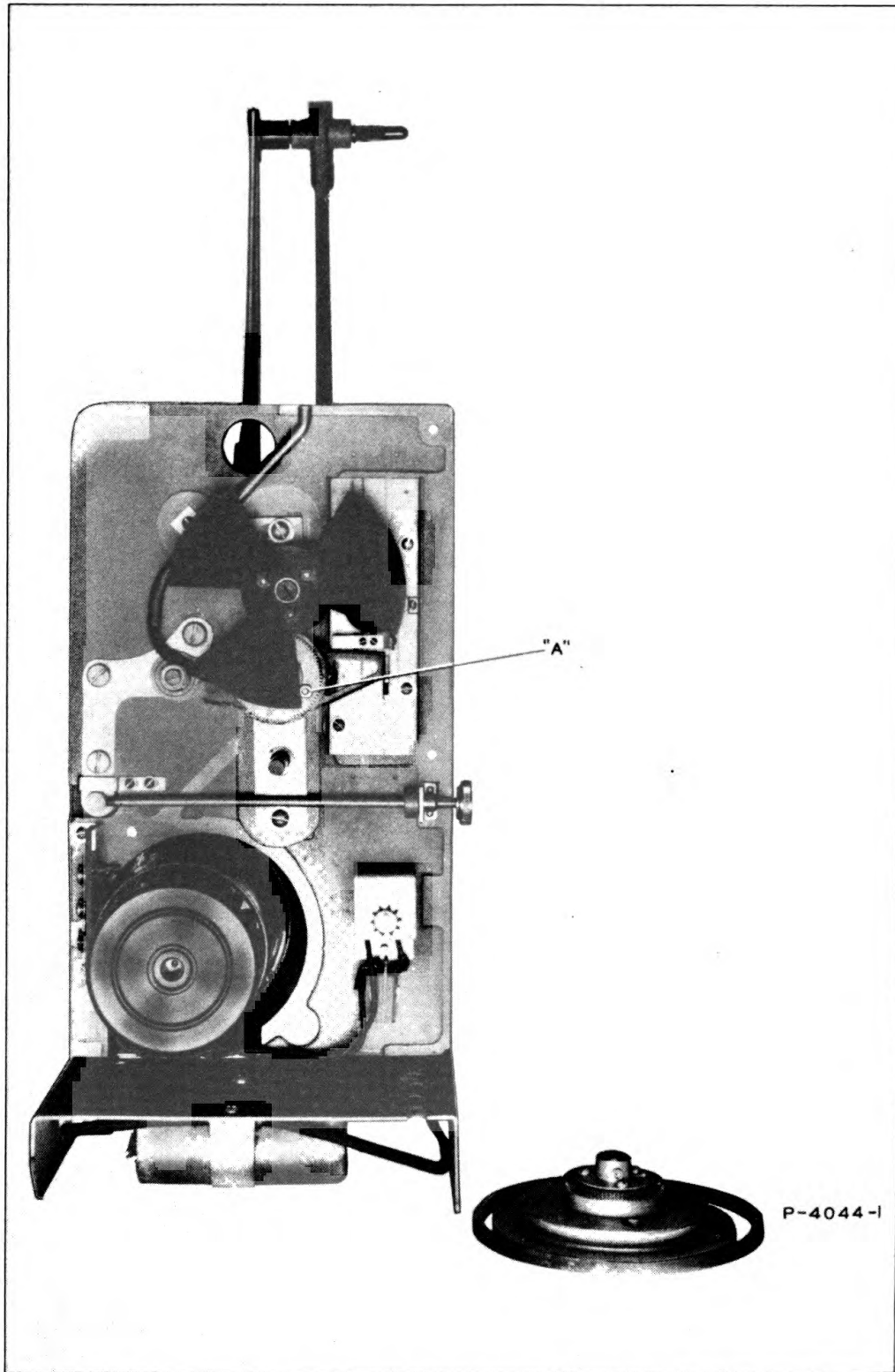
*d. In-and-Out Motion.*

(1) Remove the flywheel (“D” of Figure 18) by loosening the two Allen set screws and forcing the belt off the pulley while turning the flywheel and pulling it from the shaft. (Refer to paragraph 26 *d.*)

(2) Turn the shutter blades so that the set screw and locking nut “A” on the in-and-out cam gear can be reached. (See Figure 19.)

(3) Loosen the lock nut so that the set screw can be adjusted and adjust the position of the claw so that it protrudes through the aperture plate 0.030 to 0.035 of an inch. This adjustment may be checked approximately by checking the distance between the intermittent body and the back of the aperture plate. This should be approximately  $\frac{1}{8}$  of an inch. A slightly worn “Buffalo nickel” approximates this dimension. After the proper adjustment is found, lock the set screw in place by means of the locking nut.

**28. Synchronization of Shutter and Pull Down Mechanism.**—In order to project an image upon the screen properly and to obtain the desired illusion of motion, it is necessary that the shutter be synchronized with the intermittent mechanism so that the light is cut off from the picture as each frame is being pulled into position in front of the picture aperture. This synchronization is accomplished as follows, assuming that the shutter gear and/or intermittent gear had been removed for replacement or some other reason:



*Figure 19—Projector—Rear View Showing In and Out Adjustment for Intermittent Mechanism*

*a.* Assemble the shutter gear and intermittent gears with the timing holes coinciding.

*b.* With the pull down claw set in the position where it is ready to move downward, assemble the shutter blade on the three screws with the leading edge of the wide blade at the center of the flare ("F" of Figure 18.)

*c.* Assemble the three nuts to hold the shutter blade and tighten in place.

*d.* After this adjustment, if a travel ghost is still noticeable, refinement of the adjustment can be made by loosening the three nuts holding the shutter blade and rotating the shutter blade slightly on the three elongated holes.

*e.* If the travel ghost is seen at the top of the picture, the shutter is lagging behind the claw operation and the blade should be rotated slightly in a clockwise direction.

*f.* If the travel ghost is seen at the bottom of the picture, the shutter is leading and should be rotated slightly counter-clockwise.

*g.* Tighten the three nuts firmly to keep the shutter blade from shifting.

## 29. Sound Pressure Roller Adjustments

*a.* Using a 16 ounce spring scale, lift the pressure roller with it until it just leaves the drum; take the scale reading. Take another reading as the roller is lowered to the point where it is just ready to seat on the drum. The average of these two readings should be 8 ounces.

*b.* Should the pressure be incorrect, it may be adjusted as follows:

(1) Loosen the two Allen head set screws that hold the flat spring anchor to the bracket. ("E" of Figure 9.)

(2) To increase the roller pressure, rotate the spring anchor in a counter-clockwise direction a small amount and tighten the set screws.

(3) Re-check the pressure as in *a* and if not correct again shift the position of the spring anchor until the desired pressure is obtained.

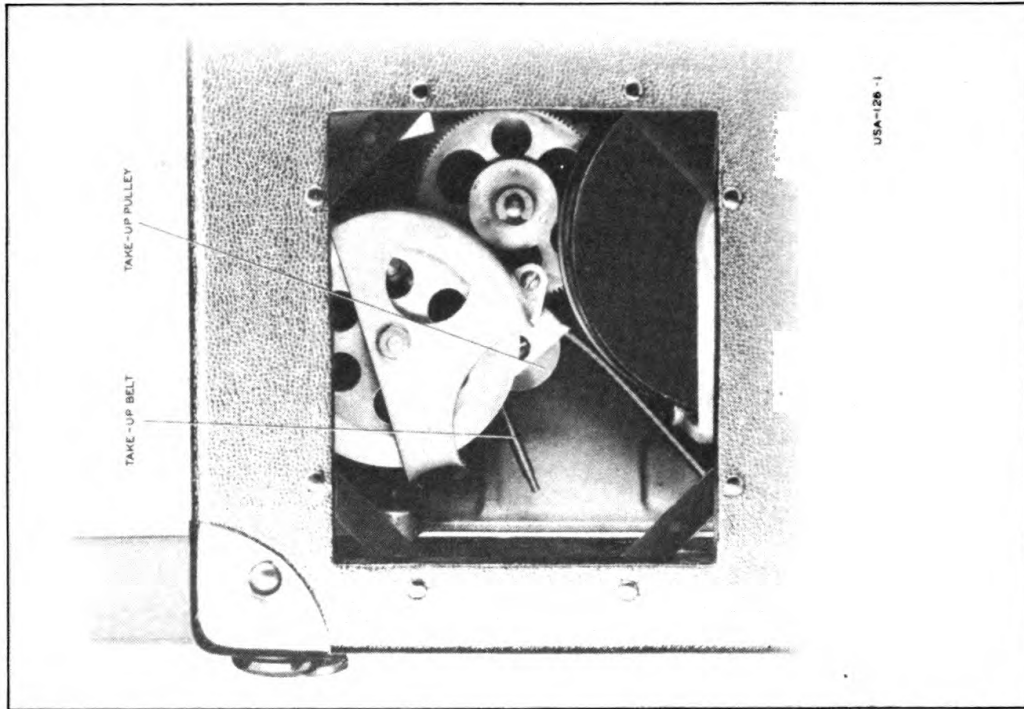


Figure 20—Takeup Belt Threaded Through Pulley

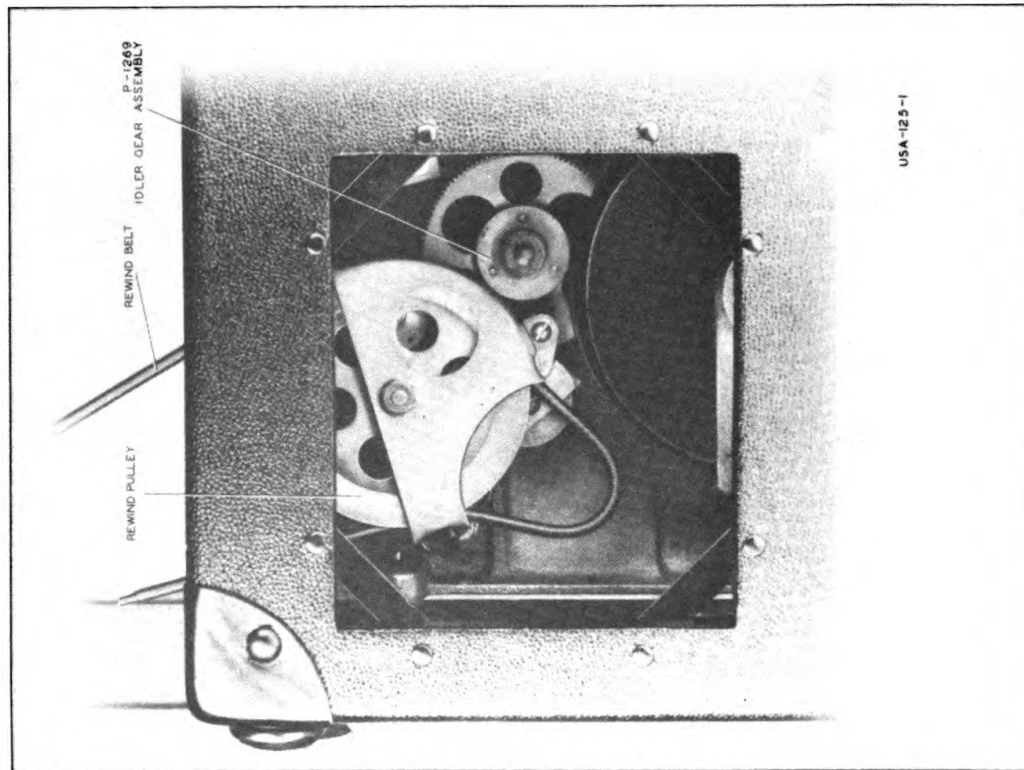


Figure 21—Rewind Belt Threaded Through Pulley

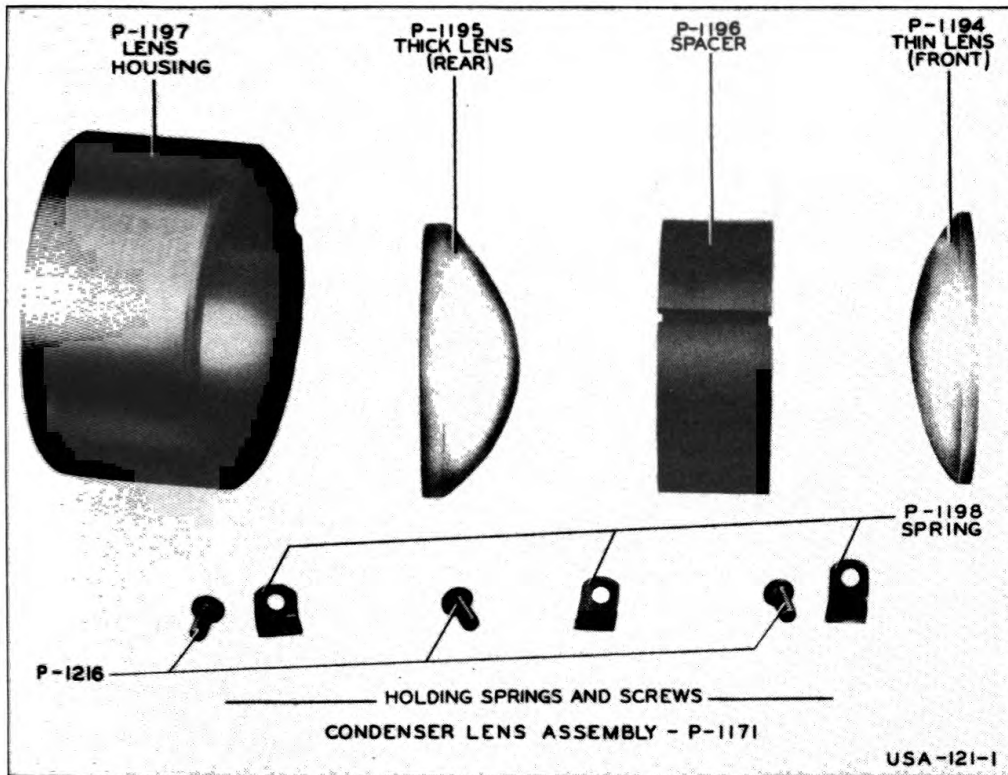


Figure 22—Condenser Lens—Disassembled

(4) Rotation of the spring anchor in a clockwise direction will reduce the pressure.

(5) After the proper adjustment is obtained, see that the two Allen head screws "E" of Figure 9 are tightened firmly in place.

### 30. Installing Take-up or Rewind Belts

a. Figures 20 and 21 show the take-up and rewind belts respectively being threaded through the take-up-rewind mechanism. Note the cover plate removed. Also note that the ends of the belts are taken apart for installation.

b. After a belt is threaded and both ends are protruding from the case, grasp one end in each hand and twist one end seven turns counter-clockwise.

c. Place the two ends together and allow the belt to untwist which will result in screwing the small end into the large one. Assist the spring motion by hand until the two ends are firmly joined.

**31. Servicing The Amplifier.**—The audio amplifier used with this equipment is similar to the audio amplifiers used in radio receivers and public address systems. Service work in connection with such equipment usually consists of locating and replacing defective parts. The following data, when used in conjunction with the schematic and wiring diagrams, gives all of the information required for proper servicing by a competent service man. To assist others in locating trouble and remedying defects, the following discussion is presented:

*a. Caution: Study the safety warning in the front of this book.*

*b.* Check the overall equipment regularly to maintain optimum performance at all times.

The following procedure is suggested:

(1) Mount and connect all units for operation as shown in the overall connection diagram.

(2) Turn "on" the amplifier power switch.

(3) See that the amplifier pilot lamp lights.

(4) With the volume control set to give a moderate output from the loudspeaker, operate the projector. Operate the volume control to check for noiseless operation.

(5) Test the operation of the tone control.

(6) Check the operation of the loudspeaker by listening for undistorted output.

(7) If a tube tester is available, test the tubes and replace if necessary.

*c. Amplifier.*—Should the system be "dead", i.e., no sound is heard when the instructions for operation have been followed, and the line voltage, and the loudspeaker or interconnecting cables have been checked and found to be in operating condition, it is likely that the difficulty will be found in the amplifier. The following procedure is suggested for locating the fault:

(1) Check to see that the power fuse is not burned out.

*NOTE: Never replace a blown fuse with one of higher rating.*

**CAUTION: ALWAYS TURN OFF THE POWER SWITCH BEFORE REMOVING FUSES.**

(2) Replace the tubes of each stage with tubes known to be in good condition.

(3) Voltage Check.—If the trouble persists and power is applied as indicated by the lighted pilot lamp or lighted filaments of the RCA 5U4-G rectifiers, turn off the power switch and remove the amplifier chassis from the case. Remove the chassis bottom plate by drilling out the eyelets. Next turn on the power switch and check all socket voltages as shown in the diagram of socket voltages included as part of these instructions. Any wide variation in reading from those given will indicate the location of the trouble. D-C plate and screen grid voltages should be checked from the respective tube prong to ground.

(4) Listening Test.—Should a tube and socket voltage check fail to locate the cause of the trouble, a “listening” or “signal tracing” test should be made. A pair of headphones connected to test leads through one 600-volt series capacitor of 0.1 mfd. or higher is recommended as a convenient means for listening at each amplifier stage. The projector providing a signal, or other suitable source of sound, one test prod should be connected to the plate contact of the tube socket in the first amplifier stage. The second test prod should be connected to chassis ground, or cathode contact of the tube socket in the first amplifier stage. The same procedure should be followed at each successive amplifier stage. If the signal is heard on one stage, but is not heard on the following stage, the trouble may be due to a defect in the coupling capacitor, volume control, or coupling transformer. Test for an open coupling capacitor by shunting a capacitor of similar value across it. If the signal then appears in the following stage replace the original coupling capacitor as the indication is that it is “open”. A faulty volume control or coupling transformer, or a shorted coupling capacitor can be detected by a d-c resistance measurement.

(5) Continuity Test.—Should the preceding tests fail to locate an amplifier fault, a complete continuity check should be made of the parts and the circuit of the amplifier for short circuits, grounds, or open circuit conditions which could cause the trouble. An ohmmeter is required for the continuity check and the d-c resistance measurement in (4) above. Frequent reference to schematic and wiring diagrams and the continuity test table in these instructions will be helpful.



**32. Conunuity Test Table**  
 Showing Measured Resistance From Terminals To Ground

Terminal No.....	1	2	3	4	5	6	7	8	13	14	15	16
Speaker Recpt.....	0	0	750	0	0	—	—	—	—	—	—	—
Photocell Plug.....	—	—	—	—	—	—	—	—	0	0	1.2 Meg.	.96 Meg.
Exciter Lamp Plug.....	—	—	—	—	—	—	—	—	0	0	—	—
RCA 6J7.....	0	0	336M	1.3 Meg.	1800	100M	0	1800	—	—	—	—
RCA 6J5.....	0	0	122M	44M	500M	44M	0	1200	—	—	—	—
RCA 6N7.....	0	0	134M	12M	500M	134M	0	2200	—	—	—	—
Front RCA 6L6.....	0	0	15M	12.5M	282M	34.5M	0	185	—	—	—	—
Rear RCA 6L6.....	0	0	15M	12.5M	270M	23M	0	185	—	—	—	—
RCA 6F6.....	0	0	15.5M	15.5M	56M	15.5M	0	560	—	—	—	—
RCA 5U4G (Amp.).....	0	15M	0	60	0	60	0	15M	—	—	—	—
RCA 5U4G (Speaker).....	0	910	0	34	0	34	0	910	—	—	—	—

*NOTE: Amplifier controls in maximum clockwise position. All tubes in sockets and speaker cable plugged in. Photo-cell and exciter lamp not connected.*

33. Socket Voltage Diagram.

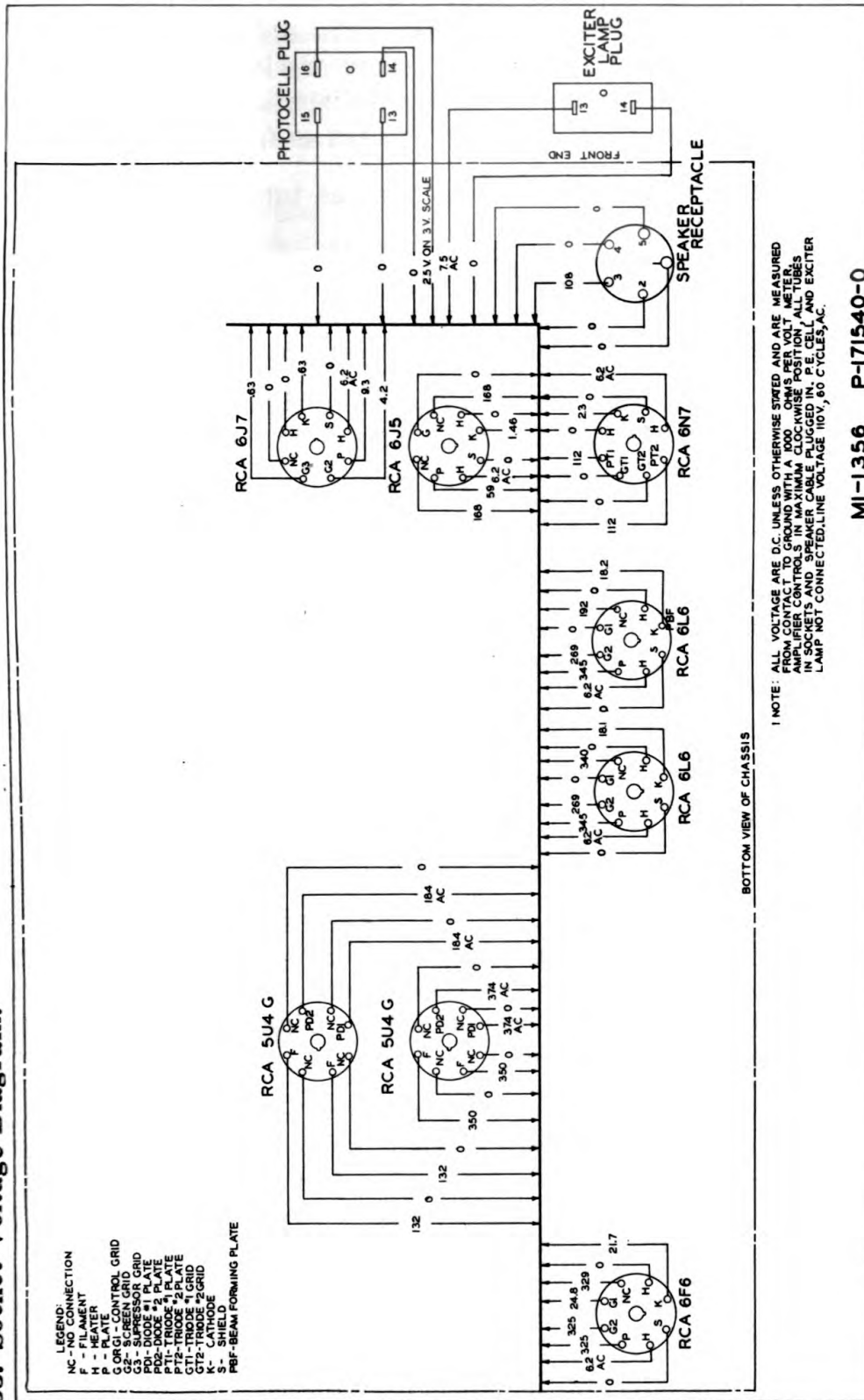


Figure 23—Amplifier Socket Voltage Diagram

**34. Servicing The Loudspeaker.**—The only troubles that might be experienced with the loudspeaker are loose terminal connections, damaged voice coil, damaged diaphragm, or damaged field coil. To correct these troubles, proceed as follows:

*a.* Remove all loose parts such as tubes, lamps, belts, etc., from the loudspeaker case.

*b.* Remove the four screws "A" and "B" of Figure 3-A from the loudspeaker case and withdraw the speaker compartment and partition (made as one unit) from the case.

*c.* Disconnect the speaker cable from the speaker by means of the split connector on the under side of the cone housing.

*d.* Check for open field or voice coils by use of an ohmmeter. The field coils should measure approximately 1,350 ohms and the voice coil approximately  $5\frac{1}{2}$  ohms. The two field coil leads are color coded black/red and black/yellow and are connected to the two connector pins with the closest spacing.

*e.* If voice or field coils are indicated to be defective by the resistance checks, proceed as follows:

(1) To replace the cone and voice coil assembly:

*(a)* Remove the four machine screws "C" of Figure 3-A, together with associated nuts and withdraw the loudspeaker assembly from the case.

*(b)* Disconnect the voice coil leads from the connector plug mounted on the cone housing after noting the manner in which the leads are connected. Remove the two pieces of spaghetti tubing and save.

*(c)* Remove the two No. 8-32 flister-head machine screws that hold the voice coil and cone assembly in place and withdraw the coil and cone assembly from the loudspeaker. See that all cement and any torn sections of the cone are removed from the rim of the cone housing.

**CAUTION: USE EXTREME CARE THAT IRON FILINGS OR OTHER FOREIGN MATTER IS NOT PERMITTED TO ENTER THE AIR GAP BETWEEN THE CORE AND THE TOP PLATE. ANY SUCH FOREIGN MATERIAL WILL RESTRICT THE MOTION OF THE VOICE COIL AND IMPAIR THE EFFICIENCY OF THE LOUDSPEAKER.**

(*d*) Cement a new thin gasket in place against the rim of the cone housing. Coat the face of the new gasket with cement before installing the new cone. Hold the cone and coil assembly loosely in place with the two No. 8-32 screws removed in (*c*).

(*e*) Center the voice coil in the gap by means of centering shims placed around the core between the core and the voice coil.

(*f*) Tighten the two screws to hold the voice coil and cone assembly in place.

(*g*) Cement the dust cap in place to prevent foreign particles entering the air gap.

(*h*) Cement the heavy gasket to the rim of the cone.

(*i*) Slip the two pieces of spaghetti tubing removed in (*b*) over the voice coil leads and connect them to the terminals of the connector plug from which the old leads were removed.

(*j*) Replace the loudspeaker in the case and fasten in place with the machine screws and nuts removed in (*a*).

(2) To replace the field coil.—Proceed as in (1) (*a*), (1) (*b*), and (1) (*c*) then:

(*a*) Disconnect the field coil leads from the connector plug.

(*b*) Remove the four No. 8-32 filister-head machine screws that hold the yoke and core assembly in place and remove the cone housing from the yoke.

(*c*) Remove the field coil from the core and yoke assembly.

(*d*) Place the new field coil in position on the core and reassemble in the inverse order to the procedure in (2) (*a*), (2) (*b*), and (2) (*c*).

(*e*) Complete reassembly of the loudspeaker as outlined in paragraphs (1) (*d*) to (1) (*j*) inclusive.

(3) To replace the connector plug.—Should it be necessary to replace the connector plug proceed as follows:

(*a*) Note the connections to the plug and disconnect all leads therefrom.

(b) Remove the single No. 8-32 round-head machine screw and associated lockwasher and hex nut, and remove the damaged plug.

(c) Install a new plug using the screw, washer, and nut removed in (b).

(d) Connect the leads to the new plug in the same position as was noted in (a).

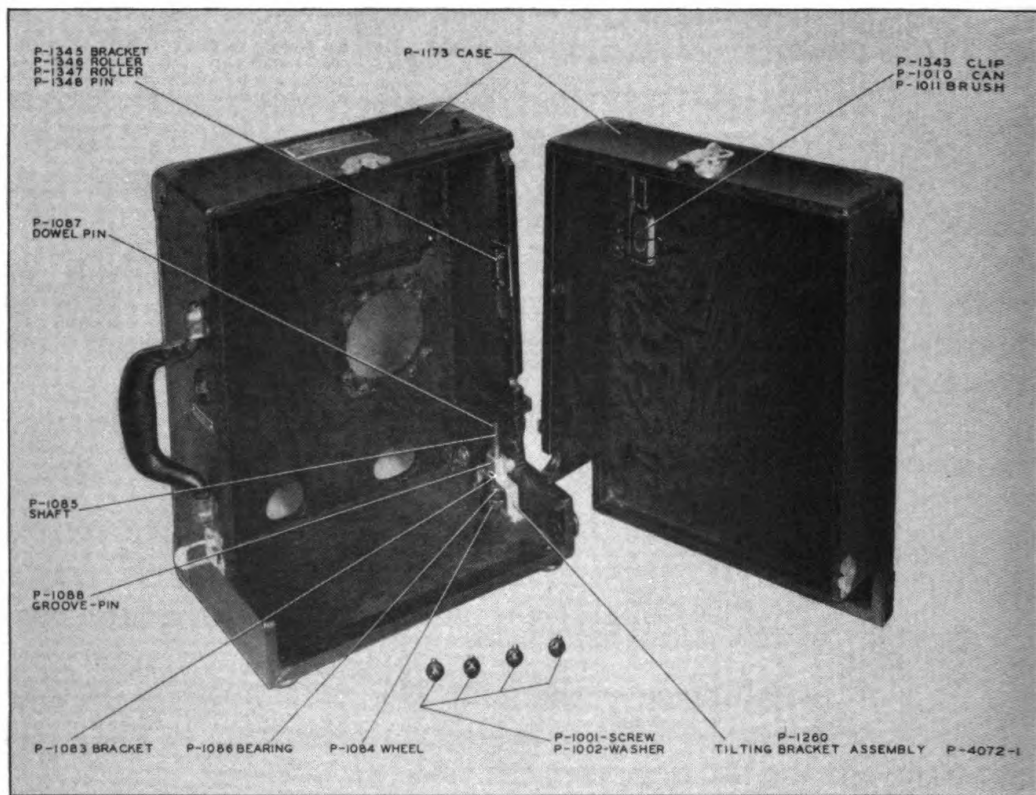


Figure 24—Projector Case—Parts Identification

TABULAR LIST OF REPLACEABLE PARTS

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	1000 Series	8P398	16 MM. Projector.	Projector in Carrying Case	Sound Motion Pictures	RCAM.	MI-1341
4	P-1001.	6L7032-142	Machine Screw	No. 10-32 Oval Hd. $\frac{7}{8}$ lg.	Parts Assembly	RCAM.	K-57490-19
8	P-1002.	6L52022	Fin. Washer	No. 10 Steel Beveled	Bearing For Hds. of Case Screws	RCAM.	K-184013-4
1	P-1003.	No Stock No. Necessary	Nameplate	Formica-Power Label	Power Designation	RCAM.	1821-1
2	P-1004.	6L8102-2S	Woodscrew	No. 2 RH Steel $\frac{1}{4}$ Lg.	Holds Nameplate	RCAM.	K-56444-1
1	P-1005.	8P3-117	Foot	Brawley Felt Foot	Adjustable Foot	TRB.	K-181527-3
1	P-1006.	No Stock No. Necessary	License Label	Black Ink on blue card	Patent Notices	RCAM.	1831-2
1	P-1007.	8P3-175	Projection Lens	16 mm. Proj. Lens F 1.65 2" Focal Lgth.	Focuses Light on Screen	Ilex	K-181340-2
1	P-1008.	8P3-347	Photo Tube	RCA No. 927	Light Transducer	RCAM.	K-181290-1
1	P-1009.	8P3-169	Exciter Lamp	GE 4V, $\frac{3}{4}$ Amp., Pre-Focused S-8 Bulb	Light Source	GE.	K-180599-2
1	P-1010.	6Z7385	Oilcan	Noera Cat. No. 968 Waterbury Oil	Oil Applicator	NMC	K-35522-1
1	P-1011.	8P3-47	Brush	Osburn No. 610 Size 3.	Cleaning	OSB.	W-130329-21
1	P-1012.	8P3-23	Take-up Spring Belt	Music Wire Coiled .156 O.D. x 28 Lg.	Take-up belt.	RCAM.	K-184261-2
1	P-1013.	8P3-21	Rewind Spring Belt	Music Wire Coiled .156 O.D. x 21 Lg.	Rewind Belt	RCAM.	K-184261-1



PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1014	No Stock No. Necessary	Nameplate	Zinc-Army Nameplate	Identification	RCAM	1402-1
1	P-1015	8P3-237A	Shaft	Screw Steel .1875 D. x 1-27/32 x 1/4-20 Thrd.	Sprocket Shoe Shaft (lower)	RCAM	K-182681-2
2	P-1016	8P3-297	Spring	"C" Spring 0.029 Diam. Music Wire	Sprocket Shoe Springs	RCAM	K-182856-1
2	P-1017	8P3-325	Spring Post	Anchor Post for "C" Spring	Anchors Fixed End of Springs	RCAM	K182852-2
3	P-1018	8P3-203	Hinge Pin	Screw Steel PS No. 53	Film Gate and Optical Bracket Pins	RCAM	K-182837-3
1	P-1019	8P3-207	Plate	C.R. Steel Plate	Nut Plate for Optical Bracket Screw	RCAM	K-181250-3
1	P-1020	6L7932-13	Screw	No. 10-32 Shoulder Screw	Take-up Reel Arm Stud.	RCAM	K-181338-3
1	P-1021	8P3-215	Cover Plate	0.031 Thk. Steel 1/4 Hard	Photocell Cable Coverplate	RCAM	K-181333-3
2	P-1022	8P3-273	Spacer	5/8" Lg. x 1/4" O.D. x 0.149 I.D. Steel	Photocell Bracket Spacer	RCAM	K-180678-2
2	P-1023	6L73016	Washer	5/8 O. D. x .149 I. D. x .031 Thk. Steel	Bearing Surface	RCAM	K-180685-12
1	P-1024	8P3-299	Spring	5/8 Lg. x 9/32 I. D.	Positioning Sprg Sound Press. Roller	RCAM	K-183734-3



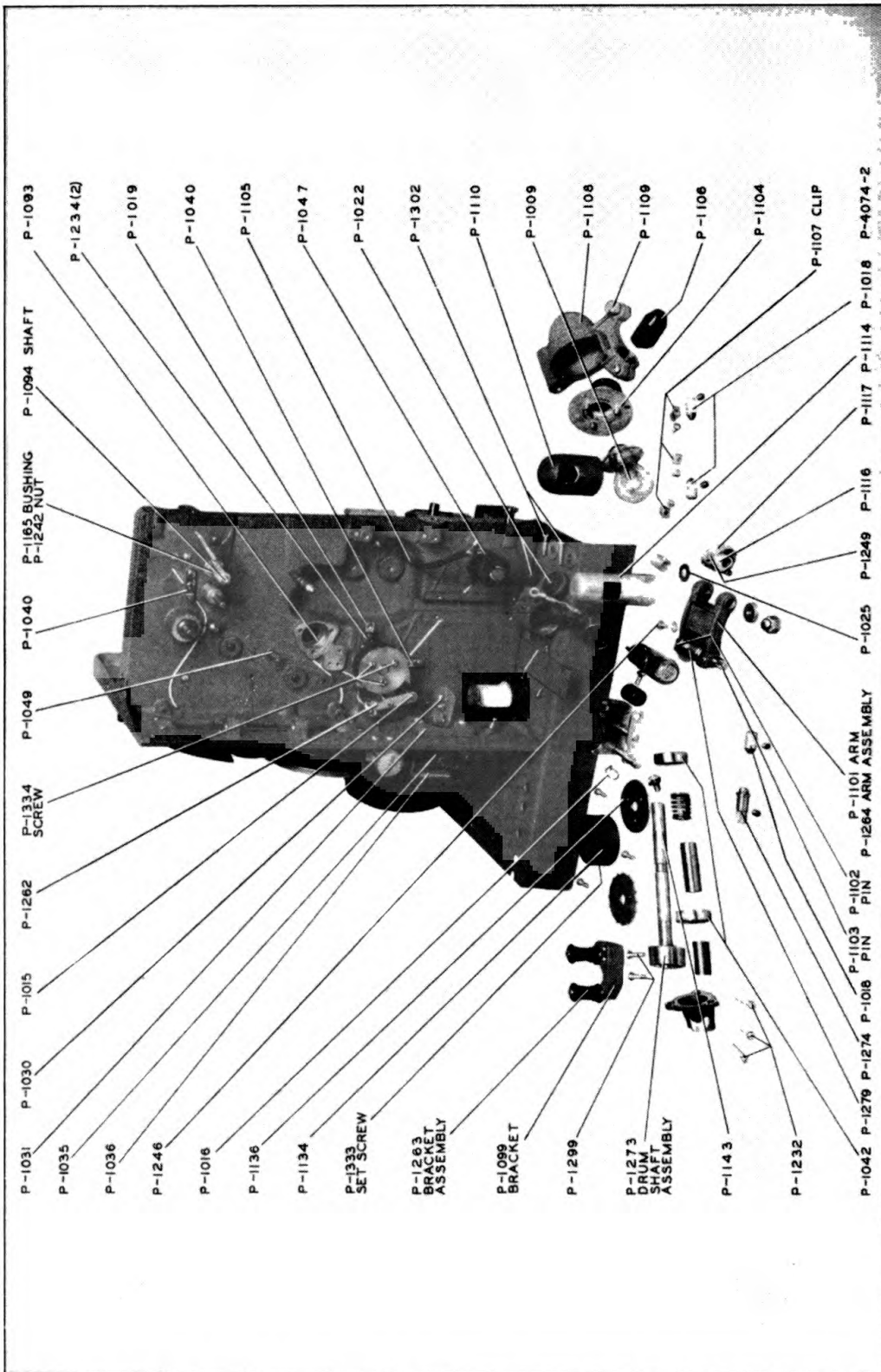


Figure 25-B—Projector—Operating Side—Parts Identification

PROJECTOR EQUIPMENT PH-398

TM 11-406

35

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1025	6L75035	Washer	C.R. Strip Steel. 1/4 O.D. x .260 I.D. x 3/8 Thk.	Bearing Surface	RCAM	K-55938-1
1	P-1026	8P3-183	Adjusting Nut	Steel Knurled No. 10/32 x 1/4 Thk.	Adjusting Film Position	RCAM	K-181066-3
1	P-1027	8P3-221A	Plug	Cat. No. P-404 AB % Drop	Photocell Connector	HBJ	K-183749-1
1	P-1028	8P3-251	Shield	Photocell Plug Shield	Shields Photocell Plug	RCAM	K-183751-1
1	P-1029	8P3-253	Shield Pilot Lamp	Pilot Light Shield	Light Shield	RCAM	K-814495-1
1	P-1030	2Z5941.2	Lamp, Pilot	Cand. Screw Base Bulb C-7	Indicator	GE	K-849546-2
1	P-1031	8P3-207B	Plate	1/8" Zinc Die Casting	Pilot Lamp Socket Plate	DDC	K-183684-1
1	P-1032	2Z7228.7	Plug	Cat. No. P-402 AB % Drop	Exciter Lamp Connector	HBJ	K-183749-2
1	P-1033	8P3-27	Blower	Steel Blower Unit	Ventilation	TMC	K-181239-1
1	P-1034	8P3-275	Spacer	Fibre % O.D. x .3125 I.D. x 1 1/8	Motor Shaft Spacer	RCAM	K-180482-15
1	P-1035	6Z8356	Socket Pilot Lamp	AHH # 328-75W-125V	Lamp Socket	AHH	K-814743-2
1	P-1036	8P3-37	Bracket	"U" Bracket C.R. Steel	Holds Pilot Lamp Socket	RCAM	K-183683-1
1	P-1037	8P3-25	"V" Belt, Motor Drive	40° 15/64" Wide 13-12/32 Long	Drive Belt	LHG	K-181291-2
1	P-1038	No Stock No. Necessary	Nameplate	For 16mm Projector	Identification	RCAM	1827-1
2	P-1039	8P3-265	Skid	C.R. Steel .020 Thk.	Film Skid	RCAM	K-182679-2



PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
2	P-1040	8P3-45	Stop Bracket	C.R. Steel ¼ Hd. 0.078 Stk.	Sprocket Shoe Stop	RCAM	K-182855-2
7	P-1041	6L75018	Spring Washer	"C" Washer Blue Spring Steel ⅞ O.D. x .185 I. D.	Retainer	RCAM	K-61933-1
2	P-1042	8P3-13	Ball Bearing	MR No. 38 FF or NDP No. 77038	Bearing	MR or NDP	K-180000-7
1	P-1043	8P3-277	Spacer	0.316 I.D. x ⅝ D.	Sound Drum	RCAM	K-181266-6
1	P-1044	8P3-37A	Bracket	x 1.319 Lg. Hard 0.125 Thk. C.R. Steel PS-4 Soft	Shaft Spacer Holds Case to Projector	RCAM	K-183676-1
1	P-1045	8P3-178	Motor	GE Type "KC" with No. 17 Fame 105-125 V a-c, 60 Cycles	Drive Motor	GE	M-140800-1
1	P-1046	8P3-256	Motor Shim	0.031 Thk. C.R. Steel PS-4 Hard	Adjusts Vertical Motor Position	RCAM	K-182155-2
1	P-1047	8P3-235B	Roller	Black Cellulose Acetate	Idler Roller	CEL	K-182370-2
1	P-1048	8P3-279	Spacer	0.316 I.D. x ⅝ O.D. x 0.880 Lg. Steel	Sound Drum Shaft Spacer	RCAM	K-181266-3
1	P-1049	8P3-197	Pin	Catch Pin	Film Gate Catch Pin	RCAM	K-182823-2
2	P-1050	8P3-281	Spacer	Screw Steel .469 Diam. x .630 Lg.	Sprocket Shoe Spacer	RCAM	K-181233-3
1	P-1051	8P3-37B	Bracket	Framing Rod Bracket	Holds Framing Rod	RCAM	K-183699-1

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1052	6L75025	Spring Washer	Shakeproof # 3502-10-3 ⅝ O.D. x .196 I.D.	Maintain Tension	SHK	K-183750-2
1	P-1053	8P3-89	Collar	Steel Collar with Set Screw	Framing Rod Collar	RCAM	K-180888-9
1	P-1054	3Z9692	Toggle Switch	Single Pole Single Throw 3A 250V	Controls Pilot Light	AHH	K-181196-3
1	P-1055	8P3-19	Base	C.R. Steel .0625 Thk.	Mount Frame and Parts	RCAM	P-171223-1
1	P-1056	8P3-77A	Clamp	Steel Strip Clamp	Capacitor Clamp	RCAM	K-182147-2
1	P-1057	8P3-97	Detent	Framing Detent	Basic Framing Adjustment	RCAM	K-181636-2
2	P-1058	8P3-77	Clamp	Steel Cable Clamp	Holds Oil Pipe	RCAM	K-17301-9
4	P-1059	6L75015	Spring Washer	Shakeproof No. 3502- 10-7	Framing Rod Tension	SHK	K-183750-1
3	P-1060	6L7932-10	Screw	No. 10-32 x ⅝ Shoulder Screw	Guide and Stop For Framing Arm	RCAM	K-181227-3
1	P-1061	6L75034	Washer	C.R. Steel ⅝ O.D. x .318 Thk.	Bearing Surface	RCAM	K-286391-12
1	P-1062	8P3-105	Eccentric	Framing Eccentric	Framing Basic Adjustment	RCAM	K-181217-7
1	P-1063	8P3-301	Spring	½" Lg. x 0.328 I.D.	Positioning Sprg Intermittent Assy.	RCAM	K-180444-5
1	P-1064	8P3-205	Pivot Pin	For Framing Rod	Seats Framing Rod	RCAM	K-181100-2
1	P-1065	8P3-317	Coil Spring	.200 O.D. x ¾ Lg. Music Wire	Claw in and out Spring	RCAM	KX286418-11
1	P-1066	8P3-15	Ball	⅝ Diam. Steel	Intermittent Sprg Seat	RCAM	K-76757-8

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1067	8P3-185C	Oil	Sta-Put Oil No. 370	Lubrication	EFH	W-130352-100
1	P-1068	8P3-185A	Oil	Vactra Oil Light X	Lubrication	SV	W-130352-102
3	P-1069	6L7032-8.8S	Screw	Bind. Hd. No. 10-32 x 1/2 Steel	Parts Assy.	RCAM	K-90445-7
1	P-1070	6L3505-27	Nut	5/8-27 Steel	Parts Assy.	RCAM	K-59149-13
2	P-1071	6L73018	Washer	Steel 0.128 I.D. x 0.279 O.D. x 3/8 Thk.	Bearing Surface	RCAM	K-73109-13
1	P-1072	6L75010	Washer	Bl. Spr. Steel 1/2 O.D. x .323 I.D. x .005 Thk.	Bearing Surface	RCAM	KX286391-23
2	P-1073	6L75032	Washer	C.R. Steel 1/2 O.D. x .323 I.D. x .005 Thk.	Bearing Surface	RCAM	KX286391-4
2	P-1074	6L75031	Washer	C.R. Steel 1/2 O.D. x .257 I.D. x .030 Thk.	Bearing Surface	RCAM	KX286391-1
1	P-1075	6L75030	Washer	C.R. Steel 1/2 O.D. x .257 I.D. x .020 Thk.	Bearing Surface	RCAM	KX286391-8
3	P-1076	6L75008	Washer	Bl. Sp. Steel 1/2 O.D. x .257 I.D. x .002 Thk.	Bearing Surface	RCAM	KX286391-13
3	P-1077	6L75009	Washer	Bl. Sp. Steel 1/2 O.D. x .257 I.D. x .003 Thk.	Bearing Surface	RCAM	KX286391-14
1	P-1078	8P3-185B	Oil	S/V No. 7030 Rust Proof Oil	Lubrication	SV	W-130352-149
1	P-1079	8P3-237B	Shaft	Screw Steel-Shoulder and 3/32 Thrd.	Sprocket Shoe Shaft (upper)	RCAM	K-184281-1
1	P-1080	8P3-207A	Plate	0.125 Thk. 2 No. 10-32 holes	Nut Plate	RCAM	K-184258-1
1	P-1081	8P3-319	Coil Spring	Music wire 0.328 Diam. 1 1/8" long	Drum Shaft Tension	RCAM	K-183734-2



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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1082	8P3-363	"C" Washer	.025 Stk. .123 I.D. x $\frac{1}{8}$ O.D.	Hold idler Roller on Shaft	RCAM.	K-60503-1
1	P-1083	8P3-37C	Bracket	Doehler Zinc No. 9 Die Casting	Tilting Adjustment Bracket	DDC	M-141238-1
1	P-1084	8P3-371	Wheel	Zinc Die Casting	Tilting Adjustment Wheel	DDC	K-183659-1
1	P-1085	8P3-287C	Shaft	Steel, $\frac{1}{8}$ -18 Thrd. Slotted	Tilting Assembly Shaft	RCAM.	K-183660-1
1	P-1086	8P3-17	Bearing	Boston No. A08	Take-up Spindle Bearing	BOS	K-183672-1
1	P-1087	8P3-199	Dowel Pin	0.088 Diam. x $\frac{3}{2}$ Lg. 1/64 x 45° Chamfer Drill Rod	Holds Take-up Rewind Lever	RCAM.	K-181872-24
1	P-1088	8P3-201C	Groov-Pin	Type 1 5/64 Diam. x $\frac{1}{4}$ long	Engages Adjusting Screw	GRV	K-183673-7
2	P-1089	8P3-49F	Bushing	Oilite .523 O.D. with Rim	Main Drive Shaft Bushing (Rear)	CC	K-182051-4
2	P-1090	8P3-237D	Shaft	Drive Gear Shaft	Hold Drive Gears	RCAM.	K-181057-1
1	P-1091	8P3-49H	Bushing	0.3125 I.D. x 0.534 O.D.	Main Frame "Oilite" Bearing	CC	K-182051-7
1	P-1092	8P3-49G	Bushing	0.313 I.D. x 0.503 O.D. x $\frac{5}{8}$ " long	Main Frame "Oilite" Bearing	CC	K-180531-9
1	P-1093	8P3-267	Sleeve	Steel .8675 O.D. x $\frac{3}{4}$ I.D. x $\frac{3}{8}$ long	Spacer on Sound Drum Shaft (Front)	RCAM.	K-180588-2
1	P-1094	8P3-287E	Shaft	0.1825 Diam. x 2 $\frac{1}{2}$ Lg.	Take-up Rewind Shaft	RCAM.	K-183652-1



Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1095	8P3-121	Main Frame	Aluminum Casting-Machined	Mounting For Parts	RCAM	P-170948-2
1	P-1096	8P3-237F	Shaft	0.2495 D x 2 $\frac{1}{2}$ No. 10-32 x 0.375 Thrd.	Sound Pressure Roller Shaft	RCAM	K-182903-2
2	P-1097	8P3-235A	Roller	Black Cellulose Acetate	Sound Drum Guide Rollers	CEL	K-182370-1
2	P-1098	6L73011	Washer	C.R. Steel .218 O.D. x .094 I.D. x .031 Thk.	Bearing Surface	RCAM	K-89799-14
1	P-1099	8P3-43	Roller Bracket	Sound Drum Guide	Holds Roller Guide	RCAM	K-182650-1
2	P-1100	8P3-237G	Shaft	Scr. Steel 1 $\frac{1}{4}$ Lg. x .124 Diam.	Idler Roller Shaft	RCAM	K-182826-1
1	P-1101	8P3-9	Arm	Pressure Roller Arm	Holds Sound Pressure Roller	RCAM	K-181141-3
1	P-1102	8P3-195A	Pin	$\frac{1}{2}$ x .2175 Diam. with $\frac{1}{8}$ x .093 Tip	Holds Roller in Arm	RCAM	K-181064-3
1	P-1103	8P3-195B	Pin	$\frac{1}{2}$ x .2175 Diam. x $\frac{1}{4}$ knurl with $\frac{1}{8}$ x .093 Tip	Holds Roller in Arm (Left Arm)	RCAM	K-181064-4
1	P-1104	8P3-269	Exciter Lamp Socket	Socket with Pineapple Type Pins	Holds Exciter Lamp	HC	K-180658-1
1	P-1105	8P3-375	Shielded Braided Wire	Single Cond. Shielded 10 strand .010 Diam.	Shielded Cond. for Exciter Lamp	RCAM	M-140601-2
1	P-1106	8P3-191	Sound Optical Unit	Bausch and Lomb No. 41-87-16	Focuses Light on Sound Track	BL	P-705265-4
3	P-1107	8P3-83	Clip	Annealed Spring Steel	Holds Exciter Lamp Shield	RCAM	K-181142-2

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1108	8P3-41	Sound Optical Bracket	Zinc Alloy Die Casting	Holds Sound Optical Unit and Exciter Lamp	DDC	M-140413-3
1	P-1109	6L7932-6.40	Screw	Thumb Screw No. 8-32 Steel	Holds Optical Bracket in Place	RCAM	K-181248-5
1	P-1110	8P3-255	Shield	Soft Steel .022 Thk.	Exciter Lamp Shield	RCAM	K-181160-3
1	P-1111	2Z8658	Socket	Amphenol No. PC 3F	Photo Tube Socket	AMP	P-287453-1
2	P-1112	8P3-143	Grommet	Rubber Grommet	Photocell Cushion	RCAM	K-180830-4
1	P-1113	8P3-39	Photocell Bracket	Zinc Alloy Die Casting	Holds Photocell Socket	DDC	M-140444-3
1	P-1114	8P3-93A	Cover	Soft Aluminum .020 Thk.	Shields Photocell	RCAM	K-181145-2
1	P-1115	8P3-53	Shielded Cable Assembly	2 Cond. Shielded	Shielded Cond.	RCAM	M-141148-505
1	P-1116	8P3-153	Spring Holder	Screw Steel	Anchors Sound Roller Pressure Spring	RCAM	K-182924-2
1	P-1117	8P3-303	Spring	Flat Spring Steel	Sound Drum Roller Spring	RCAM	K-182927-2
1	P-1118	8P3-233C	Pulley	Screw Steel 1.325 O.D. "V" Type	Main Drive Pulley (Motor)	RCAM	K-182156-4
1	P-1119	8P3-127	Gear	Fibre 78 teeth x 1.6667 O.D.	Spur Gear	RCAM	M-141145-2
3	P-1120	8P3-283	Spacer	Screw Steel .130 Lg. x .167 O.D.	Between Gear and Pulley	RCAM	K-182941-14
3	P-1121	8P3-49B	Bushing	Neoprene .297 O.D. x .171 I.D. x .058	Screw Bushing	PRC	K-182882-1

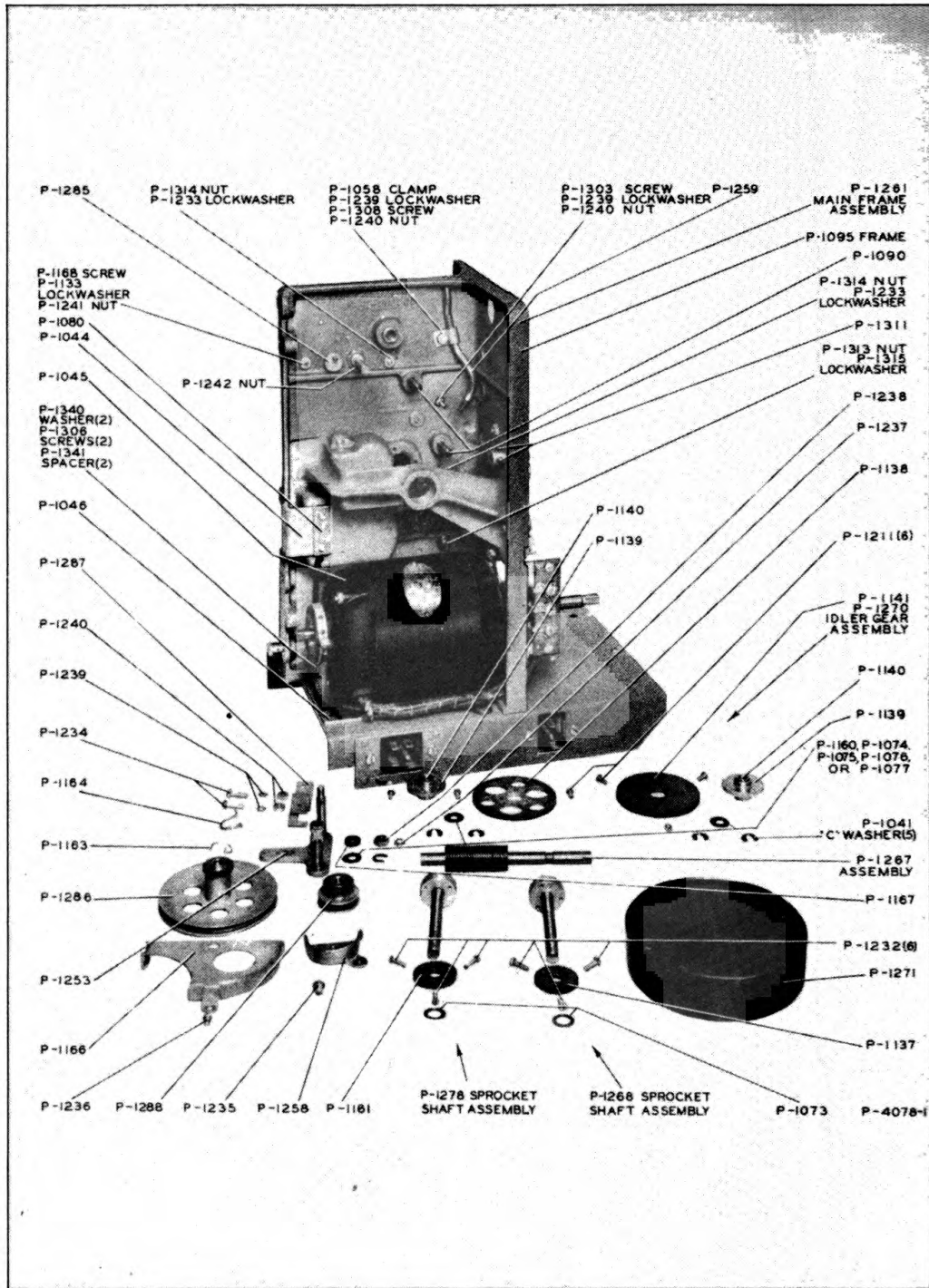


Figure 28—Projector—Opposite Operating Side—Parts Identification

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1122	8P3-233A	Pulley	Gray Iron "V" 4" Diam	Main Drive Pulley (Drive Shaft)	RCAM.	M-141152-2
1	P-1123	6L73020	Washer	.044 Thk. Steel x 1 $\frac{1}{8}$ " O.D.	Pulley Gear Washer	RCAM.	K-182811-2
1	P-1124	8P3-232	Reflector	Bausch and Lomb No. 43-35-39	Proj. Lamp Reflector	BL.	K-181289-1
1	P-1125	8P3-305	Spring	$\frac{3}{8}$ " O.D. x $\frac{1}{4}$ Lg. Music Wire	Reflector Spring	RCAM.	P-286418-7
1	P-1126	8P3-63	Friction Catch	Corbin No. 3060 $\frac{1}{2}$ Zinc. Plate	Lamp Housing Door Catch	CCL.	K-181287-5
2	P-1127	3Z9508	Switch	AHH No. 80600 D. Pole —S. Throw.	"Lamp" and "Proj." Switches	AHH.	K-181348-1
1	P-1128	8P3-201D	Groov Pin	Type 4 Steel .125 Diam. x $\frac{3}{8}$ Lg.	Guide for Projection lens	GRV.	M-171243-9
1	P-1129	8P3-93	Cover	.0625 Thk. Bakelite. 2 $\frac{1}{8}$ x 2 $\frac{3}{8}$	Covers Switch Compartment	RCAM.	K-181339-1
3	P-1130	8P3-293	Flanged Spacer	$\frac{1}{4}$ " Steel Spacers .170 Diam. x .113 Flange	Holds Reflector Mirror	RCAM.	K-181512-2
1	P-1131	8P3-107	Escutcheon	"Lamp-Proj." Switch Label	Identification	RCAM.	26530-1
2	P-1132	8P3-77B	Cable Clamp	Steel Cable Clamp	Holds Cable	RCAM.	K-17301-12
1	P-1133	6Z7786	Receptacle	G.E. No. 23 x 590	A-C Power Recept.	GE.	K181369-3
2	P-1134	8P3-331	Sprocket Body	Screw Steel 1.484 Diam. x .525	Film Bearing Surface	RCAM.	K-182369-2
2	P-1135	8P3-329	Sprocket	1.581 Diam. Steel 16 Teeth	Film Sprocket	RCAM.	P-286429-1
2	P-1136	8P3-359	Washer	1.510 Diam. Steel	Sprocket Washer	RCAM.	K-181229-3

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1137	8P3-129	Gear	48 teeth 1.045 Fibre	Sprocket Gear	RCAM	M-140442-10
1	P-1138	8P3-131	Gear	Steel 113 teeth 2.366 O.D. x .125 Thk.	Idler Gear	RCAM	M-140442-11
2	P-1139	8P3-51C	Bushing	Screw Steel—Flanged and Drilled	Idler Gear Bushing	RCAM	K-182816-3
2	P-1140	8P3-49	Bushing	.377 O.D. x .02505 I.D. x .735 Lg.	Idler Gear "Oilite" Bearing	CC	K-182051-8
1	P-1141	8P3-133	Gear	Lam. Phenolic 113 teeth 2.404 O.D.	Drives Steel Idler Gear	RCAM	M-140442-9
1	P-1142	8P3-101	Drum	Screw Steel .850 Diam.	Sound Drum	RCAM	M-141135-7
1	P-1143	8P3-237H	Shaft	Screw Steel .2189 Diam	Sound Drum Shaft	RCAM	M-141135-8
1	P-1144	6L6832-5.2S	Screw	No. 8-32 x $\frac{1}{8}$ Steel. Oval Hd.	Sound Drum Screw	RCAM	K-182868-3
2	P-1145	8P3-307	Spring	Music Wire $\frac{1}{8}$ Lg. x .165 O.D.	Gate Shoe Spring	RCAM	K-180444-9
1	P-1146	6L7932-4	Screw	Pointed Set Screw No. 6-32 x $\frac{1}{4}$	Holds Gate Shoe. Plunger and Bushing	RCAM	K-182293-1
2	P-1147	8P3-51D	Bushing	Steel Drill Rod .672 Lg. x .249 O.D. x .1875 I.D.	Plunger Bushing	RCAM	K-182291-1
2	P-1148	8P3-196	Pin	Scr. Steel .1865 Diam. x .656 long	Film Shoe Plunger	RCAM	K-182292-1
1	P-1149	6L7932-6-1	Screw	Pointed Set Screw No. 6-32 x $\frac{1}{2}$	Holds Gate Shoe. Plunger and Bushing	RCAM	K-182293-2
1	P-1150	8P3-125	Gate	Zinc Alloy Die Casting	Film Gate	RCAM	M-141213-3

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1151	8P3-111	Finger Pull	C.R. Strip Steel	For Opening Film Gate	RCAM	K-181259-3
1	P-1152	6L7932-7.40	Thumb Screw	Screw Steel 5/8 Diam. Knurled Hd. No. 6-32 Thrd. x 7/8 Lg.	For Clamping Proj. Lens	RCAM	K-182047-3
1	P-1153	8P3-257	Shoe	Film Gate Pressure Shoe	Holds Film Against Aperture	RCAM	M-141131-2
1	P-1154	8P3-309	Spring	Steel flat spring .018 Thk.	Gate Latch Spring	RCAM	K-181285-2
1	P-1155	8P3-149	Guide	C.R. Steel	Film Guide	RCAM	K-182062-4
1	P-1156	8P3-151	Flare	Zinc Die Casting Doehler Print B-14499	Light Flare	RCAM	K-182058-2
1	P-1157	8P3-3	Aperture	C.R. Steel	Light Aperture	RCAM	K-182135-2
1	P-1158	8P3-361	Washer	C.R. Steel Hardened % O.D.	Bearing Surface	RCAM	K-182858-1
1	P-1159	6L6632-4-1S	Screw	No. 6-32 x 3/4 F. Hd. Steel	Parts Assembly	RCAM	K-182812-1
3	P-1160	6L75028	Washer	C.R. Steel 1/2 O.D. x .257 I.D. x .010 Thk.	Bearing Surface	RCAM	KX-286391-10
1	P-1161	8P3-135	Gear	Steel 48 teeth 1.045 O.D.	Sprocket Gear	RCAM	M-140442-12
1	P-1162	8P3-165	Knob	Doehler Dwg. No. A-15692	Takeup-Rewind Knob	DDC	K-184329-1
1	P-1163	8P3-311	Spring	"C" Spring 1/2" Diam. x .035 Diam. Wire	Take-up and Rewind Bracket Spring	RCAM	K-184300-1
1	P-1164	8P3-313	Spring	"C" Spring 5/8" Diam. x .051 Diam. Wire	Take-up and Rewind Bracket Spring	RCAM	K-184300-2

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Qty.	Ref or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1165	8P3-51B	Bushing	Scr. Steel Hex. Hd. .1875 I.D.	Take-up and Rewind Lever Shaft Bushing	RCAM	K-184276-1
1	P-1166	8P3-147	Guard	Steel Pulley Guard	Rewind Pulley Guard	RCAM	K-184265-1
1	P-1167	6L75033	Washer	C.R. Steel $\frac{1}{8}$ O.D. x .199 I.D. x .093 Thk.	Bearing Surface	RCAM	K-286391-20
1	P-1168	6L6832-5.8S	Screw	Bind Hd. Steel No. 8-32 x $\frac{1}{8}$	Parts Assembly	RCAM	K-184301-1
1	P-1169	3DB72	Capacitor	Elec. G.E. No. 5243119G5 110 V. A-C	Phase Splitter	GEN	K-182132-1
1	P-1170	8P3-201	Groov-Pin	$\frac{1}{8}$ " x $\frac{3}{8}$ " Lg. Steel	Holds Lever in Position	RCAM	K-57422-2
1	P-1171	8P3-171	Lens Assy.	Double Lens, Housing, Spring Holders, and Screws	Concentrates Light	RCAM	K-182928-502
1	P-1172	8P3-163	Intermittent Assy.	Shutter Gear, Body, Cam, and Plate	Film Pull Down	RCAM	P-170961-502
1	P-1173	8P3-69	Proj. Carrying Case Assy.	Fabrikoid Covered Case	Houses Proj.	RCAM	W-130327-501
1	P-1174	8P3-103	Door	Zinc Alloy Die Casting	Lamp House Door	DDC	P-170350-3
1	P-1175	8P3-355	Tube—upper	Steel Tubing	Part of Lamp Shield	RCAM	K-181048-2
1	P-1176	8P3-351	Tube—lower	Steel Tubing	Part of Lamp Shield	RCAM	K-181047-2
1	P-1177	8P3-37D	Bracket	Zinc Alloy Die Casting	Proj. Lamp Bracket	DDC	K-182040-2
1	P-1178	2Z8725	Lamp Socket	G.E. No. 296562 With- out Cap or Screws	Proj. Lamp Socket	GEN	K-35821-2
1	P-1179	8P3-63A	Friction Catch	Corbin No. 3060 $\frac{1}{2}$ Zinc Plate	Lamp Housing Door Catch	CCL	K-181287-6

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1180	8P3-343	Support Hinge	Nat'l Lock No. 951 Fall No. 939 Lug.	Fall Support and Sliding Lug	NATL	K-181288-2
1	P-1181	8P3-151	Hinge	Similar to Nat'l Lock Co. No. 5319	Lamp House Door Hinge	RCAM	K-181297-2
1	P-1182	8P3-337	Strap	Steel .125 Stock x $\frac{3}{8}$ x $\frac{3}{8}$	Strap for Hinge Mounting	RCAM	K-181295-2
1	P-1183	8P3-339	Insulating Strip	$\frac{1}{8}$ Thk. Asbestos Paper	Heat Block between Tube and Door	RCAM	K-181050-1
1	P-1184	8P3-37E	Bracket	Steel Bracket	Holds L. House. Switch Cover Plate	RCAM	K-181339-3
1	P-1185	8P3-165A	Knob	Steel Knurled Knob	Lamp Housing Door Knob	RCAM	K-182053-2
1	P-1186	8P3-184	Thumb Nut	$\frac{1}{8}$ -32 Tap Screw Steel	Locks Adjusting Screw	RCAM	K-182039-2
1	P-1187	6L4732-19	Adjusting Screw	$\frac{1}{8}$ -32 x 1 $\frac{1}{8}$ Lg. Screw Steel	Lateral Adjustment of Proj. Lamp	RCAM	K-182042-2
2	P-1188	8P3-236	Screw	Smooth Sq. Ft. Hd. No. 6-32 x $\frac{3}{32}$	Holds Sliding Bracket to Fixed Bracket	Phe	K-182043-1
1	P-1189	8P3-37F	Bracket	Zinc Alloy Die Casting	Holds Proj. Lamp Socket	DDC	K-182041-2
2	P-1190	8P3-285	Spacer	Steel $\frac{1}{8}$ " Dia. x $\frac{1}{8}$ Lg.	Lamp Socket Spacer	RCAM	K-181437-7
2	P-1191	8P3-321	Coil Spring	Music Wire $\frac{1}{16}$ Lg. x $\frac{3}{16}$ I.D.	Holds Lamp Socket in Place	RCAM	K-819107-7
2	P-1192	6L6436-8S	Screw	Flt. Hd. No. 4-36 x $\frac{1}{2}$ Lg. Steel	Holds Lamp Socket to Bracket	RCAM	P-171244-29



Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1193	6L73015	Washer	Steel .279 O.D. x .128 I.D. x $\frac{3}{8}$ Thk.	Bearing Surface	RCAM	K-73109-13
1	P-1194	8P3-173	Lens	Plano Convex 34.7 MM.	Part of Condenser Lens Assembly	Ilex	K-181279-3
1	P-1195	8P3-173A	Lens	Bulls Eye Lens	Part of Condenser Lens Assembly	Ilex	K-181279-4
1	P-1196	8P3-287	Spacer	Steel Tubing $\frac{1}{8}$ Saw Cut One Side 1.357 O.D. x .562 Lg. x .070 Thk.	Condenser Lens Spacer	RCAM	K-182923-1
1	P-1197	8P3-181	Lens Mounting	Zinc Alloy Die Casting	Holds Lenses, Spacer, Clips	RCAM	K-181274-3
3	P-1198	8P3-315	Spring	Annealed Spring Steel	Holds Cond. Lens in Place	RCAM	K-182842-2
2	P-1199	8P3-323	Coil Spring	Music Wire .137 O.D. x $\frac{1}{8}$ Lg.	Provides Shoe Pressure	RCAM	K-819107-12
1	P-1200	8P3-49A	Bushing	.377 O.D. x .250 I.D. x $\frac{7}{8}$ Lg.	"Oilite" Bearing	CC	K-182051-2
1	P-1201	8P3-261	Shutter	Steel—Three Blades	Interrupt Light Beam	RCAM	K-182802-1
1	P-1202	8P3-137	Gear	Lam. Phenolic 78 teeth x 1.6667 O.D.	Spur Gear	RCAM	M-141145-1
3	P-1203	8P3-49C	Bushing	Neoprene .058 Thk. x .297 O.D.	Shutter Gear Screw Bushings	RCAM	K-182882-1
3	P-1204	8P3-289	Spacer	Screw Steel .130 x .167 O.D.	Shutter Gear Spacer	RCAM	K-182941-14
1	P-1205	8P3-51A	Bushing	Screw Steel Bushing	Shutter Bushings	RCAM	K-182697-2

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1206	8P3-291	Spacer	.154 Thk. Steel x 1 1/4 O.D.	Shutter Gear Spacer	RCAM	K-182696-2
1	P-1207	8P3-37G	Bracket	Right Angle Bracket For Claw	For Up-Down Motion of Claw	RCAM	K-183652-1
1	P-1208	8P3-373	Wire	Tinned Copper 1 1/8 Lg. x .020 Diam.	Holds Oiling Felt in Place	RCAM	M-141502-5
1	P-1209	8P3-187	Oil Pipe Assembly	Steel Pipe with Felt Wick	Oil Feed to Claw and Cam	GB	K-183680-1
1	P-1210	8P3-109	Felt	Strip Black 1/4 x 3/64 x 1 1/2	Oil Feed to Claw & Cam Assembly	FCO	K-180473-4
20	P-1211	6L6440-4.1S	Screw	R.H. Steel No. 4-40 x 1/4 Lg.	Parts Assembly	RCAM	K-57454-5
1	P-1212	6L6632-3.8S	Screw	Bind. Hd. No. 6-32 x 3/8 Steel	Parts Assembly	RCAM	K-82288-2
1	P-1213	6L6440-2.8S	Screw	Bind. Hd. No. 4-40 x 1/8 Steel	Parts Assembly	RCAM	K-82287-1
2	P-1214	6L6256-4.1S	Screw	No. 2-56 x 1/4 R.H. Steel	Parts Assembly	RCAM	K-57452-5
4	P-1215	6L6440-3.1S	Screw	R.H. Steel No. 4-40 x 3/8 Lg.	Parts Assembly	RCAM	K-57454-3
7	P-1216	6L6256-3.1S	Screw	No. 2-56 x 3/8 R.H. Steel	Parts Assembly	RCAM	K-57452-3
1	P-1217	None	Wire	Yellow Stranded, 16 Strands, .010 diam. Copper	Electrical Connections	RCAM	T-161139-4

Qty.	Ref or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1218	None	Wire	Blue Stranded, 16 Strands, .010 diam. Copper	Electrical Connections	RCAM.	T-161139-5
1	P-1219	None	Wire	Brown Stranded, 26 Strands, .010 diam. Copper	Electrical Connections	RCAM.	T-161139-6
1	P-1220	None	Wire	Black/Brown Stranded 16 Strands, .010 diam. Copper	Electrical Connections	RCAM.	T-161139-7
1	P-1221	None	Wire	Red Stranded, 16 Strands, .010 diam. Copper	Electrical Connections	RCAM.	T-161139-8
1	P-1222	None	Wire	Red Stranded, 26 Strands, .010 diam. Copper	Electrical Connections	RCAM.	T-161139-9
1	P-1223	None	Wire	Black Stranded, 16 Strands, .010 diam. Copper	Electrical Connections	RCAM.	T-161139-10
1	P-1224	None	Sleeving	No. PS-50 Black .133 I.D. Lacquered Cotton Braid	Insulation	RCAM.	T-161139-12
1	P-1225	3G2503	Sleeving	No. PS-50 Black .042 I.D. x 3½ Lg. Lacquered Cotton Braid	Insulation	RCAM.	T-161139-13
1	P-1226	None	Sleeving	No. PS-50 Black .166 I. D. Lacquered Cotton Braid	Insulation	RCAM.	T-161139-14

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Qty.	Ref or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1227	None	Bus Wire	.032 Dia. No. PS-105	Electrical Connections	RCAM	T-161139-15
1	P-1228	None	Cord	Linen No. 6 Gray	For Lacing Cables	RCAM	T-161139-18
3	P-1229	3Z12050-6	Terminal	No. PS-294 Spade Terminal-Tinned	Electrical Connections	RCAM	K-61580-1
3	P-1230	3Z12050-5	Terminal	Small Hot Tin Dip	Connections to Proj. and Lamp Switches	RCAM	K-818337-8
1	P-1231	None	Bus Wire	.040 Diam. 7½ Lg.	Electrical Connections	RCAM	T-161139-25
11	P-1232	6L6440-6.3S	Machine Screw	Fil. Hd. Steel No. 4-40 x ¾ Lg.	Parts Assembly	RCAM	K-57474-9
15	P-1233	6L71108	Lockwasher	No. 8 Steel Shakeproof No. 1108	Holds Nut Tight	SHK	K-59049-4
9	P-1234	6L6632-6.8S	Screw	Bind. Hd. No. 6-32 x ¾ Steel	Parts Assembly	RCAM	K-82288-5
1	P-1235	6L6832-5.8S	Screw	Bind. Hd. No. 8-32 x ¾ Steel	Parts Assembly	RCAM	K-82289-4
1	P-1236	6L6632-3.1S	Screw	R.H. Steel No. 6-32 x 3/16 Lg.	Parts Assembly	RCAM	K-57456-3
11	P-1237	6L71110	Lockwasher	No. 10 Steel Shakeproof No. 1110	Holds Nuts Tight	SHK	K-59049-5
4	P-1238	6L3110-32	Nut	No. 10-32 x .375 x .125 Steel Hex	Parts Assembly	RCAM	K-57435-6
16	P-1239	6L71106	Lockwasher	No. 6 Steel Shakeproof No. 1106	Holds Nut Tight	SHK	K-59049-3

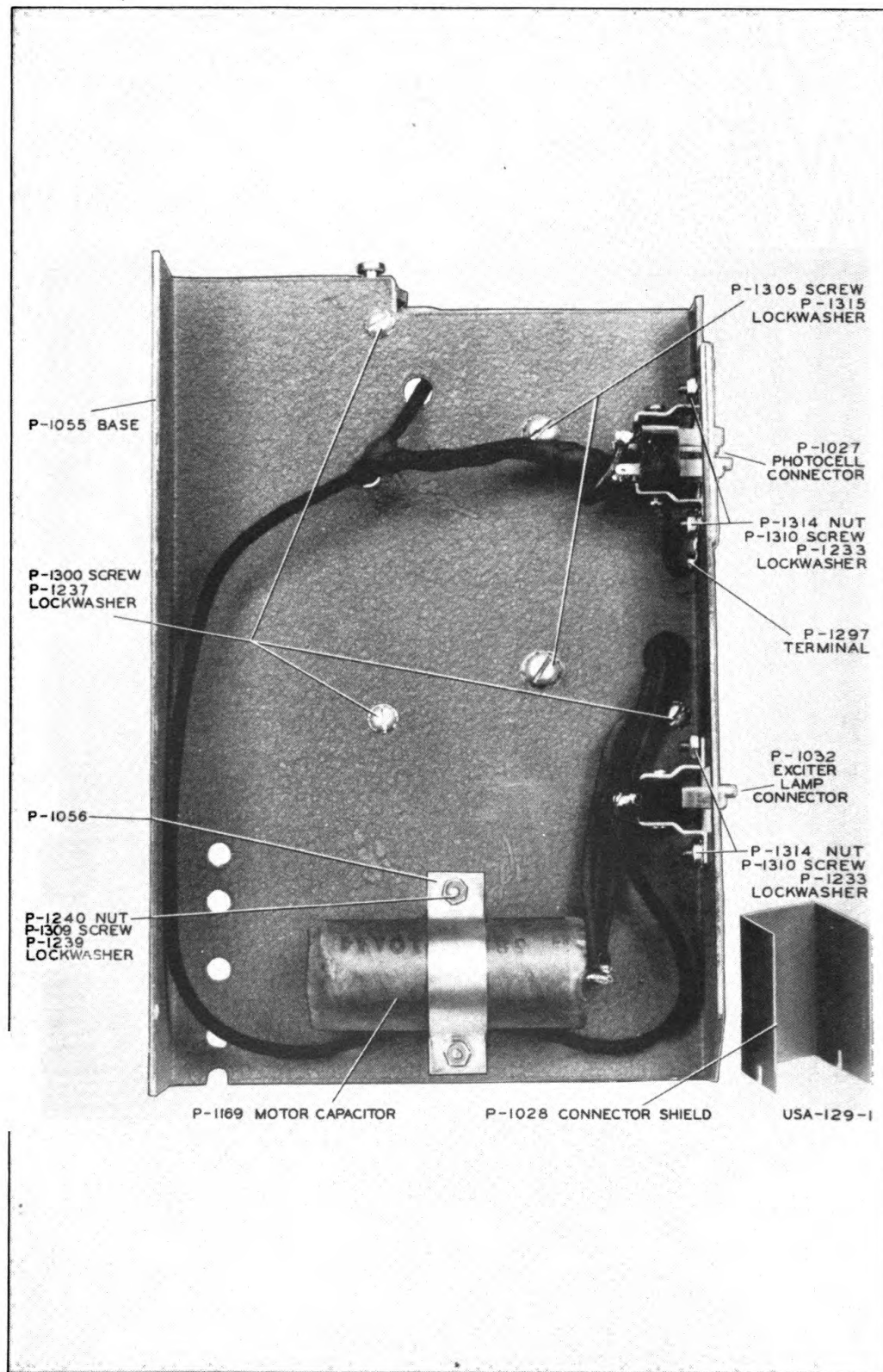


Figure 29—Projector—Sub-Chassis View—Parts Identification

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
13	P-1240	8P3-184A	Nut	No. 6-32 x .312 x .109 Steel Hex	Parts Assembly	RCAM	K-57435-4
1	P-1241	8P3-184B	Nut	No. 8-32 x .312 x .093 Steel Hex	Parts Assembly	RCAM	K-82244-2
2	P-1242	8P3-184C	Nut	Hex $\frac{3}{8}$ -32 x .500 Steel	Parts Assembly	RCAM	K-59149-6
1	P-1243	8P3-359B	Insulating Washer	Fibre .156 O.D. x $\frac{7}{8}$ I.D. x $\frac{1}{8}$ Thk.	Insulation	RCAM	K-57441-13
2	P-1244	6L75042	Washer	Steel 7/16 O.D. x .195 I.D. x .050 Thk.	Bearing Surface	RCAM	K-57428-6
2	P-1245	6L75036	Washer	Steel $\frac{3}{8}$ O.D. x .150 I.D. x .031 Thk.	Bearing Surface	RCAM	K-57428-4
11	P-1246	6L6632-4-1S	Screw	R.H. Steel No. 6-32 x $\frac{1}{4}$ Lg.	Parts Assembly	RCAM	K-57456-5
2	P-1247	6L6832-4-1S	Screw	R.H. Steel No. 8-32 x $\frac{1}{4}$ Lg.	Parts Assembly	RCAM	K-57458-5
4	P-1248	6L6632-4-8S	Screw	Bind. Hd. No. 6-32 x $\frac{1}{4}$ Steel	Parts Assembly	RCAM	K-82288-3
11	P-1249	6L6256-2-1S	Screw	No. 2-56 x $\frac{1}{8}$ R.H. Steel	Parts Assembly	RCAM	K-57452-1
3	P-1250	6L72204	Lockwasher	No. 4 Steel Shake-proof No. 1204	Holds Nut Tight	SHK	K-59049-18
8	P-1251	8P3-184D	Nut	No. 41-40 x .250 x .093 Steel Hex	Parts Assembly	RCAM	K-57435-3
6	P-1252	6L6440-8-1S	Screw	R.H. Steel No. 4-40 x $\frac{1}{2}$ Lg.	Parts Assembly	RCAM	K-57454-13

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1253	8P3-5	Arm Assembly	T Bracket Takeup and Rewind Gears	To Change Gears. Engaging	RCAM	K-184278-501
2	P-1254	8P3-258	Shoe and Pin Assembly	Steel Shoe and Pin	Film Side Pressure Shoe	RCAM	K-182335-501
2	P-1255	8P3-33	Bracket Assembly	Steel "L" Bracket	Side Pressure Shoe Bracket	RCAM	K-182332-501
1	P-1256	8P3-59	Cam and Gear Assembly	In & Out, Up & Down Cams and Gear	Operates Intermittent Mechanism	RCAM	K-183753-501
1	P-1257	8P3-81	Claw Assembly	Body, Claw, Channel	Pulls Down Film	RCAM	P-171213-501
1	P-1258	8P3-145	Guard Assembly	Steel Guard and Plate	Pulley Guard (Take up)	RCAM	K-184536-501
1	P-1259	8P3-189	Oil Pipe Assembly	Steel Pipe with Felt Wick	Lubricates Idler Gear	GB	K-184280-1
1	P-1260	8P3-349	Tilting Bracket Assembly	Steel Thumb Wheel, Shaft and Bracket	Raises or lowers Front of Proj.	RCAM	K-183673-501
1	P-1261	8P3-119	Main Frame Assembly	Aluminum Frame with Shafts and Bushings	Holds Proj. sub-assemblies	RCAM	P-170427-506
2	P-1262	8P3-333	Sprocket Shoe Assembly	Steel Sides, Pins, Spacers	Holds Film Against Sprocket	RCAM	K-182680-503
1	P-1263	8P3-29	Roller Bracket Assembly	Sound Drum Guide Roller Bracket	Guides Film	RCAM	K-183574-501
1	P-1264	8P3-235E	Pressure Roller Arm Assembly	Arm, Roller, Pins & Set Screws Assd.	Positions Film and Applies Pressure	RCAM	K-181156-503
1	P-1265	8P3-231	Motor Pulley Assembly	Steel Pulley 1.325 Dia. "V" Type	Drives "V" Belt	RCAM	K-182156-502
1	P-1266	8P3-209	Plate Assembly	Aperture Plate	Holds Aperture, Guides, Shoes, etc.	RCAM	K-182138-501

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Qty.	Ref or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1267	8P3-241	Drive Shaft..... Assembly	Gear, Pin and Shaft..... Assembly	Main drive shaft..... Assembly	RCAM	K-181293-501
1	P-1268	8P3-243	Sprocket Shaft..... Assembly	Shaft, Gear, Pin, Screws	Drive Film Sprocket.....	RCAM	KX286442-503
1	P-1269	8P3-141A	Idler Gear..... Assembly	Steel Idler Gear, Hub..... and Bushing	Drives Sprocket and..... Takeup-Rewind Gears	RCAM	K-183793-501
1	P-1270	8P3-141	Idler Gear..... Assembly	Phenolic Idler Gear..... Hub and Bushing	Drives Steel Idler..... Gear	RCAM	K-183793-502
1	P-1271	8P3-335	Rotary Stabilizer..... Assembly	Oil Filled Stabilizer..... Wheel	To Maintain Con..... stant Speed	RCAM	M-141144-501
1	P-1272	8P3-35	Mirror Bracket..... Assembly	Zinc Alloy Die Casting.....	Sound Optical Mirror..... and Bracket	RCAM	K-181284-503
1	P-1273	8P3-245	Drum Shaft..... Assembly	Drum, Shaft and Screw..... Assembled	Aids in Sound Trans..... lation	RCAM	M-141135-503
1	P-1274	8P3-155	Holding Pin..... Assembly	Spring Hinge Pin.....	Holds Gate in Place.....	RCAM	K-182885-502
1	P-1275	8P3-167	Knob and Shaft..... Assembly	Shaft, Collar, Knob and..... Pin	Framing Control.....	RCAM	K-183698-501
1	P-1276	8P3-345	Terminal Board..... Assembly	3 Term. Bakelite Ins..... With Brackets	For Terminal Con..... nections	RCAM	M-140579-503
1	P-1277	8P3-7	Arm & Bushing..... Assembly	Arm with Bushing..... Staked in Place	Framing Control.....	RCAM	K-181281-502
1	P-1278	8P3-247	Sprocket Shaft..... Assembly	Shaft, Gear, Pin, Screws	Turns Sprocket.....	RCAM	KX286442-504
1	P-1279	8P3-235	Roller Assembly.....	Core and Roller..... Assembled	Sound Pressure..... Roller	RCAM	K-181155-502



Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1280	8P3-159	Lamp House Sub-Assembly	Lamp Housing Only	Holds Proj. Lamp Switches, etc.	RCAM.	P-171279-501
1	P-1281	8P3-327	Spring and Pin Assembly	Flat Steel Spring and Pin	Holds Condenser Lens in Place	RCAM.	K-181092-506
1	P-1282	8P3-327A	Spring and Pin Assembly	Flat Steel Spring and Pin	Holds Proj. Lens. in Place	RCAM.	K-181092-505
1	P-1283	8P3-263	Shutter and Gear Assembly	Shutter, Gear, Hub, Bushing, Screws	Cut off Light while Film Moving	RCAM.	M-140447-503
1	P-1284	8P3-217	Gear Plate Assembly	Assembly of Gear Plate and Studs	For Shutter, Cam and Pulley Gears	RCAM.	K-182695-502
1	P-1285	8P3-249	Shaft and Pin Assembly	Steel Shaft with Assembled Pin	Takeup-Rewind Control	RCAM.	K-184291-501
1	P-1286	8P3-231A	Pulley and Gear Assembly	Pulley, Gear and Bushings	Rewind Pulley and Gear Assembly	RCAM.	K-184307-501
1	P-1287	8P3-31	Bracket Assembly	C.R. Steel Bracket	Spring Holder and Stop	RCAM.	K-184277-501
1	P-1288	8P3-231B	Pulley Assembly	Pulley, Gear and Bushing	Take-up Pulley	RCAM.	K-184297-501
2	P-1289	6L6440-3.3S	Screw	Fil. Hd. Steel No. 4-40 x $\frac{1}{8}$ Lg.	Parts Assembly	RCAM.	K-57474-3
1	P-1290	6L6440-6.3S	Lockwasher	Steel $\frac{1}{2}$ " Shakeproof	Holds Nut Tight	SHK.	K-59049-27
1	P-1291	8P3-236G	Screw	Set Screw Oval Pt. No. 6-32 x $\frac{1}{8}$ Lg.	In and Out Adjustment	RCAM.	K-59100-14
1	P-1292	6L3106-32S	Nut	No. 6-32 Steel	Lock Nut for In-Out Adj.	RCAM.	K-82244-1

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Qty.	Ref or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1293	6L672206	Lockwasher	No. 6 Steel Shakeproof No. 1206	Holds Nut Tight	RCAM	K-59049-19
4	P-1294	6L7032-10.2S	Machine Screw	No. 10-32 Oval Hd. $\frac{5}{8}$ Lg.	Parts Assembly	RCAM	K-57490-15
4	P-1295	6L9104-2	Screw	No. 4 Steel $\frac{1}{4}$ Lg.	Assembles Nameplate	RCAM	K-56444-13
1	P-1296	8P3-61A	Cap Nut	No. 10-32 Brass	Locks Adjusting Nut on Sound Press.	RCAM	K-67583-4
1	P-1297	3Z12050-4	Terminal	Brass with .180 Diam. Hole	Bracket Connector	RCAM	K-8431-1
1	P-1298	6G615	Grease	Fiske Lubriplate No. 130A	Lubrication of Gears and Cams	FB	W-130352-101
2	P-1299	6L6440-10.1S	Screw	R.H. Steel No. 4-40 x $\frac{1}{2}$ Lg.	Parts Assembly	RCAM	K-57454-15
7	P-1300	6L7032-8.1S	Screw	R.H. No. 10-32 x $\frac{1}{2}$ Steel	Parts Assembly	RCAM	K-57460-13
2	P-1301	6L6832-8.3S	Screw	No. 8-32 x $\frac{1}{2}$ Steel Hd.	Parts Assembly	RCAM	K-57478-13
2	P-1302	6L6632-10.1S	Screw	R.H. Steel No. 6-32 x $\frac{5}{8}$ Lg.	Parts Assembly	RCAM	K-57456-15
1	P-1303	6L6632-14.1S	Screw	R. H. Steel No. 6-32 x $\frac{7}{8}$ Lg.	Parts Assembly	RCAM	K-57456-19
2	P-1304	6L6832-5.1S	Screw	R.H. Steel No. 8-32 x $\frac{1}{4}$ Lg.	Parts Assembly	RCAM	K-57458-7
2	P-1305	6L7920-4-6.1S	Screw	R.H. Steel No. $\frac{1}{4}$ -20 $\frac{5}{8}$ Lg.	Parts Assembly	RCAM	K-57459-5

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Qty.	Ref or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
2	P-1306	6L6440-6.3S	Screw	No. 6 Wood Screw R.H. ½ Lg. Steel	Holds Spacer in Place	RCAM	K-56444-33
2	P-1307	6L6256-4.1S	Screw	No. 2-56 x ¼ R.H. Steel	Parts Assembly	RCAM	K-57452-5
3	P-1308	6L6632-5.8	Screw	Bind. Hd. No. 6-32 x ⅝ Steel	Parts Assembly	RCAM	K-82288-4
3	P-1309	6L6632-5.1S	Screw	R.H. Steel No. 6-32 x ⅝ Lg.	Parts Assembly	RCAM	K-57456-7
4	P-1310	6L6832-5.8S	Screw	Bind. Hd. No. 8-32 x ⅝ Steel	Parts Assembly	RCAM	K-82289-4
8	P-1311	8P3-236A	Screw	Socket Hd. No. 8-32 x ⅝ Lg. Steel	Parts Assembly	RCAM	K-843365-12
4	P-1312	6L6632-2.39	Screw	Socket Hd. Set Screw No. 6-32 x ⅝ Lg.	Parts Assembly	RCAM	K-843365-1
1	P-1313	8P3-184E	Nut	No. ¼-20 x .437 x .187 Steel Hex	Parts Assembly	RCAM	K-57435-8
9	P-1314	8P3-184F	Nut	No. 8-32 x .343 x .125 Hex Steel	Parts Assembly	RCAM	K-57435-5
3	P-1315	6L71114	Lockwasher	No. ¼ Steel Shakeproof. No. 1114	Holds Nut Tight	SHK	K-59049-7
1	P-1316	6L71118	Lockwasher	No. ⅝ Steel Shakeproof. No. 1118	Holds Nut Tight	SHK	K-59049-8
12	P-1317	6L71104	Lockwasher	No. 4 Steel Shakeproof. No. 1104	Holds Nut Tight	SHK	K-59049-2
1	P-1318	6L75037	Washer	Steel ¾ O.D. x .170 I.D. x .031 Thk.	Bearing Surface	RCAM	K-57428-5

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Qty.	Ref or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
3	P-1319	6L75040	Washer	Steel 1/2 O.D. x 3/2 I.D. x .065 Thk.	Bearing Surface	RCAM.	K-82278-6
2	P-1320	6L6632-3.39	Set Screw	Socket Hd. Set Screw No. 6-32 x 3/8 Lg.	Parts Assembly	RCAM.	K-843365-2
3	P-1321	6L6440-4.3S	Screw	Fl. Hd. Steel No. 4-40 x 1/4 Lg.	Parts Assembly	RCAM.	K-57474-5
2	P-1322	6L6632-6.3S	Screw	Fl. Hd. Steel No. 6-32 x 3/8 Lg.	Parts Assembly	RCAM.	K-57476-9
1	P-1323	6L6002-4.85BS	Screw	Drive Screw Parker Kalon No. 2 x 1/4 Lg.	Parts Assembly	PK	K-59137-9
1	P-1324	8P3-236B	Screw	Headless Slotted No. 6-32 x 3/8 Steel	Holds Photocell Socket in Bracket	RCAM.	K-59100-3
1	P-1325	3Z12050-3	Terminal	Small—Hot Tin Dip	On Ground Lead of Photocell Bracket	RCAM.	K-818337-16
2	P-1326	6L7032-4.39	Screw	Set Screw Socket Hd. No. 10-32 x 1/4 Lg.	Holds Motor Pulley On Shaft	RCAM.	K-843365-23
2	P-1327	6L7032-3.39	Screw	Socket Hd. Set Screw No. 10-32 x 3/8 Lg.	Parts Assembly	RCAM.	K-843365-22
2	P-1328	6L6440-5.2S	Screw	No. 4-40 x 3/8 Steel Oval Hd.	Parts Assembly	RCAM.	K-57484-7
3	P-1329	6L6440-12.2S	Screw	No. 4-40 x 3/4 Steel Oval Hd. 1 1/2 Lg.	Parts Assembly	RCAM.	K-57484-16
2	P-1330	6L6832-8.1S	Screw	R.H. Steel No. 8-32 x 1/2 Lg.	Parts Assembly	RCAM.	K-57458-13
2	P-1331	6L6832-6.2S	Screw	Oval Hd. Steel No. 8-32 x 3/8 Lg.	Parts Assembly	RCAM.	K-57488-9

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	P-1332	6L6832-5-1.1S	Screw	R.H. Steel No. 8-32 x $\frac{3}{4}$ Lg.	Parts Assembly	RCAM	K-57458-9
2	P-1333	6L6832-4.39	Set Screw	Socket Hd. No. 8-32 x $\frac{1}{4}$ Lg. Steel	Parts Assembly	RCAM	K-843365-13
6	P-1334	6L6440-6.8S	Screw	Bind. Hd. No. 4-40 x $\frac{3}{8}$ Steel	Parts Assembly	RCAM	K-82287-5
1	P-1335	8P3-51	Bushing	Screw Steel Bushing	In and Out, Up-Down Cam Assy. Bushing	RCAM	K-182813-1
1	P-1336	8P3-139	Gear	C.R. Steel, 78 teeth 1.6667 Diam.	In and Out, Up-Down Cam Gear	RCAM	M-141145-4
1	P-1337	8P3-57A	Cam	C.R. Steel, Chapman-ized and Hardened	In and Out Cam	RCAM	K-182836-1
1	P-1338	8P3-57	Cam	Aluminum-Bronze Cam	Up and Down Cam	RCAM	K-182838-1
1	P-1339	8P3-49E	Bushing	"Oilite" .377 O.D. x $\frac{1}{2}$ Lg.	Bearing for In-Out, Up-Down Cam	CC	K-182051-1
6	P-1340	6L75038	Washer	Steel $\frac{1}{2}$ O.D. x $\frac{1}{2}$ I.D. x .042 Thk.	Bearing Surface	RCAM	K-82278-4
2	P-1341	8P3-73	Spacer	Wooden Block	Holds Motor in Place	RCAM	K-184896-1
1	P-1342	8P3-213	Plate and Arm Assembly	Steel Plate and Latch	Protect Case and Hold Spring Belt	RCAM	K-184298-501
1	P-1343	8P3-83A	Clip	Music Wire	To hold Oil Can	RCAM	K-819305-1
1	P-1344	8P3-231A	Plate and Arm Assembly	Steel Plate and Latch	Protect Case and Holds Spring Belt	RCAM	K-184299-501
1	P-1345	8P3-37H	Bracket	Steel "U" Bracket	Holds Belt Rollers	RCAM	K-184270-1
1	P-1346	8P3-235C	Roller	Steel Roller	Guides Takeup Belt	RCAM	K-184254-1
1	P-1347	8P3-235D	Roller	Steel Roller	Guides Takeup Belt	RCAM	K-184259-1
2	P-1348	8P3-199A	Dowel Pin	Steel Pin	Roller Shaft	RCAM	K-804389-23
2	P-1349	8P3-45A	Bracket	Rectangular Steel Plate	Bearing Surface	RCAM	K-181689-2

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		MI-1356
1	A-101	8P3-65	Case Assembly	Steel Carrying Case	Houses Amplifier	RCAM	T-161088-501
1	A-102	8P3-1	Projector Amplifier	Amplifier only	Sound Amplifier	RCAM	T-161077-501
1	T-2	2Z9612.10	Plate Trans-former	340 V-170 m.a., 5V-3A, 2.4 V-4.5 A.	Plate Supply	RCAM	K-182108-2
1	T-1	2Z9611.11	Filament Trans-former	3.9 V-3.8 A.	Filament Supply	RCAM	K-182107-2
1	T-3	2Z9632.5	Output Trans-former	4, 8, 15, 250 ohms output	Output Coupling	RCAM	M-140552-4
1	T-5	2Z9615.1	Field Supply Transformer	200 V-200 MA, 5V-3 amp.	Speaker Field Power	CHGO	M-141200-1
7	A-103	2Z8659-6	Socket	Black Phenolic Am-phenol Cat. No. MIP8	Radiotron Sockets	AMP	K-87156-1
27	A-104	8P3-234	Rivet	$\frac{5}{16}$ Tubular Steel	Parts Assembly	RCAM	K-57494-3
12	A-105	8P3-234A	Rivet	$\frac{3}{16}$ Tubular Steel	Parts Assembly	RCAM	K-57494-4
1	A-106	2Z8762.2	Socket Assembly	Steatite Octal Amphenol No. SS-8	Socket for 6F6	AMP	K-844041-503
1	A-107	2Z8687	Socket Assembly	Black Phenolic Am-phenol No. RS-5	Socket for Oscillator Coil	AMP	K-920040-501
2	A-108	6L3506-32	Hex Nut	$\frac{3}{8}$ "-32 Steel	Parts Assembly	RCAM	K-59149-6
2	A-109	6L72220	Lockwasher	$\frac{3}{8}$ " Cat. No. 1220	Hold Nut Tight	RCAM	K-59049-25

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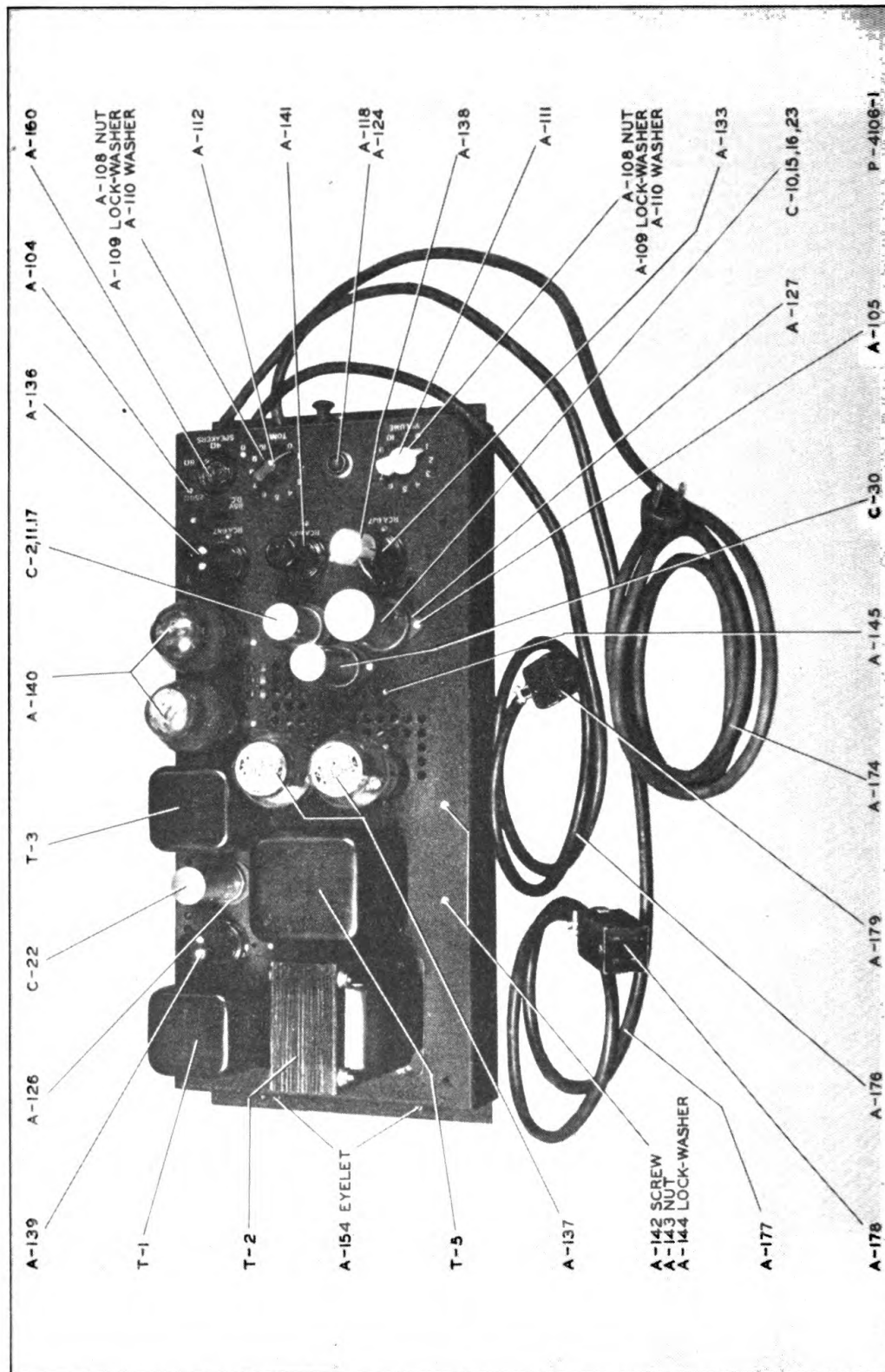


Figure 30—Amplifier—Top View—Parts Identification

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		
2	A-110	8P3-359A	Plain Washer	$\frac{3}{8}$ " I.D. C.R. Steel Hard	On volume and tone Control Shaft	RCAM	K-82237-25
1	A-111	2Z5848	Knob	White-Kurz Kasch No. S-292 IL	Volume Control Knob	KK	K-845607-3
1	A-112	2Z5848.1	Knob	Red-Kurz Kasch No. S-292-IL	Tone Control Knob	KK	K-845607-4
5	A-113	2Z9479.1	Terminal Board	Single Terminal	Connection Board	RCAM	K-81641-1
1	A-114	2Z9479.2	Terminal Board	Five Terminal (one Gnd.)	Connection Board	RCAM	K-81641-21
1	A-115	2Z9479.3	Terminal Board	Three Terminal	Connection Board	RCAM	K-81641-16
1	R-13	2Z7296- 500M	Variable Resistor	$\frac{1}{2}$ meg. Non-Linear Taper	Volume Control	RCAM	K-97500-6
1	R-17, 10	2Z7275	Variable Resistor	500,000 ohms, 10 meg. Dual Contralab Type 18-010-000	Tone Control	RCAM	K-140357-11
3	R-1, 7, 9	3Z6801A2	Resistor	1.2 meg. $\frac{1}{2}$ watt Insu- lated Carbon Type Tinned End Leads	Photocell Coupling S. Grid Coupling	RCAM	K-78727-99
4	R-4, 21, 22, 41	3Z4550	Resistor	100,000 ohms $\frac{1}{2}$ watt Insulated Carbon Type Tinned End Leads	Grid and Plate Coupling	RCAM	K-78727-86

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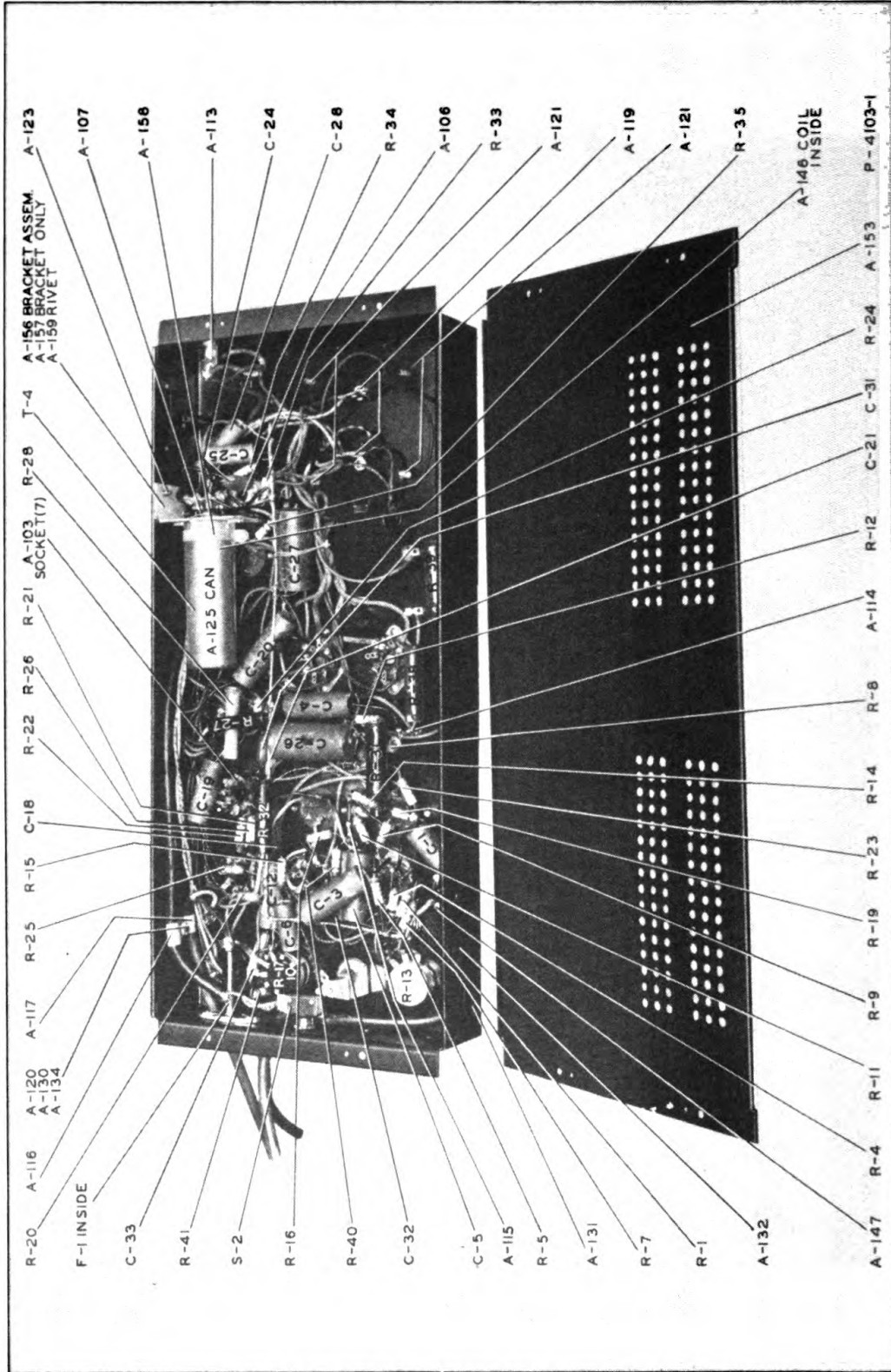


Figure 31—Amplifier Sub-Chassis View—Parts Identification

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		
3	R-14, 16, 23	3Z6622-2	Resistor	22,000 ohms, 1/2 watt Insulated Carbon Type Tinned End Leads	Voltage Dropping and Filter	RCAM.	K-78727-78
3	R-11, 24, 26	3Z6727	Resistor	270,000 ohms, 1/2 watt Insulated Carbon Type Tinned End Leads	Plate and Grid Coupling	RCAM.	K-78727-91
1	R-5	3Z6180-1	Resistor	1,800 ohms, 1/2 watt Insulated Carbon Type Tinned End Leads	Cathode Bias	RCAM.	K-78727-65
1	R-8	3Z6804A7-4	Resistor	4.7 Meg., 1/2 watt Insulated Carbon Type Tinned End Leads	Voltage Dropping and Filter	RCAM.	K-78727-106
1	R-12	3Z6582-3	Resistor	8,200 ohms, 1/2 watt Insulated Carbon Type Tinned End Leads	Voltage Dropping and Filter	RCAM.	K-78727-73
1	R-15	3Z6120-8	Resistor	1,200 ohms, 1/2 watt Insulated Carbon Type Tinned End Leads	Cathode Bias	RCAM.	K-78727-63
1	R-19	3Z4529	Resistor	10,000 ohms, 1/2 watt Insulated Carbon Type Tinned End Leads	Voltage Dropping and Filter	RCAM.	K-78727-74

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		
1	R-20	3Z6220-4	Resistor	2,800 ohms, ½ watt Insulated Carbon Type Tinned End Leads	Cathode Bias	RCAM	K-78727-66
1	R-25	3Z6612-1	Resistor	12,000 ohms, ½ watt Insulated Carbon Type Tinned End Leads	Grid Coupling	RCAM	K-78727-75
1	R-27	3Z6018E5-1	Resistor	185 ohms, 10 watt Type 1½ G-16 Wirewound Vitreous Enamel	Cathodes Bias	HH	M-140521-8
1	R-28	3Z6582-4	Resistor	8,200 ohms, 2 watt Carbon Non-Insulated	Compensator Resistor	RCAM	K-78724-73
1	R-31	3Z6250-29	Resistor	2,500 ohms, 20 watt Type 2A-16 Wirewound Vitreous Enamel	Dropping Resistor	HH	M-140521-10
1	R-32	3Z6612A5-10	Resistor	12,500 ohms, 20 watt Type 2A-16 Wirewound Vitreous Enamel	Bleeder Resistor	HH	M-140521-9
2	R-33, R-40	3Z6656-1	Resistor	56,000 ohms, ½ watt Insulated Carbon Type Tinned End Leads	Grid Resistor, Plate Resistor	RCAM	K-78727-83
1	S-1	3Z9692	Switch	A-C Toggle 3 amp. 250 Volts	Power Control	AHH	K-181196-2

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100..... Series or below		Projector Amplifier		Sound Amplifier.....		
1	A-116.....	6Z1932	Cable Clamp.....	C.R. Steel PS-4, ¼ Hard Cadmium Plt.	Holds Cable.....	RCAM.	K-181205-1
2	A-117.....	6Z1932	Cable Clamp.....	C.R. Steel PS-4, ¼ Hard	Holds Cable.....	RCAM.	K-17301-7
1	A-118.....	2Z5990-6	Pilot Light Assembly	Socket, Bracket.....	Holds Lamp.....	DRK.	K-181500-1
6	C-1, 5, 12, 18, 19, 32	3DA100-132	Capacitor.....	0.1 mfd. 400 V.....	Coupling and By-pass	RCAM.	K-72017-532
2	C-3, 4	3DA250-37	Capacitor.....	0.25 mfd. 350 V.....	Filter and By-pass	RCAM.	K-72050-546
1	C-6	3DA2.500-3	Capacitor.....	0.0025 mfd. 700 V.....	Tone Control Capacitor	RCAM.	K-72017-502
2	C-24, 31	3D9270-2	Capacitor.....	270 mmf. 400 Volt. Working 500 V. Peak	Coupling and Equalization	RCAM.	K-86012-582
1	C-25	3DA3.500-1	Capacitor.....	0.0035 mfd. 700 V.....	Tuning.....	RCAM.	K-72017-504
2	A-119	2Z9479.5	Terminal Board.....	One Dual Terminal.....	Connection Board.....	RCAM.	K-81641-9
1	C-30	3DB40-8	Capacitor.....	40-40 mfd. 250 V.....	Filter.....	PRM.	P-170285-16
1	C-10, 15, 16, 23	3DB10-31	Capacitor.....	20-10-10-10-mfd. 450 V.....	H.V. Filter.....	PRM.	M-86023-4
1	C-20	3DB16-4	Capacitor.....	16 mfd. 150 V.....	Cathode By-pass.....	PRM.	M-86011-1

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		MI-1356
2	C-26, 27	3DB16-5	Capacitor	16 mfd. 450 V.	H.V. Filter and By-pass	PRM.	M-86011-12
1	C-2, 11, 17	3DB20-7	Capacitor	20-20-20-mfd. 25 V.	L.V. By-Pass	PRM.	M-86054-4
1	C-22	3DB40-9	Capacitor	40 mfd. 450 V.	H.V. Filter	PRM.	M-86054-8
2	A-120	6L6832-3S	Machine Screw	No. 8-32 Steel $\frac{3}{8}$ Lg.	Parts Assembly	RCAM.	K-78785-5
4	A-121	8P3-236C	Screw	Self Tapping No. 8 $\frac{3}{8}$ Lg.	Parts Assembly	PK	K-73159-2
1	A-122	3Z3274	Fuse Post	Alden Cat. No. 440 FH	Fuse Mounting	APC	K-920041-1
1	R-35	3Z6075-17	Resistor	750 ohms, 2 watt	Voltage Dropping and Filter	RCAM.	K-867972-456
2	A-123	8P3-236D	Screw	Self Tapping No. 6 $\frac{3}{8}$ Lg.	Parts Assembly	PK	K-73159-6
1	A-124	2Z5927	Lamp, Pilot	G.E. Mazda No. 44	Indicator	GE	K-849546-3
1	A-125	2Z1211/2	Oscillator Coil	Aluminum or zinc can 1 $\frac{3}{8}$ " diameter x 4 $\frac{3}{4}$ Lg. .016 Thk.	Coil Shield	RCAM.	K-80392-2
3	A-126	8P3-179	Capacitor	.062 stock bakelite with Mtg. holes	Mount Capacitor	PRM.	K-85558-2
1	A-127	8P3-179B	Capacitor	.062 stock bakelite with Mtg. holes	Mount Capacitor	PRM.	K-85558-3
1	A-128	8P3-361A	Washer	$\frac{3}{4}$ " I.D. Vellutex $\frac{3}{4}$ Thk.	Bearing Surface	RCAM.	K-860619-4

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		
1	A-129	No Stock No. Necessary	Nameplate	.032 Thk. Formica	Identification	RCAM	K-1860-1
2	A-130	6Z3108-32S	Hex Nut	No. 8-32 Steel Hex	Parts Assembly	RCAM	K-57435-5
1	A-131	2Z1480.2	Plug Button	3/4" Diam. Cat. No. 51026 Steel	Close hole	UCF	K-99051-15
2	A-132	2Z1480.3	Plug Button	7 1/2" Diam. Cat. No. 48155 Steel	Close hole	UCF	K-99051-17
1	F-1	3Z1926	Fuse	Type 3AG 3 ampere	Overload Protection	BUS	K-55544-4
1	A-133	2Z8300.1	Top Cap Shield	ARH No. 92 Top Cap Shield .830 Diam. x 1" High Steel	Shields Grid Cap	ARH	K-79034-1
2	A-134	6L72208	Shake Proof Lockwasher	No. 8 Cat. No. 1208	Hold Nut Tight	RCAM	K-59049-20
1	A-135	No Stock No. Necessary	License Label	"DE" and "SE" Granite Blue Paper	Patent Notices	RCAM	K-1857-1
1	A-136	2V6N7	Radiotron	RCA 6N7 or 6N7GT/G	Driver and Phase Inverter	RCAM	T-161077-90
2	A-137	2V5U4G	Radiotron	RCA 5U4G	Rectifier Power Tube	RCAM	T-161077-91
2	A-138	2V6J7	Radiotron	RCA 6J7 or 6J7GT	Input Voltage Amplifier	RCAM	T-161077-92
1	A-139	2V6F6	Radiotron	RCA 6F6 or 6F6G	Oscillator	RCAM	T-161077-93
2	A-140	2V6L6	Radiotron	RCA 6L6 or 6L6G	Power Output	RCAM	T-161077-94

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		
1	A-141	2V6J5	Radiotron	RCA 6J5 or 6J5GT	Intermediate and Voltage Amplifier	RCAM	T-161077-95
3	A-142	6L6632-8S	Machine Screw	No. 6-32 x 1/2 Steel	Parts Assembly	RCAM	K-57456-13
3	A-143	6L8106-32S	Hex Nut	No. 6-32 Steel Hex	Parts Assembly	RCAM	K-57435-4
3	A-144	6L72206	Lockwasher	No. 6 Cat. No. 1206	Hold Nut Tight	RCAM	K-59049-19
1	A-145	8P3-234B	Rivet	1/2 Tubular Steel	Holds Terminal Board	RCAM	K-57494-5
1	A-146	3C1081-3A	Oscillator Coil	Plug in type coil	Coils for Oscillator	RCAM	K-180603-2
1	R-34	3Z6075-17	Resistor	750 ohms, 2 watts Insulated Carbon, Tinned End Leads	Cathode Bias	RCAM	K-867972-456
1	C-21	3DA1-88	Capacitor	1,000 mmf. 400 V	Compensator	RCAM	K-95099-533
1	A-147	2Z9479.4	Terminal Board	Two Terminal	Connection Board	RCAM	K-81641-3
1	R-39	3Z6150-37	Resistor	1,500 ohms, 25 Watt. Wirewound Vitreous Enamel Type 2P-2	Bleeder	HH	K-182120-3
1	C-33	3D9390-1	Capacitor	390 mmf. 400 V	Tone Control	RCAM	K-95099-513
1	A-148	2Z5752	Knob	ACH Cat. No. 685-A	Capacitor Pull Knob	ACH	K-184034-1
1	R-38	3Z6016-4	Resistor	160 ohms, 20 watt. Type 2A-16	Voltage Dropping and Filter	HH	M-140521-16
1	C-28	3DA100-131	Capacitor	0.1 mfd. 200 V	Cathode By-Pass	RCAM	K-72017-528
1	A-149	6L7044-6.1S	Machine Screw	No. 10-24 RH Steel %" Lg.	Parts Assembly	RCAM	K-59150-9

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		MI-1356
2	A-150	6L6440-5S	Machine Screw	No. 4-40 x 1/8 Steel	Parts Assembly	RCAM.	K-57454-7
2	A-151	6L3104-40S	Hex Nut	No. 4-40 Steel Hex	Parts Assembly	RCAM.	K-57435-3
2	A-152	6L72204	Lockwasher Shakeproof Type 12	No. 4 Cat. No. 1204	Hold Nut Tight	RCAM.	K-59049-18
1	A-153	8P3-95	Bottom Cover	0.04 Thk. C.R. Steel	Protection	RCAM.	M-922117-1
4	A-154	None	Eyelet	PS-4 Soft 0.156 LG.	Holds Bottom Cover in Place	USM	K-90436-23
1	A-155	6L71110	Lockwasher	No. 10 Cat. No. 1110	Hold Nut Tight	RCAM.	K-59049-5
1	A-156	2Z1211	Oscillator Coil Bracket Assembly	Bracket and Socket	Holds Oscillator Coil	RCAM.	M-922118-501
1	A-157	2Z1211/1	Oscillator Coil Bracket	.062 Thk. C.R. Steel PS No. 4 Soft	Holds Oscillator Coil Assembly	RCAM.	K-920046-1
1	A-158	2Z2602	Clamp	Capacitor clamp	Holds Shield Can	PB	K-77634-1
2	A-159	None	Rivet	S/32 Tubular Brass	Parts Assembly	RCAM.	K-57494-53
1	A-160	2Z8687	Socket	Speaker Socket RS-5 Amphenol	Connector Socket	AMP	K-920040-501
1	A-161	None	Wire	Red PS-533-22	Electrical Connections	RCAM.	W-130424-4

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100..... Series or below		Projector..... Amplifier		Sound Amplifier.....		MI-1386
1	A-162	None	Wire	Green PS-533-22	Electrical Connec- tions	RCAM.	W-130424-6
1	A-163	None	Wire	Yellow PS-533-22	Electrical Connec- tions	RCAM.	W-130424-7
1	A-164	None	Wire	Black PS-533-22	Electrical Connec- tions	RCAM.	W-130424-8
1	A-165	None	Wire	Red/Black PS-533-22	Electrical Connec- tions	RCAM.	W-130424-9
1	A-166	None	Wire	Brown PS-533-7	Electrical Connec- tions	RCAM.	W-130424-10
1	A-167	None	Wire	Black/Brown PS-533-7	Electrical Connec- tions	RCAM.	W-130424-11
1	A-168	None	Wire	PS-105 .032 Diam.	Electrical Connec- tions	RCAM.	W-130424-12
1	A-169	None	Wire	PS-105 .080 Diam.	Electrical Connec- tions	RCAM.	W-130424-13
1	A-170	None	Sleeving	PS-50 .042 I.D.	Insulation.....	RCAM.	W-130424-14
1	A-171	None	Sleeving	PS-50 .166 I.D.	Insulation.....	RCAM.	W-130424-15
1	A-172	None	Cord	Linen No. 6 Gray PS-294	Binding for Cables	RCAM.	W-130424-16
1	A-173	6N7531	Solder	Rosin Core	Electrical Bonding	RCAM.	W-130424-19
1	A-174	3E4064-1	Power Cord and Plug	G.E. No. "SJ" 2-18 cord. and No. 20 plug	Power Connector.....	GE.....	K-180707-6

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
	100 Series or below		Projector Amplifier		Sound Amplifier		MI-1356
1	A-175	2Z2708.2	Grid Connector	Wire Lead With Clip	Connects to Grid Cap.	RCAM	K-920055-1
1	A-176	1B3016-2	Cable	70 in. 2 Cond. Shielded	Input Cable	RCAM	K-181461-3
1	A-177	1B3016-2	Cable	70 in. 2 Cond. Shielded	Exciter Lamp Cable	RCAM	K-181461-4
1	A-178	2Z8639-17	Connector	Jones No. S-404-CCT	Connects Photocell Circuit	HBJ	K-184488-1
1	A-179	2Z8639-13	Connector	Jones No. S-402-CCT	Connects Exciter Lamp Socket	HBJ	K-184488-2

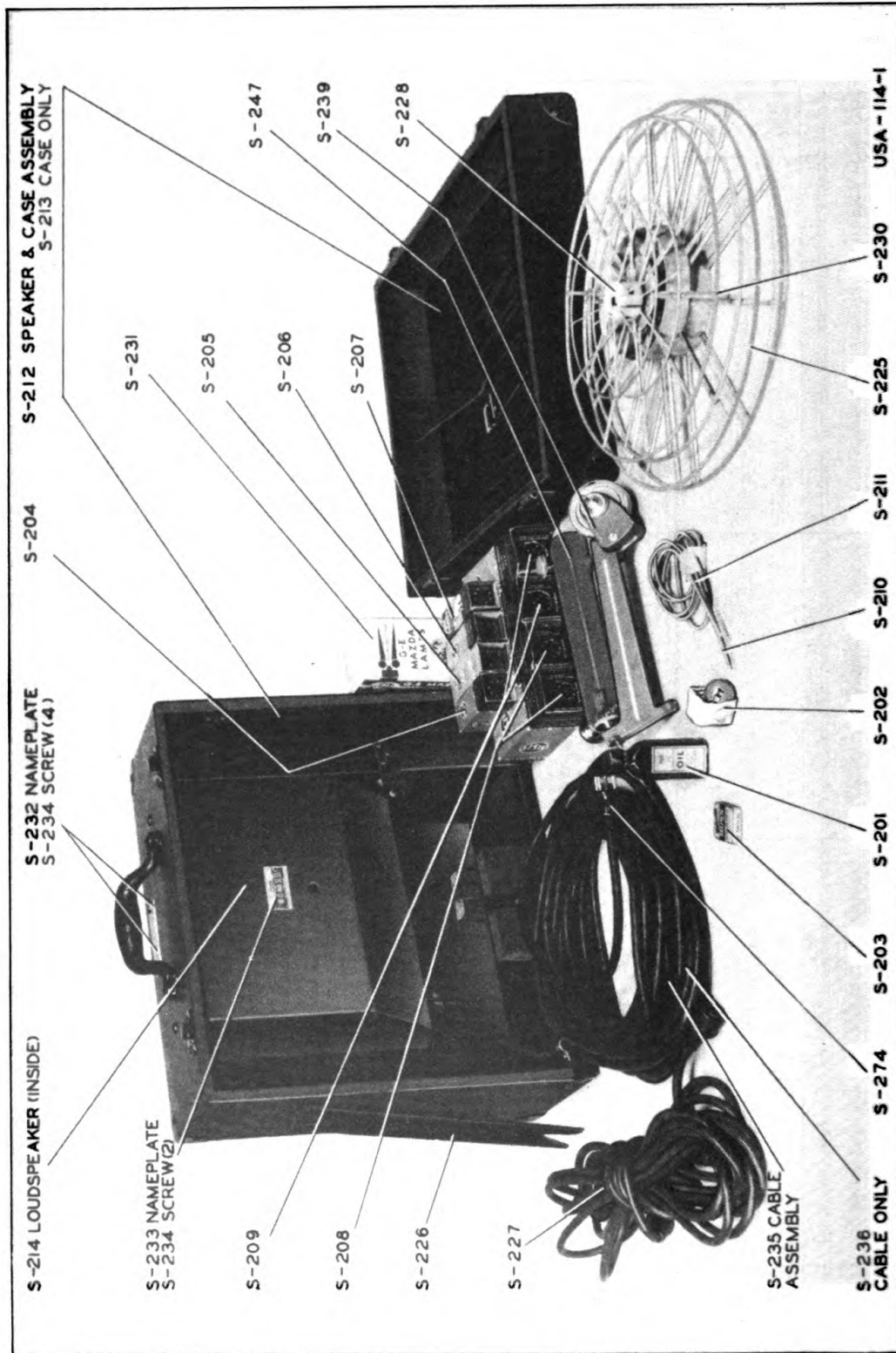


Figure 32—Loudspeaker—Opened Rear View—Parts Identification

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	200 Series		Loudspeaker	Loudspeaker for 16 mm. Projector-Amplifier	Reproduces Sound from Electrical Impulses	RCAM.	MI-1386
1	S-201	8P3-185	Oil Bottle	Sta-Put Oil No. 370	To Lubricate Equip.	EFH	MI-1331
1	S-202	8A2096-1	Exciter Lamp Assembly	GE 4V., ¼ Amp. Pre-focused S-8 Bulb	Spare	GE	K-180599-2
5	S-203	3Z2603.2	Amplifier Fuses	Type 3AG, 3 Ampere	Spare	BUS	K-55544-4
1	S-204	2V6J7	Radiotron	RCA 6J7	Spare	RCAM.	RCA 6J7
1	S-205	2V6N7	Radiotron	RCA 6N7	Spare	RCAM.	RCA 6N7
1	S-206	2V6F6	Radiotron	RCA 6F6	Spare	RCAM.	RCA 6F6
1	S-207	2V6J5	Radiotron	RCA 6J5	Spare	RCAM.	RCA 6J5
2	S-208	2V6L6	Radiotron	RCA 6L6	Spare	RCAM.	RCA 6L6
2	S-209	2V5U4G	Radiotron	RCA 5U4-G	Spare	RCAM.	RCA 5U4-G
1	S-210	8P3-325A	Take-up Spring	29" Long	Spare	RCAM.	K-184261-2
1	S-211	8P3-325	Rewind Spring	21½" Long	Spare	RCAM.	K-184261-1
1	S-212	8P3-67	Speaker & Case Assembly	Case, Loudspeaker, and Acces. Compt.	Holds Speaker and Accessories	RCAM.	W-130340-501
1	S-213	8P3-71	Carrying Case	Fabrikoid Covered Case	Contains Loudspeaker and Acces.	RCAM.	W-130332-1
1	S-214	2Z6212	Speaker Assy.	Loudspeaker Mech.	Sound Reproducer	RCAM.	MI-6332
8	S-215	8P3-123	Gasket	.038 to .050 Thk. News Board	Seal	RCAM.	K-182895-1
1	S-216	8P3-250	Screen	Grille Screen 10¼ Diam. Iron Wire Cloth, 16 Mesh, .025 Wire	Protects Mechanism	RCAM.	K-183708-1

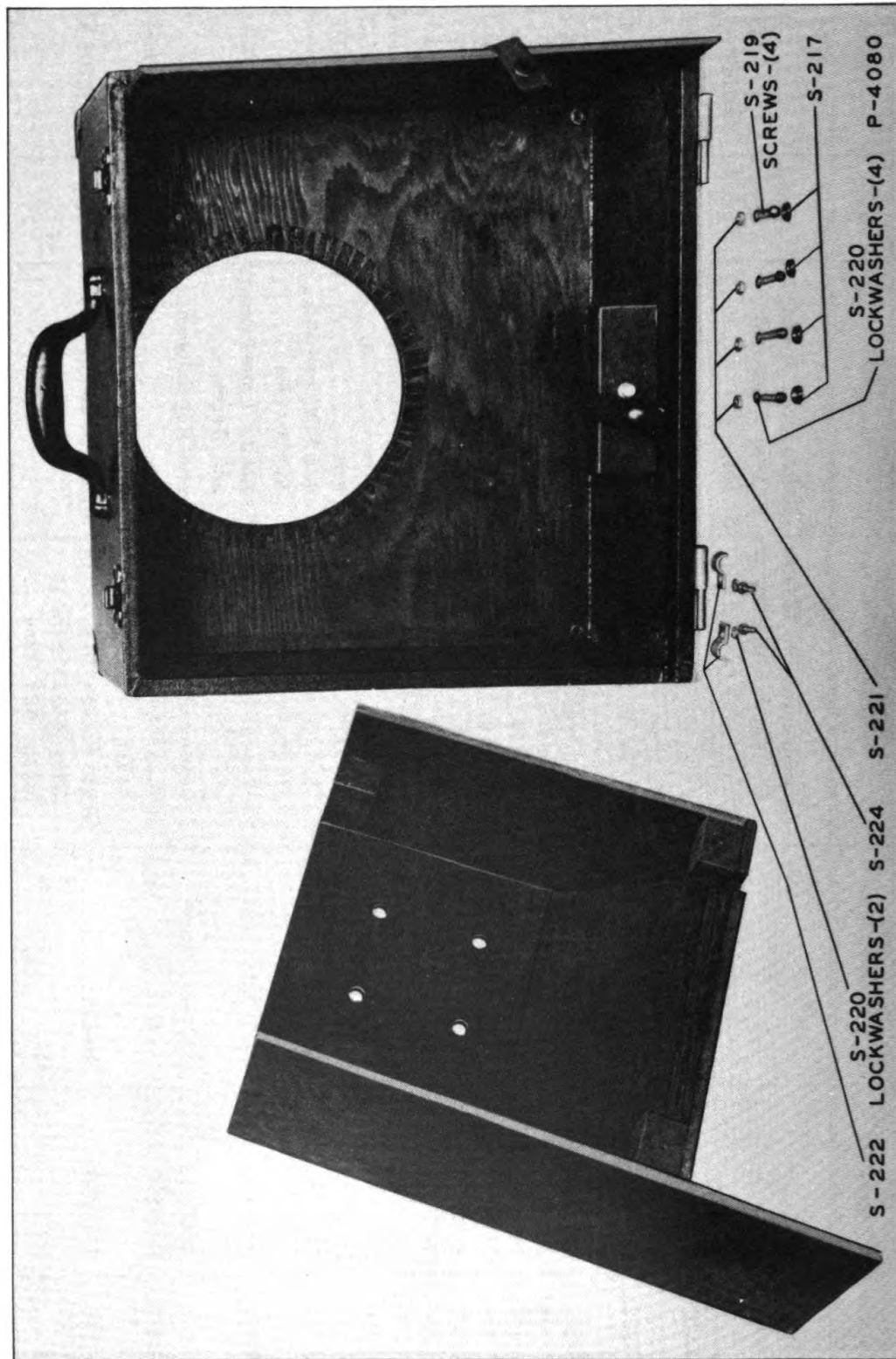


Figure 33—Loudspeaker Case—Disassembled—Parts Identification

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
4	S-217	8P3-365	Fin. Washer	No. 8, .180 I.D. x $\frac{1}{16}$ O.D. x .100 Thk. Stl. Grille Screen 10 $\frac{1}{4}$ Diam.	Protects Finish	RCAM	K-184013-3
1	S-218	8P3-250A	Screen	Iron Wire Cloth, 16 Mesh, .025 Wire	Protects Mechanism	RCAM	K-183708-2
4	S-219	6L6832-20.2S	Machine Screw	No. 8-32 x 1 $\frac{1}{4}$ Oval Head	Holds Speaker to Case	RCAM	W-130340-8
6	S-220	6L72208	Lockwasher	Shakeproof Lockwrs. Type 12, Steel No. 8 Cat. No. 1208	Holds Nut Tight	SHK	K-59049-20
4	S-221	8P3-184G	Hex Nut	Steel Hex Nut 8/32 x .312 x .093 Thk.	Holds Speaker to Case	RCAM	K-82244-2
2	S-222	8P3-79	Cable Clamp	Steel Cable Clamp	Holds Cable to Case	RCAM	K-17301-12
8	S-223	8P3-123A	Gasket	.109 to .130 Thk. News Board	Seal	RCAM	K-182895-2
2	S-224	6L9108-4	Screw	Steel Woodscrew No. 8 x $\frac{1}{2}$ " Long	Anchors Cable Clamps	RCAM	K-56444-45
1	S-225	8P3-227	Reel	1,600 ft. Steel Reel	Film Storage	RCAM	W-130340-20
1	S-226	8P3-55A	Cable Reel	$\frac{1}{4}$ Thk. Stock, 12 Lg. x 2 $\frac{3}{4}$ Fibre Board	Holds Spkr. Cable	RCAM	K-183701-1
1	S-227	3E3157	Power Cord	2 Condr. with Connector	Connects a-c Power	RCAM	M-141682-1
1	S-228	8P3-229	Reel Assy.	400 ft. Steel Reel	Film Storage	RCAM	W-130340-25
1	S-229	8P3-193	Felt Pad	Circular Black Felt 1 $\frac{1}{2}$ Diam. x $\frac{1}{8}$	Cushion between Screens	RCAM	K-183857-2
1	S-230	8P3-229A	Reel	1,200 ft. Steel Reel	Film Storage	RCAM	W-130340-29

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
2	S-231	6Z6815-11	Proj. Lamp	750W., 115V., T-12 Bulb	1 spare, 1 reg.	GE	K-810897-4
1	S-232	None	Nameplate	Zinc Army Nameplate	Identification	RCAM	W-130340-42
1	S-233	None	Nameplate	Formica Nameplate	Identification	RCAM	1843-1
6	S-234	6L9204-2	Screw	No. 4 Steel Woodscrew 1/4 Lg.	Parts Assy	RCAM	K-56444-13
1	S-235	8P3-55	Spkr. Cable Assembly	50 ft. Cable with Plug and Socket	Connects Speaker to Amplifier	RCAM	K-184040-501
1	S-236	1B3016-3	Cable	50 ft. 3 Conductor Cable	Electrical Cond.	RCAM	K-184030-1
1	S-237	2Z5868.1	Cable Socket	Connector Socket	Connects to Cable Plug	APC	K-77243-2
1	S-238	None	Wire	.032 Diam.	Jumper in Socket	RCAM	K-184040-7
1	S-239	8P3-11A	Reel Arm Assy.	Arm Pulley Clutch Assy. and Bushing	Take-up Reel Arm	RCAM	P-171397-501
1	S-240	8P3-236F	Screw	Steel Thumbscrew No. 1/4-28 x 1 1/4 Lg.	Holds Arm to Proj.	RCAM	K-181338-4
1	S-241	8P3-233D	Pulley	Screw Steel "U" Type 1 1/4 O.D.	Turns Reel Shaft	RCAM	K-184240-1
1	S-242	8P3-201A	Groov-Pin	Steel 5/64 Diam. x 1/2 Lg.	Holds Pulley on Shaft	RCAM	K-57422-7
1	S-243	8P3-49D	Bushing	"Oilite" No. A-304-20	Bushing for Reel Shaft	CC	K-180531-19
1	S-244	8P3-11	Reel Arm	Zinc Alloy Die-Casting	Take-up Reel Arm	RCAM	P-171400-2
1	S-245	8P3-184H	Nut	No. 8-32 x .312 Steel Hex	Holds Stud in Arm	RCAM	K-82244-2
1	S-246	6L72208	Lockwasher	No. 8 Steel Shakeproof No. 1208	Holds Nut Tight	SHK	K-59049-20

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	S-247	8P3-11B	Reel Arm Assy.	Arm, Shaft, Pulley, Bushing and Screw	Rewind Reel Arm	RCAM	M-141787-501
1	S-248	8P3-201B	Groov Pin	Steel 5/64 x 3/8 Lg.	Holds Pulley On Shaft	RCAM	K-57422-6
1	S-249	6L75041	Washer	C.R. Steel 1/2 O.D. x .257 I.D. x .030 Thk.	Bearing Surface	RCAM	KX286391-1
1	S-250	8P3-239	Reel Shaft	Screw Steel with Ball and Spring	Holds Rewind Reel	RCAM	K-184244-1
1	S-251	8P3-233	Pulley	Screw Steel "U" Type 1 1/8 O.D.	Turns Rewind Reel Shaft	RCAM	K-184243-1
1	S-252	8P3-236E	Screw	Steel Thumbscrew 1/4 - 28 x 2 1/2 Lg.	Holds Rewind Reel Arm	RCAM	K-181338-5
1	S-253	8P3-223	Expansion Plug	Steel .3125 Diam.	Covers Oil Hole	RCAM	K-25848-3
1	S-254	8P3-109A	Felt	1/4 Diam. x 1/8 Lg. White	Oiler	FCO	K-180473-10
1	S-255	8P3-185A	Oil	Socony-Vacuum Vactra Light "X"	Lubrication	SV	M-141787-12
1	S-256	8P3-85	Clutch Assy.	Bracket, Flange, Pulley, Felt, Shaft	Friction Clutch	RCAM	M-141146-502
1	S-257	8P3-37J	Bracket	Zinc Alloy Die Casting	Holds Bearing	DDC	K-182594-1
1	S-258	8P3-113	Drive Flange	C.R. Steel Shell	Friction Surface	RCAM	K-182808-1
1	S-259	8P3-233B	Pulley	Zinc Die Casting	Friction Surface	DDC	K-182690-1
1	S-260	6L6440-6.3S	Machine Screw	Doehler No. B-15646	Holds Bearing in Place	RCAM	K-57474-9
1	S-261	6L7032-4.8S	Machine Screw	Bind. Hd. No. 10-32 x 1/4 Steel	Holds Bracket to Arm	RCAM	K-90445-3



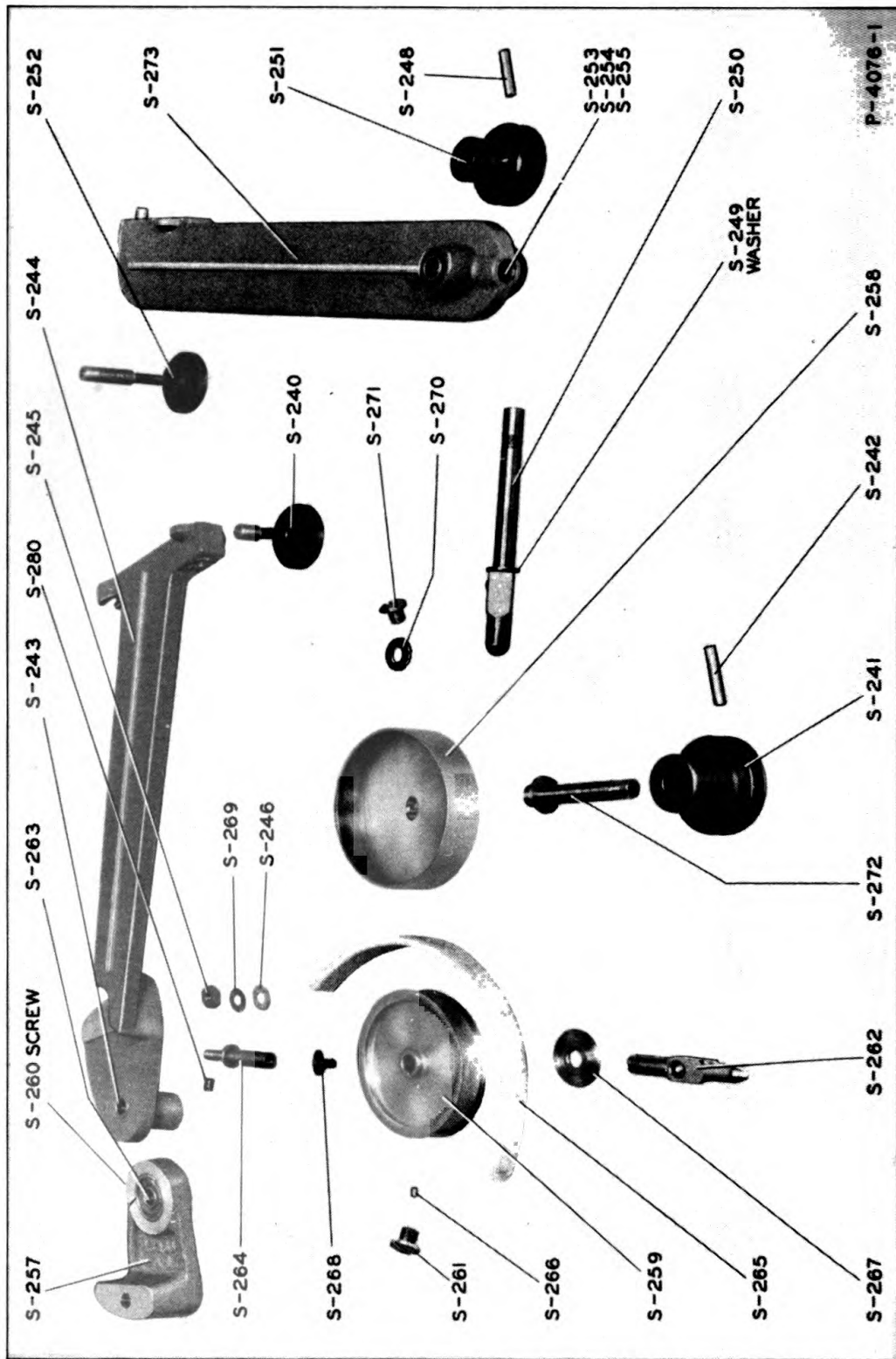


Figure 34—Takeup and Rewind Reel Arms—Disassembled—Parts Identification

PROJECTOR EQUIPMENT PH-398

Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	S-262	8P3-239A	Reel Shaft	Screw Steel with Ball and Spring MR No. 36-FF or New Dep. No. 77036	Holds Take-up Reel	RCAM	K-182809-1
2	S-263	8P3-13A	Ball Bearing	Steel No. 6-32 Thrd. and No. 10-32 Tap with Flange	Reel Shaft Bearing	MR or NDP	K-180000-13
1	S-264	8P3-341	Stud	Felters White Felt No. 3489, 6- $\frac{1}{4}$ x $\frac{3}{8}$ x .100 Thk.	Holds Bracket to Arm	RCAM	K-182807-1
1	S-265	8P3-99	Drive Ring Strip	Steel .0625 Diam. $\frac{3}{32}$ Lg.	Friction Drive	FCO	K-183551-1
1	S-266	8P3-195	Pin	Screw Steel with Offset	Locks Pulley to Shaft	RCAM	K-181872-21
1	S-267	6L52020	Washer	Bind. Hd. Steel No. 6-32 x $\frac{1}{4}$ Long	Bearing Surface	RCAM	K-182806-1
1	S-268	6L6632-4.8S	Machine Screw	No. 6 Steel $\frac{5}{32}$ O.D. x $\frac{5}{32}$ I.D.	Holds Reel Shaft to Pulley	RCAM	K-82288-3
1	S-269	6L72196	Washer	No. 8 Steel $\frac{7}{8}$ O.D. x $\frac{7}{8}$ I.D.	Bearing Surface	RCAM	K-82278-4
1	S-270	6L72198	Washer	Bind. Hd No. 8-32 x $\frac{7}{8}$ Lg. Steel	Bearing Surface	RCAM	K-82278-5
1	S-271	6L6832-5.8S	Machine Screw	Screw Steel .2495 Diam. x $1\frac{1}{2}$ Lg.	Holds Pulley Shaft to Flange	RCAM	K-82289-4
1	S-272	8P3-237	Shaft	Arm with Bushings Assembled	Pulley Shaft	RCAM	K-184242-1
1	S-273	8P3-11C	Reel Arm and Bushing Assy.	Speaker Cable Male	Holds Shaft and Pulley	RCAM	K-181085-503
1	S-274	2Z3010.7	Connector	5 Prong	Connects Cable	AMP	M-413691-12

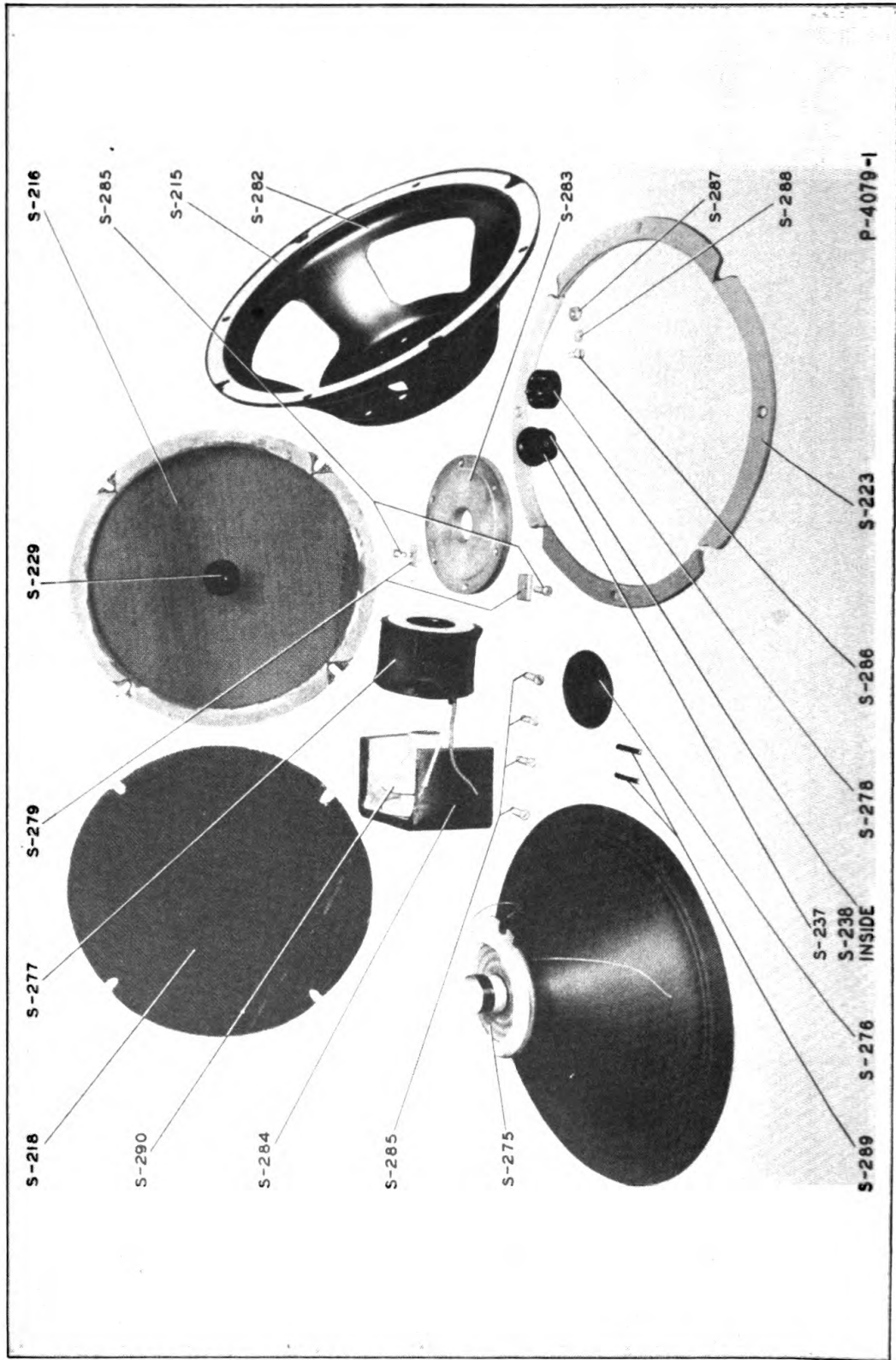


Figure 35—Loudspeaker—Disassembled—Parts Identification

PROJECTOR EQUIPMENT PH-398

TM 11-406

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Qty.	Ref. or Symbol No.	Stock No.	Name of Part	Description	Function	Mfr.	Drawing No.
1	S-275	2Z6212/2	Cone and Voice Coil Assy.	Moulded Phenolic Cone with Coil	Sound Reproduction	RCAM.	P-171175-501
1	S-276	8P3-61	Dust Cap	Moulded Phenolic Cap	Dust Shield	RCAM.	K-183674-1
1	S-277	2Z6212/1	Field Coil	1,350 Ohm Field Coil	Produce Magnetic Field	PD	M-141161-1
1	S-278	2Z7107	Plug	Connector Plug	Connects Cable	APC	K-77209-2
2	S-279	8P3-219	Nut Plate	Threaded Plate	Anchors Screws	RCAM.	K-182854-1
1 pt.	S-281	8P3-75	Cement	No. 1504 Roxylin	Cements Gaskets and Cone	ROX	
1	S-282	8P3-157	Cone Housing	Steel .044 Thk.	Houses Cone and Supports Speaker Mech.	RCAM.	P-170954-1
1	S-283	8P3-207C	Top Plate	H.R. Steel Pickled and Annealed	Topplate for Core and Yoke	RCAM.	M-141160-1
1	S-284	8P3-357	Yoke and Core Assembly	Armco Magnetic Ingot Iron	Provides Path for Magnetic Field	RCAM.	M-141162-501
6	S-285	6L6832-10.3S	Screw	Steel No. 8-32 x ¾ Fil. Hd.	Parts Assembly	RCAM.	K-57478-15
1	S-286	6L6832-8.1	Screw	Steel No. 8-32 x ½ R.H.	Holds Plug	RCAM.	K-57458-13
1	S-287	6L3108-32S	Nut	Hex No. 8-32 Steel	Holds Plug	RCAM.	K-82244-2
1	S-288	6L72208	Lockwasher	Shakeproof No. 8 Cat. No. 1208	Holds Nut Tight	SHK	K-59049-20
2	S-289	None	Sleeving	Black .064 I.D. x ¾ Lg.	Insulation	RCAM.	T-161068-17
1 Set	S-290	8P3-123B	Gasket	Newsboard .020 to .030 Thk.	Spacer	RCAM.	K-182943-1

36. Names and addresses of manufacturers.

LIST OF MANUFACTURERS

NO.	NAME	ADDRESS
ARH	American Radio Hardware Company.....	New York, N. Y.
ACH	American Cabinet Hardware Company.....	Rockford, Ill.
AHH	Arrow-Hart & Hegeman Electric Company.....	Hartford, Conn.
AMC	Allen Manufacturing Company.....	Hartford, Conn.
AMP	American Phenolic Corporation.....	Chicago, Ill.
APC	Alden Products Company.....	Brockton, Mass.
BL	Bausch & Lomb Optical Company.....	Rochester, N. Y.
BORUT	Borut Mirror Specialties Company.....	New York, N. Y.
BOS	Boston Gear Works.....	North Quincy, Mass.
BUS	Bussman Manufacturing Company.....	St. Louis, Mo.
CC	Chrysler Corporation.....	Detroit, Mich.
CCL	Corbin Cabinet Lock Company.....	New Britain, Conn.
CEL	Celluloid Corporation.....	New York, N. Y.
CHGO	Chicago Transformer Company.....	Chicago, Ill.
DDC	Doehler Die Casting Company.....	New York, N. Y.
DRK	Drake Manufacturing Company.....	Chicago, Ill.
EFH	E. F. Houghton & Company.....	Philadelphia, Pa.
FB	Fiske Brothers Refining Company.....	Toledo, O.
FCO	The Felters Company, Inc.....	Chicago, Ill.
GB	Gits Brothers Manufacturing Company.....	Chicago, Ill.
GE	General Electric Company.....	Cleveland, O.
GEN	General Electric Company.....	New York, N. Y.
GRV	Groov-Pin Corporation.....	Union City, N. J.
HBJ	Howard B. Jones.....	Chicago, Ill.
HC	Henry Cole, F. C. Hersee Company.....	Boston, Mass.
HH	Hardwicke-Hindle.....	Newark, N. J.
ILEX	Ilex Optical Company.....	Rochester, N. Y.
KK	Kurz-Kash.....	Dayton, O.
LHG	L. H. Gilmer Company.....	Chicago, Ill.
MR	Marlin-Rockwell.....	Jamestown, N. Y.
Nat'l	National Lock Company.....	Rockford, Ill.
NDP	New Departure Company.....	Bristol, Conn.
NMC	Noera Manufacturing Company.....	Waterbury, Conn.
OSB	Osborn Manufacturing Company.....	Cleveland, O.
PB	Paul & Beekman.....	Philadelphia, Pa.
PD	Phelps Dodge Corporation.....	Fort Wayne, Ind.
Phe	Pheoll Manufacturing Company.....	Chicago, Ill.
PK	Parker Kalon Company.....	New York, N. Y.
PRC	Premier Rubber Company.....	Dayton, O.
PRM	P. R. Mallory Company.....	Indianapolis, Ind.
RCAM	RCA Victor Division of Radio Corporation of America.....	Camden, N. J.
ROX	Roxylyn Flexible Lacquer Company.....	Elizabeth, N. J.
SHK	Shakeproof Lockwasher Company.....	Chicago, Ill.
SV	Socony-Vacuum Oil Company.....	St. Louis, Mo.

LIST OF MANUFACTURERS (Con't)

NO.	NAME	ADDRESS
TMC	Torrington Manufacturing Company.....	Torrington, Conn.
TRB	T. R. Brawley Felt Company.....	Brooklyn, N. Y.
UCF	United Carr Fastener Corporation.....	Boston, Mass.
USM	United Shoe Machine Company.....	Boston, Mass.

[A.G. 062.11 (1-12-48).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

J. A. ULIO,  
*Major General,*  
*The Adjutant General.*

DISTRIBUTION:

X

LIST OF PARTS					W-130329	
QTY	REF	QTY	REF	DESCRIPTION	MATERIAL	
1	1	0		ASSEMBLY		
1	2	0		PROJECTOR ASSEM.		
1	3	0		PROJECTOR ADJUSTING CASE ASSEM.		
4	4	18	70	WASH SCREW 1/8" DIA X 1/2" L	STEEL	
2	5	4	70	POWERING BRUSH #10	STEEL	
1	6	1		NAMEPLATE		
2	7	1	230	WOOD SCR 1/4" DIA X 1/2" L	STEEL	
1	8	0		TILTING BRACKET ASSEM.		
4	9	15	70	WASH SCREW 1/8" DIA X 1/2" L	STEEL	
1	10	3		FOOT		
1	11	2		LICENSE - INSTRUCTION LABEL	SEE E.N.	
1	12	0		CONV. - MODEL B-7		
X	13	0		PROJECTION LAMP		
1	14	0		PROJECTION LENS		
1	15	0		PHOTO TUBE		
1	16	0		EXCITER LAMP		
2	17	0		HEEL ARM ASSEM. (UPPER)		
1	18	0		HEEL ARM ASSEM. (LOWER)		
1	19	0		OIL CAN		
1	20	0		OIL		
1	21	0		BRUSH		
1	22	0		CLIP		
1	23	0		WOOD SCR 1/4" DIA X 1/2" L	STEEL	
X	24	0		POWER CORD		
1	25	0		TAKE-UP SPRING DELT (20" LONG)		
1	26	0		REWIND SPRING DELT		
1	27	0		NAMEPLATE		
4	28	15	70	WOOD SCREW 1/8" DIA X 1/2" L	STEEL	
1	29	0		WASHER		

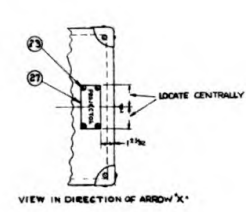
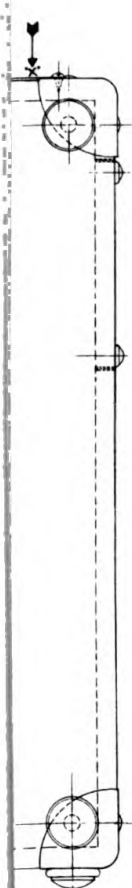


Figure 36—Projector and Case Assembly

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