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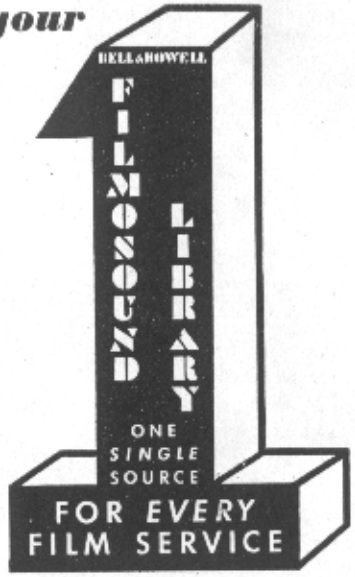

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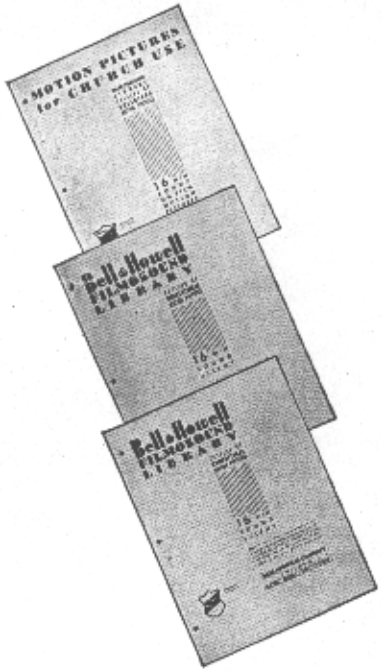

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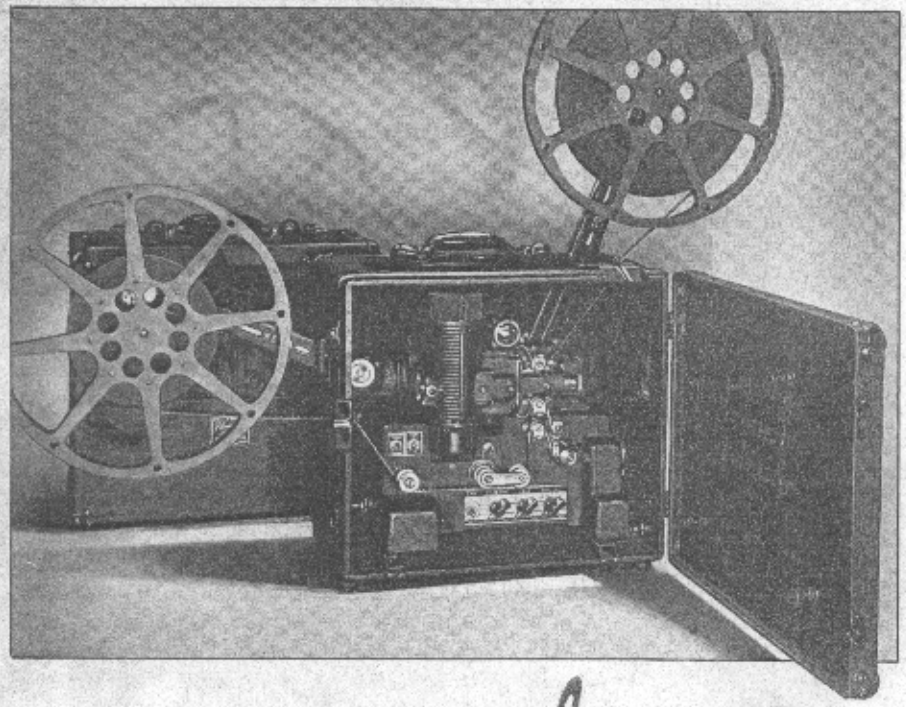
OWNER'S MANUAL OF OPERATION and MAINTENANCE *for* BELL & HOWELL

"COMMERCIAL," "ACADEMY" and "UTILITY" MODELS



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Instructions for Operating the

BELL & HOWELL FILMOSOUNDS

"Commercial," "Academy," and "Utility" Models

General Information

SINCE this instruction manual applies to three distinct models, select those instructions which apply to your projector.

Threading, amplifier operation, converter connection, rewinding, and most other features are common to all models.

Since each of the models has its own distinctive features, the reader should familiarize himself with these features in order to understand fully his projector.

The Filmosound "Commercial"—A Single Case Model

The "Commercial" model is not equipped with either a still picture clutch or reverse mechanism, nor is it regularly supplied with the Magnilite condenser, later mentioned in connection with the "Utility" model. It operates at sound speed only.

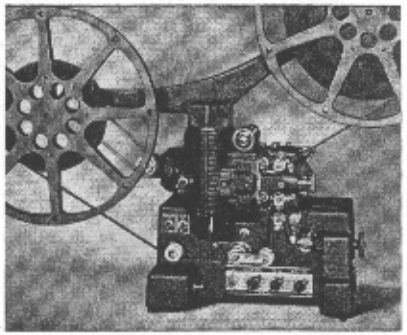


Figure 1

Its chief distinguishing characteristic is that the projector is not provided with the usual blimp case, making it lighter and more readily portable. It is supplied with a single long arm containing both the feed reel mounting spindle and the take-up assembly. See Figure 1.

Filmosound "Academy"—A Two Case Model

This projector, similar in most respects to the "Commercial" model, is equipped with a blimp case for the projector and a separate feed reel arm and take-up reel arm. It also has a selector switch to change from sound to silent speed.

Filmosound "Utility"—A Two Case Model

While the projector mechanism is identical to that of the "Commercial" and "Academy" models, the Filmosound "Utility" is equipped with a still picture clutch and a reverse switch, permitting the film to be run forward or backward without re-threading. It is factory equipped with the faster 2-inch F 1.6 lens as well as the light-increasing Magnilite Condenser.

The speaker, a 12-inch heavy-duty unit, permits the attachment of an auxiliary speaker, an accessory not available for the "Commercial" and "Academy" models.

Section I

Setting Up For Use

Preparing to Operate the Filmosound "Commercial"

Having removed the projector from its compartment in the carrying case, attach the reel arm as shown in Figure 1. The take-up assembly should be toward the rear of the projector, O, Figure 2.

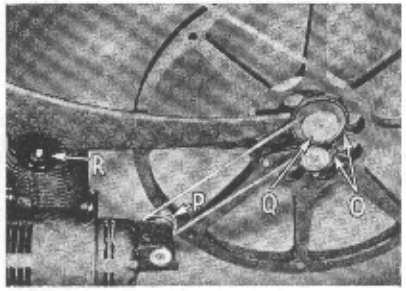


Figure 2
O. Take-up assembly
P. Take-up drive pulley
Q. Take-up pulley
R. Reel arm screw

The reel arm is attached in this position by means of the thumb screw, R, Fig. 2.

Loop the spring belt, without a twist, from the drive pulley P, Figure 2, at the rear of the projector motor to the take-up pulley Q, Figure 2, at the rear of the reel arm.

Since the absence of the blimp case and the necessary difference in reel arms are the only operating variations between the "Commercial" Filmosound and the other models described in this manual, the ensuing operating procedures, apply to all three models.

Preparing to Operate "Academy" and "Utility" Models

The removable reel arms for these models are carried inside the door of the projector case. Attach the one marked "top" at the top front and the one marked "rear" at the upper rear of the projector case as shown in Figure 3. Both are fastened by thumb screws, accessible when the large door is opened.

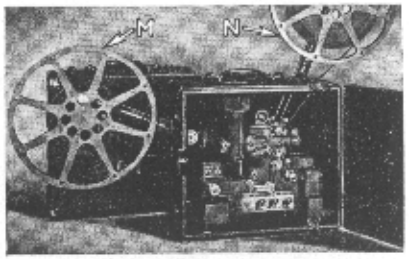


Figure 3—Filmosound "Utility"
M. Take-up reel N. Feed reel

Instructions for Filmosounds "Commercial," "Academy," and "Utility"

Loop the rear spring belt, without a twist, from the drive pulley P, Figure 4,

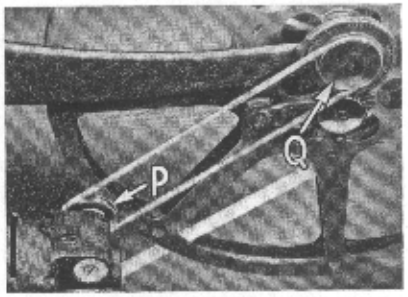


Figure 4
P. Take-up drive pulley
Q. Take-up pulley

at the rear of the projector motor, to the take-up pulley Q at the end of the rear reel arm. On the "Utility" model, loop the front belt, without a twist, over the

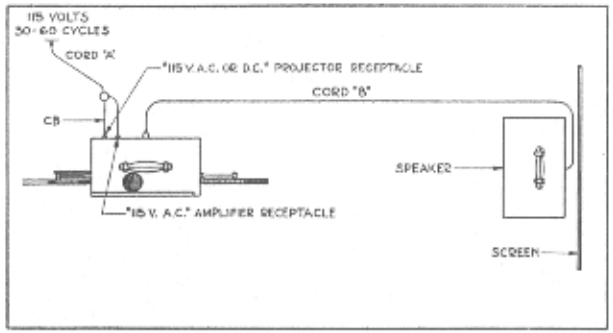


Figure 5
Relative position of the units required for Filmosound projection

small pulley at the top of the feed reel arm.

Figure 5 shows the relative position of the units required for Filmosound projection. It indicates as well, the electrical connections for operating on 115-volt 50- or 60-cycle alternating current. The same arrangement of components is used for the special Filmosound for 25- to 60-cycle 115-volt A.C. operation. For direct current and 220-volt operation, see page 10.

Cautions Before Proceeding

Be sure that:

1. The line into which you are connecting your Filmosound is AC (alternating current).
2. The voltage rating for your location is not higher than 125 volts.
3. The fuse in the line is rated at least 10 amperes, provided no other equipment is on the same circuit.
4. If other devices are connected to the same circuit, the house fuses are replaced by your spare plug type fuses of 20 ampere rating (these should be procured locally and be carried with the Filmosound).
5. All controls on the Filmosound are in "off" position.

Electrical Connections

After removing the grill cover and *all* accessories from the speaker case, carry the speaker and the speaker cable to the front of the room and place the speaker as nearly as possible at the center of the screen and above the floor, but not so high as to interfere with the picture. Locate the speaker at least 18 inches in front of any obstructing surface.

Connect the end of the speaker cable marked "speaker" in the receptacle at the rear of the speaker case.

Uncoil the speaker cable as you go toward the projector. Avoid placing the speaker cable where your audience might trip over it.

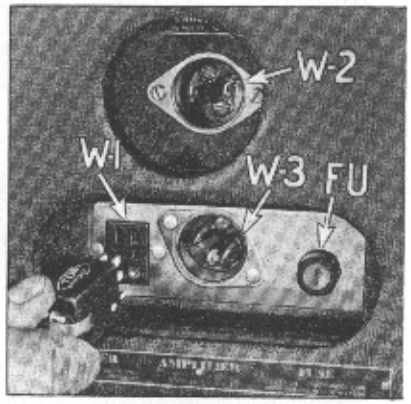


Figure 6
W1. Speaker receptacle
W2. Projector line receptacle
W3. Amplifier line receptacle
FU. 2-ampere fuse

Insert the end of the speaker cable marked "projector" into receptacle W1, Figure 6.

Insert the plugs on the two short branches of the "Y" cord into the receptacles W2 and W3, Figure 6.

Connect the attachment plug at the end of the "Y" line cord into a wall receptacle providing 115-volt 50- to 60-cycle alternating current. If the receptacle is more distant, add a 10-foot line extension cord (supplied with the "Utility" model) to the end of the "Y" cord, then attach the extension cord to the power outlet.

Adjusting the Projector to the Screen

Turn on the projector switch, C1, Figure 7, and the lamp switch C2, Figure 7. On "Academy" and "Utility" models, the small case door, covering the projection lens must, of course, be opened.

If the electrical connections are correctly made, the projector mechanism should now operate and a beam of light should be projected on the screen, provided that, on the "Utility" model, the clutch control X, Figure 7, is turned to extreme clockwise position.

Move the projector on its stand or table to such a position that the projected beam coincides with the screen. The projector is raised to the required height by turning the tilt adjustment knob Y, Figure 7, in a clockwise direction. The

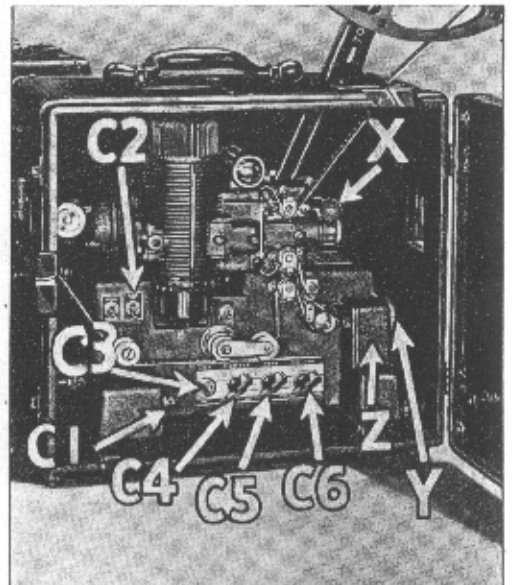


Figure 7
C1. Projector switch
C2. Lamp switch
C3. Amplifier switch
C4. Film volume control
C5. Tone control
C6. Microphone volume control
X. Clutch control
Y. Tilt adjustment knob
Z. Exciter lamp cover

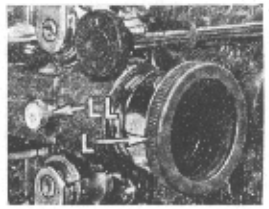


Figure 8
L. Lens
LL. Lens locking screw

tilt knob on "Academy" and "Utility" models is located within the lower door on the front of the projector case. After the vertical adjustment of the projector is completed, this lower door should be closed.

If the projected image is larger than the screen, move the projector closer.

If the image is too small, move the projector farther from the screen.

If room size limits the throw, select the correct lens, indicated in table on page 15.

With the projector operating and the lamp turned on, loosen lens locking screw LL, Figure 8, by turning to the left, and slide the lens, L, forward or backward until the outlines of the aperture or frame are sharply defined. To further sharpen the focus, revolve the lens first in one direction then in the other.

Now turn off the projector and turn on the amplifier switch C3, Figure 7. Allow about one minute for the tubes to heat, then move the film volume control C4, Figure 7, in a clockwise direction until a hiss is heard from the

speaker. At the same time, light should be seen from behind the exciter lamp cover Z, Figure 7.

If the above conditions exist, the electrical connections are properly made and the Filmosound is ready for threading.

Threading the Film

Place the Filmosound test reel, supplied with your projector, on the top reel arm spindle, and an empty "take-up" reel on the rear spindle. Press each of these reels firmly on to the spindle until the small retaining spring-balls lock the reels on the spindles. Pull off about four feet of film for threading.

The film, if correctly wound, should feed from the front of the reel with the perforated edge toward the operator.

On "Academy" and "Utility" models, slip the film into the slot at the base of the reel arm and between the two rollers. Lead film to the first sprocket. (On the "Commercial" film passes directly from feed reel to first sprocket.)

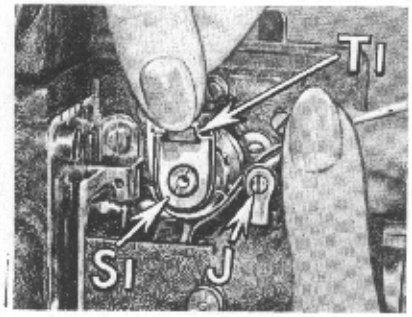


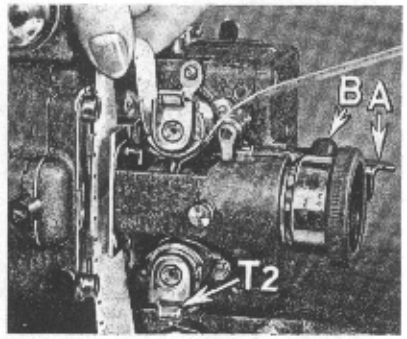
Figure 9
J. Roller in front of first sprocket
S1. Safe-lock sprocket
T1. Sprocket guard tab

Lead the film above roller J, Figure 9, and below sprocket S1, Figure 9. Slide the film as far toward the machine as it will go. Holding the film snugly around the sprocket with the left hand and the right thumb, press on tab T1, Figure 9, to open the guard. Pull gently on the film until the perforations seat over the sprocket teeth. Then release tab T1, locking the film on the sprocket.

Swing lever A, Figure 10, upward. (This lever is beyond the projection lens.) This movement will open the film gate. Now form the first loop, following the loop outline on the side of the gear case, as shown in Figure 11.

Figure 10
A. Gate lever
B. Hand setting knob

Figure 11
T2. Sprocket tab
A. Gate Lever
B. Hand setting knob



Pass the film through the channel behind the lens as in Figure 11, being certain that it is fully seated in this channel. Then close the gate by pressing down lever A, Figure 10, as far as it will go. Form the second loop, conforming to the outline on the gear case and slip the film over the second sprocket, S2, Figure 12. Again press the film as far toward the projector as it will go, and while maintaining correct loop size, lock the film on the sprocket as for S1.

Now turn the hand setting knob B, Figure 10, several clockwise revolutions. This will engage the film with the shuttle teeth. Should the lower loop slide upward, merely insert a finger in the loop and pull it down to the loop outline on the gear case. Again test the threading with the hand setting knob.

Lead the film from the second sprocket S2, Figure 12, under the top roller of the Oscillatory Stabilizer, around the sound drum "D," Figure 13, and over the third sprocket S3, Figure 14. Press the film as far toward the projector as it will go over the sprocket S3, and pull down on the film as it passes over this sprocket. When the Oscillatory Stabilizer is moved to its extreme position by the tension on the film, open the film guard by pressing on tab T3, Figure 14. Then free the film just sufficiently to permit the Oscillatory Stabilizer to pull it back to the first available set of perforations. Release tab T3, permitting the guard to lock the film in place on the third sprocket.

Pass the film under the snubber SN, and the roller K, Figure 15, and thence to the take-up reel. On "Academy" and "Utility" models, the film must be inserted in the slot in the case and between the rollers on its path to the take-up reel. The film should pass around the bottom of the take-up reel, Figure 16.

Remove the slack before starting the projector by revolving the take-up reel clockwise.

No special precautions need be observed to synchronize the sound to the picture since adherence to the foregoing instructions will assure correct synchronization. The mechanism on the rear reel arm is a combination take-up and rewind device. Set this for take-up by pressing

Figure 12
S2. Second sprocket

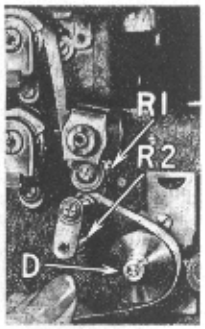


Figure 13
D. Sound drum
R1 and R2. Stabilizer rollers

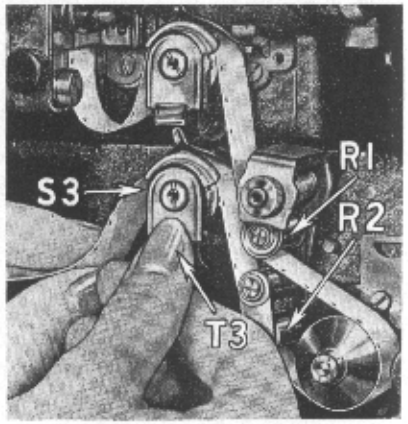


Figure 14
R1 and R2. Stabilizer rollers S3. Third sprocket T3. Sprocket tab

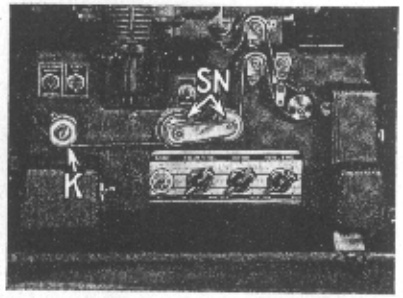


Figure 15
SN. Snubber
K. Rear idler roller

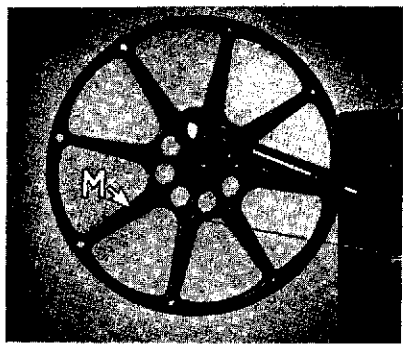


Figure 16
M. Take-up reel

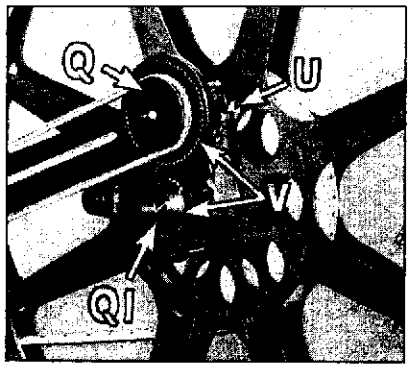


Figure 17
Q. Take-up pulley
Q1. Spindle pulley
U. Take-up lock lever
V. Rewind gears

lever U, Figure 17, while the reel is on the spindle.

No adjustment or compensation is necessary for various reel sizes, since the flat fabric belt between pulleys Q and Q1, Figure 17, provide complete and automatic compensation without any manual adjustment. The projector is now ready for operation.

BEFORE PROJECTING, YOU MUST BE ABLE TO ANSWER "YES" TO THE FOLLOWING QUESTIONS:

1. Have you read the preceding instructions?
2. Have you cleaned the aperture and the optical components? (See page 16.)
3. Are all loops of the correct size?
4. Is the film properly engaged on all sprockets?
5. Is the film gate closed?
6. Is the film properly started on the take-up reel, with all slack removed?
7. Is the take-up rewind assembly set to take up film?
8. On the "Utility" model, is the direction switch set for forward operation?
9. Have you selected the correct speed for the film you are projecting (sound or silent)?
10. On the "Utility" model, is the clutch engaged?
11. Have you tested the threading by turning the hand set knob or by momentarily turning on the motor?
12. If projecting sound film, is the amplifier turned on?
13. If using a microphone with silent film, (a) is the amplifier turned on; (b) is the film volume control at its extreme low position?
14. Is the lamp switch turned on?
15. Have you learned from the ensuing pages of this manual, how to use a microphone and turntable; how to use the still picture clutch; the tone control; how to rewind the film; and how to operate the "Utility" model in reverse? (After you have become adept at threading the film through the mechanism, turn on the amplifier before threading. This will allow the amplifier tubes to warm up to the proper operating temperature, so that sound projection can be started as soon as threading is completed.)

Section 2

Operation

Projecting

With the amplifier tubes warmed and the film volume control about one-quarter on, start the projector, switch C1, Figure 7.

As the title appears on the screen, carefully revolve the lens first in one direction then the other until the title or the first picture appears in sharp focus.

Framing

If the picture frame line shows on the screen, turn the framer knob E, Figure 18, to make the frame line disappear. If framing moves the picture off the screen, readjust the tilt control Y, Figure 7.

Projecting Silent Film

To project silent film, thread the machine in the usual way. Set the speed control switch (on "Academy" and "Utility" models) at "silent." Do not turn on the amplifier unless oral comments are to be made through the speaker by means of a microphone. When so using the amplifier, be certain that the *film* volume control is at its extreme minimum volume position.

NOTE: The Filmosound "Commercial" is not equipped with a "silent" speed. Silent film may be projected, but it will be projected at 24 frames a second, somewhat faster than normal projection speed for silent film.

Reversing

("Utility" Model Only)

Turn the volume control until the sound is inaudible. Stop the film either by disengaging the clutch or by stopping the projector motor. When the mechanism has stopped, turn the direction switch to "reverse." Before changing direction always stop the projector. The lamp may be on or off, as desired.

Still Picture Projection

("Utility" Model Only)

To project a still picture, the clutch control knob X, Figure 18, is revolved

Figure 18
E. Framer control
L. Lens
LB. Lens barrel
LL. Lens locking screw
X. Clutch control

to full counter clockwise position, thus disengaging the projector mechanism. If no picture appears on the screen, the closed section of the shutter is obscuring the light. A small movement of the handsetting knob B, Figure 10, will bring the open section of the shutter into correct position, thus permitting the projection of still pictures. It will be necessary to adjust the lens to focus a still picture. Re-focus, when motion is resumed.

Rewinding

The take-up reel, which has now received the entire film, should be removed from its spindle on the rear or take-up reel arm. The empty reel should be

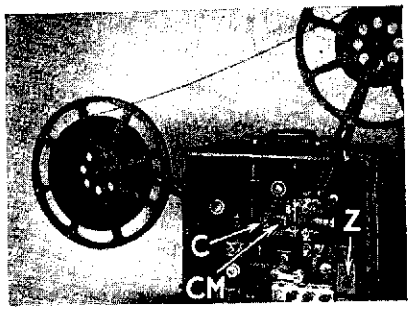


Figure 19
C. Main condenser
CM. Magnilite condenser
Z. Exciter lamp cover

removed from the top reel arm, and the two reels thus interchanged. The reels will then appear as in Figure 19.

The end of the film is led over the top of the empty reel as in Figure 19. The lever U, Figure 17, is pressed forward, and the take-up reel lifted up as far as it will go to engage the two rewind gears V, Figure 17. Then, while still holding the reel in the lifted position, the pressure should be released from the lever, thus locking the assembly in the rewind position. Turn the projector switch on, allowing the motor to run until all of the film has been rewound on the original reel.

Immediately after rewinding, and before removing the loaded reel, again press lever U, Figure 17, thus restoring the assembly to the take-up position.

CAUTION: No twisting, changing, or removing of any belt is necessary when rewinding or taking up film.

Sound Volume and Tone Control

The film volume control knob C4, Figure 7, may now be advanced or retarded. The volume control operates quite similarly to volume controls on radio sets and either full volume, to the limit of the amplifier, or minimum volume for the smallest room may be achieved.

The tone control C5, Figure 7, is also operated similarly to a tone control on a radio receiver, and the range of the tone control is such as to fully compensate for acoustical conditions of most auditoriums as well as for variations in the particular film being reproduced.

The test reel is now to be projected in its entirety, and the operator should rerun this practice film until he becomes thoroughly familiar with every phase of operation and threading.

As "The End" title appears on the screen, the operator should turn the projection lamp "off" and, as the end of the narration or music is reached, the film volume control should be reduced until no sound is heard. The remaining "trailer" of film should be permitted to run completely through the machine.

Microphone

A microphone may be used with any Filmosound. A high-grade crystal microphone or high impedance dynamic microphone should be used. Microphones are available from Bell & Howell Company, either in the hand or the floor stand type.

The microphone jack is accessible through an opening in the front of the projector base. On the "Academy" and "Utility" models, the lower front door of the projector case must be opened.

A separate microphone volume control is provided, C6, Figure 7.

If you are using a microphone with your Filmosound, we suggest that you write for the bulletin "Public Address Problems with Filmosounds," which explains this subject in detail.

Phonograph Turntables

Phonograph turntables equipped with either the crystal pick-up or a high impedance magnetic pick-up may be used. The same receptacle is used for phonograph reproduction as for the microphone.

To use both a microphone and a phonograph at the same time, a "Y" mixer-cord for this purpose should be obtained from Bell & Howell Company. The connector plug used for both phonograph and microphone is the Yaxley 75-A or equivalent.

The microphone volume control on the Filmosound amplifier control panel operates as a volume control for either the phonograph or the microphone.

When the "Y" mixer-cord is used, the phonograph is controlled by the volume control on its panel. The microphone volume control affects both microphone and phonograph volume.

Using Two Speakers with the Filmosound "Utility"

The auxiliary speaker for the Filmosound "Utility" is supplied with a 25 foot cable, one end of which plugs into a receptacle directly below the 6-prong connection on the main speaker. The other end is inserted into the jack on the auxiliary speaker.

Automatic matching is accomplished when the plugs are inserted.

Monitor Speaker

Where the Filmosound is operated in a booth, a monitor speaker helps to maintain uniform volume in the auditorium.

The Bell & Howell monitor speaker, for Filmosound "Commercial," "Academy," or "Utility" is equipped with a volume control, connector cable, and receptacle.

The volume control regulates the monitor speaker only.

The plug at the end of the short cable is connected to the "speaker" receptacle of the amplifier. The speaker cable is connected to the receptacle in the monitor speaker.

Pilot Light

The pilot light is identified by the chrome plated disc cap mounted on top of the projector casting above the Magnilite condenser. (*See the large illustration in the center of the book.*) To operate the pilot light, pull the cap forward; to turn it off, push back.

Turn off pilot light when film threading is completed.

To replace the lamp, turn the chrome plated cap counter-clockwise until it is removed from the assembly, then insert the new lamp and reassemble.

Operating the Projector on 220-Volt 50-60-Cycle Alternating Current

To operate on 220-volt alternating current, a 1000-watt, 220-volt to 115-volt transformer is required. Plug the 220-volt side into the AC outlet. Then run the Filmosound "Y" cord from the 115-volt side of the transformer to the Filmosound power receptacles as for normal operation.

Operating on 115-Volt Direct Current

To operate the Filmosound on direct

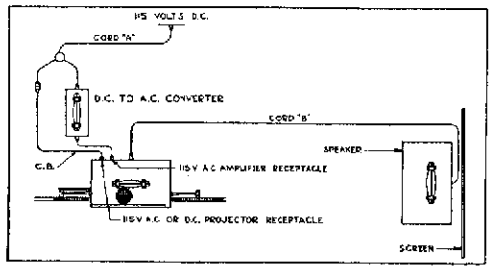


Figure 20
Arrangement and connection of Filmosound units for 115-volt D.C.

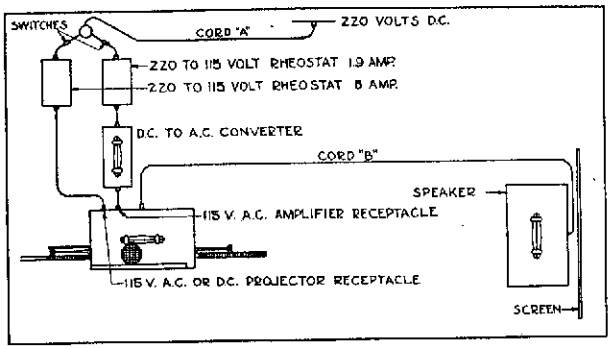


Figure 21
Arrangement and connection of Filmosound units for 220-volt D.C.

current, a high quality DC to AC converter having a capacity of 100 watts is needed for the amplifier only.

The projector motor and lamp operate from the direct-current line. Figure 20 illustrates the proper connection. One side of the "Y" cord is plugged into the converter while the other side is connected to the *projector receptacle.* The AC output of the converter is connected to the *amplifier receptacle.* When these connections have been made, the operation is the same as for AC.

Operating the Projector on 220-Volt Direct Current

An 8-ampere rheostat is required to reduce a 220-volt direct current line to the 115 volts required for the projector. In addition, a 220-volt DC to 115-volt AC rotary converter of 100 watts minimum capacity must be used to supply the amplifier with alternating current. See Figure 21.

Operating on 220-Volt or 110-Volt Direct Current

If in addition to 220-volt DC, it is desired to cope also with 115-volt DC; a 115-volt DC to 115-volt AC rotary converter of 150 watts capacity plus a second rheostat (220-volt DC to 115-volt DC of about 3 ampere capacity) may replace the 220-volt converter.

With this latter combination, the rheostat is connected between the power source and the converter when operating on 220-volt DC and omitted when operating on 115-volt DC. The connection is essentially the same as 115-volt DC connection explained on page 10, except that on the 220-volt DC, the rheostats are placed one in each side of the supply line to reduce the voltage to 115. See Figure 21.

Important Warning

Turn projector and amplifier "on" and "off" only by the line switches ahead of the rheostats and NOT by the switches on the projector. The latter should always be left "on" when operating on 220-volt DC. The rheostats will function properly only when carrying their normal loads. To provide a switch ahead of each rheostat, order the special "Y" cord equipped with such switches.

Operating on 25-Cycle 115-Volt A.C.

(Or less than 50 Cycles)

A special amplifier is required for operation on 25 cycle alternating current of less than 50 cycles.

Do not attempt to use the 50-60-cycle amplifier on such lines.

The special 25-60 cycle amplifier, when installed in the Filmosound, may be operated on any 115 volt alternating current having a frequency between 25 and 60 cycles inclusive.

Section 3

Projection Defects and Causes

Emergency Trouble Guide

1. Filmosound will not operate. This may be due to:

(a) Current supply cords not making proper contact with the power outlet.

(b) No current at the house outlet—(test with ordinary lamp).

2. No sound:

A. If the exciter lamp fails to light, absence of sound may be caused by:

(a) Speaker cable not connected at both ends.

(b) Amplifier not turned on.

(c) Fuse blown (see page 17.)

(d) Tubes in wrong sockets or tubes not fully seated in correct sockets.

(e) Burned out exciter lamp. Check by replacing with the spare.

(f) Any defective tube in amplifier.

B. Should no sound be produced even though the exciter lamp lights, the trouble may be caused by:

(a) Volume control not advanced sufficiently toward the high position.

(b) Film incorrectly threaded. Recheck threading.

(c) Grid clip not attached to the cap on the top of the 6J7 tube. (See GC, Figure 22).

(d) Dirt, dust, oil, or other foreign matter obstructing the sound optical system. Turn off the amplifier and clean the sound optical system as directed on page 16.

(e) Absence of sound record on the film. To prove that the trouble is not with the Filmosound, remove the film and turn on the amplifier. Turn the volume control knob to "high" position. Pass a card swiftly back and forth between the sound lens and the sound drum. If a loud "thumping" sound is heard from the speaker, the Filmosound itself is operating properly. The lack of sound under this condition would be due to the film.

(f) Defective tubes. Have all tubes tested and replace any which prove to be defective.

3. Inadequate volume may be the result of:

(a) Volume control not advanced far enough.

(b) Poorly made or dirty film. Compare with sound from a film known to be clean and well made, for instance, the practice reel supplied with the Filmosound.

(c) Dirt, oil, or other foreign matter partially obstructing the sound optical system.

(d) Defective tubes. Have all tubes tested and replace any which prove to be defective.

(e) Defective, dirty, or poorly adjusted exciter lamp (page 17, on "Adjustment").

(f) Low line voltage.

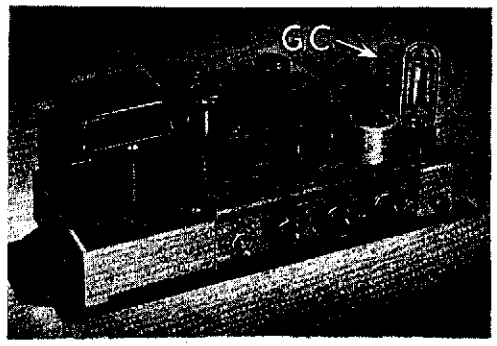


Figure 22
Amplifier removed from projector GC. Grid clip

4. **Unsatisfactory sound quality may be caused by:**

(a) "Speed" switch set in silent position (on "Academy" or "Utility").
(b) See other causes under the heading "Inadequate Volume." Noises, such as humming, and whistling are usually traceable to defective tubes. Failure to fasten the amplifier firmly in base may also cause noises as may the phototube or the first stage tube. (See check list.)
AC hum can sometimes be reduced by reversing the AC plug at the supply socket.
Static-like sound may occur if the tube base prongs are dirty. Clean them with No. 00 sandpaper and wipe them well.

5. **No Picture:**

(a) Power supply cord not correctly connected.
(b) Lamp switch not turned on.
(c) Projector lamp burned out. Replace it as directed on page 18.

6. **Insufficient picture brilliance may be due to:**

(a) Extraneous light falling upon the projection screen.
(b) Blackened projection lamp. *Effective* lamp life may terminate before the lamp actually burns out. Inspect the lamp and replace if necessary.
(c) Dirty projection lens, condenser, or lamp. Clean as directed previously.
(d) Low line voltage.

Removing the Amplifier from the Blimp Case

In the "Academy" and "Utility" models, the projector must, of course, first be removed from its blimp case in order to make the amplifier accessible. Disconnect line cord and speaker cable. Remove spring take-up belt from motor pulley and the reverse belt from the pulley on the reel arm. Loosen the lock nut discs (which are about the size of a quarter-dollar) found on the studs extending in toward the machine from the rear, the front, the left side, and the top of the machine; and two from the inside of the door. After these nuts are backed off a trifle, the main portion of each bolt can be loosened. Loosen either the screws at the back or the screws at the front, in addition to the screw at the top extending toward the gear case housing. It is unnecessary to loosen screws at both the front and rear at the same time, since any clearance is sufficient to permit the withdrawal of the projector.

Having loosened the lock nuts and retracted the screws at one end of the projector and retracted the screw at the top, be certain that the tilt mechanism is also fully retracted. While holding the projector case with the left hand, place the right hand around the lamphouse top and pull toward you. The projector will then tilt forward, see Figure 23, and permit removal from the case without detaching the extension legs or any other part of the projector.

Removing the Amplifier from the Projector

Lay the projector on its side as shown in Figure 24. Turn the tilt control knob to move the tilt legs away from the amplifier.

Pull gently on the lead wire LW, Figure 24, to disconnect the exciter lamp.

Be certain in replacing the amplifier to reconnect the exciter lamp lead.

With a coin or a screw driver, remove the four screws H, Figure 25. Supporting the amplifier with both hands, pull first on the rear end and tilt outward at an angle of about 45 degrees—this is to clear the power transformer and other parts. While sliding the amplifier to the left, pull straight toward you.

Tube Testing

All tubes should be tested about once a month, if the projector is used frequently, and replaced if they are not up to standard. Gradual deterioration of the tubes detracts from the amplifier's effectiveness before the tubes stop functioning.

A complete set of spare tubes should be carried with the Filmosound to avoid missing a scheduled show.

Correct tube types are shown on labels near each socket. It is essential that each tube be inserted in the correct socket.

Assuming that a tube has become defective, and the installation of the new set of tubes has corrected the difficulty, it then becomes necessary to isolate and eliminate the defective tube.

After the showing has been completed, remove the amplifier from the projector. One at a time the old tubes should be replaced in the amplifier, the correct connection made with the speaker and power source, and the amplifier turned on. A loud humming noise will be heard due to exposure of the photo tube when the amplifier is functioning. As soon as the defective tube is placed in it, the noise probably will not be heard. This, together with possible new or different noises, will help to identify the defective tube.

If the difficulty with the amplifier was an extraneous noise due to a defective tube, gently tapping each of the tubes with the end of a pencil will cause a "rasping" noise when the defective tube is tapped.

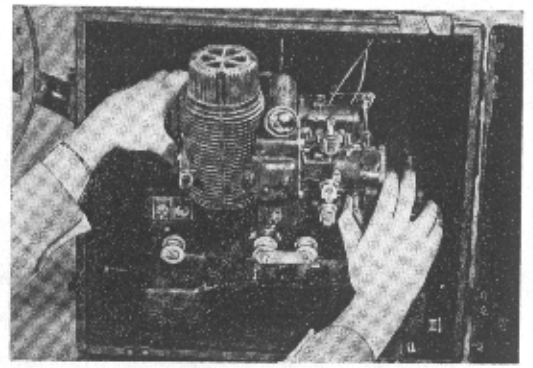


Figure 23
Removing projector from "blimp" case

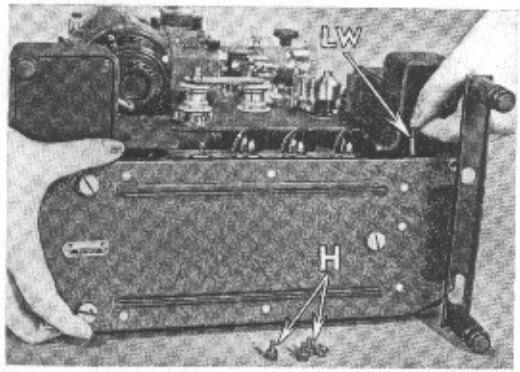


Figure 24
Removing amplifier from projector
H. Amplifier retaining screws
LW. Lead wire

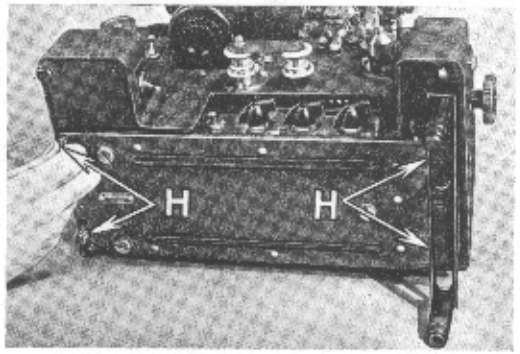


Figure 25
Removing amplifier from projector
H. Amplifier retaining screws

Discard the defective tube and install a new tube of the same type.

Correct Tubes for the Filmosound Amplifier

Since new types of tubes are frequently used in Filmosound amplifiers as they are made available by the tube manufacturers, and the model of the Filmosound is not necessarily changed because of this, we do not append a list of tubes used in this Filmosound.

Refer to your check list, or if it has become lost, remove the amplifier from the Filmosound and check the labels identifying the sockets.

Replacement Tubes

Although the tubes used in the Filmosound can be obtained from most radio stores, it is advisable to use tubes which have been thoroughly tested in Filmosound amplifiers, as well as on standard tube testers, by the Bell & Howell Company, to insure finest quality of reproduction.

Special Filmosound Models and Extra Equipment

Special Filmosound models, such as those required for 25-cycle alternating current operation as well as all other accessories required for the most elaborate show are available from the Bell & Howell Company or its dealers. Among the accessories or extra equipment most likely to be required are: DC to AC converters; extension cords for speakers, lines, or microphones; auxiliary speaker for "Utility" model; booster amplifiers for greater sound volume; spare projection lenses of various focal lengths; spare lamps; complete set of spare tubes; oil; lens cleaning kit; screens; etc.

Check List

Included in the envelope in which this instruction book was found, is a check list which itemizes all of the accessories and spares which are standard equipment with your particular Filmosound. Immediately after unpacking be sure to check the material against this list to insure (a) that none of the parts have been discarded with the packing material (b) that none of the spares have been inadvertently omitted from the shipment.

Suggestions for Presenting an Effective Show

A booklet on this subject is packed in the envelope with your instruction book. If you need additional copies, write Bell & Howell Company, 1801 Larchmont Avenue, Chicago.

Projected Picture Sizes Obtained with Filmo Projection Lenses

Lens Focal Length	*Distance in Feet from Screen*														
	8′	10′	12′	16′	20′	25′	32′	36′	40′	50′	64′	75′	100′	125′	150′
16mm. Projector	*Width of Picture*														
⅝″	4′10″	6′0″	7′2″	9′7″	12′0″	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
¾″	4′0″	5′0″	6′0″	8′0″	10′0″	12′6″	.....	.....	.....	.....	.....	.....	.....	.....	.....
1″	3′0″	3′9″	4′6″	6′0″	7′6″	9′4″	11′11″	13′ 5″	14′11″	.....	.....	.....	.....	.....	.....
1½″	2′0″	2′6″	3′0″	4′0″	5′0″	6′3″	8′ 0″	9′ 0″	10′ 0″	12′6″	.....	.....	.....	.....	.....
2″	1′6″	1′10″	2′3″	3′0″	3′9″	4′8″	6′ 0″	6′ 9″	7′ 5″	9′4″	11′11″	14′0″	18′9″	23′5″	28′1″
2½″	1′2″	1′6″	1′9″	2′4″	3′0″	3′9″	4′ 9″	5′ 4″	6′ 0″	7′6″	9′ 7″	11′3″	15′0″	19′8″	22′5″
3″	.....	1′3″	1′6″	2′0″	2′6″	3′1″	4′ 0″	4′ 6″	5′ 0″	6′3″	8′ 0″	9′4″	12′6″	15′7″	18′8″
3½″	.....	1′0″	1′3″	1′8″	2′1″	2′8″	3′ 5″	3′10″	4′ 3″	5′4″	6′11″	8′0″	10′8″	13′4″	16′0″
4″	.....	.....	1′1″	1′6″	1′10″	2′4″	3′ 0″	3′ 3″	3′ 9″	4′8″	6′ 0″	7′0″	9′4″	11′8″	14′0″

Section 4

Care and Maintenance of Filmosound

Cleaning Optical Parts

Before every show, and at any other time that appears necessary, the projection lens and aperture should be cleaned.

The projection lens as well as the condenser lens and the Magnilite condenser, on machines equipped with this device, must be kept scrupulously clean and free from dirt and oil. For cleaning, use the B&H lens cleaning kit or Filmo lens cleaning tissue, either of which may be secured from your Filmo dealer at small expense.

The projector lens, L, Figure 18, is removed merely by pulling forward on the lens barrel LB, Figure 18.

The front and rear lens elements are then accessible for cleaning. If only a slight amount of dust has accumulated on these lenses, merely use lens cleaning tissue to remove the dust. If, however, finger prints, oil, grease, or other accumulations of dirt are present, lens cleaning fluid should be wiped on the lens surface and followed by a thorough cleaning with lens cleaning tissue.

The same treatment should be given the Magnilite condenser (on "Utility" model) CM, Figure 19; and the main condenser lens C, Figure 19, on all models.

The condenser and the Magnilite condenser are removed from the projector by pulling on the holder handles, Figure 19. They should be cleaned frequently with the same materials as used for the lens.

Never attempt to remove or adjust the lens of the sound optical system. This requires special training and equipment.

This lens, with one face exposed within the exciter lamp compartment and the other exposed toward the sound drum should be cleaned occasionally. The mirror which can be seen by looking down behind the sound drum from in front of and above the Filmosound should also be cleaned occasionally.

Remove the exciter lamp compartment cover, by the same methods employed to replace the exciter lamp. This is described in a following paragraph.

Both ends of the lens of the sound optical system should then be cleaned with cleaning tissue wrapped around the end of a toothpick, as should the mirror, already described.

Cleaning Film Handling Parts

Must Be Done While the Projector Is Not Operating!

The aperture should be cleaned by removing the lens from its carrier and inserting the aperture brush, supplied with the projector, through the opening. The film channel is cleaned by drawing a clean lintless cloth through it. The gate must be open and the machine not running.

A feature of the most current model Filmo Projectors is the removable gate

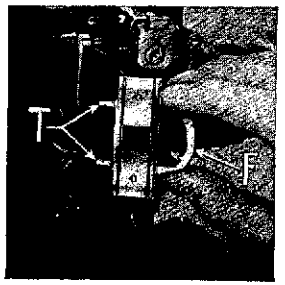


Figure 26

Letters Refer to Figure 27	*Silent Speed*	*Sound Speed*
Cup C	One drop of oil after each eight hours of operation	One drop of oil after each four hours of operation
Cups B and A . . .	One drop of oil after each thirty-two hours of operation	One drop of oil after each sixteen hours of operation
Sprockets D (3)	Saturate felts once every six months	Saturate felts once every three months

shoe illustrated in Figure 26. To remove, grasp the metal frame F, Figure 26, and withdraw. *Use no tools!* Clean and polish shoe with a soft cloth. If dirt or emulsion has gathered and hardened on the shoe, remove by rubbing with a soft dampened cloth. To avoid scratching polished surface *use no sharp tools*. Replace it being sure that the tines, T, Figure 26, are guided to the grooves formed by the metal plate attached to the back of the lens casting. An audible click will be heard when the metal frame, F, is correctly positioned.

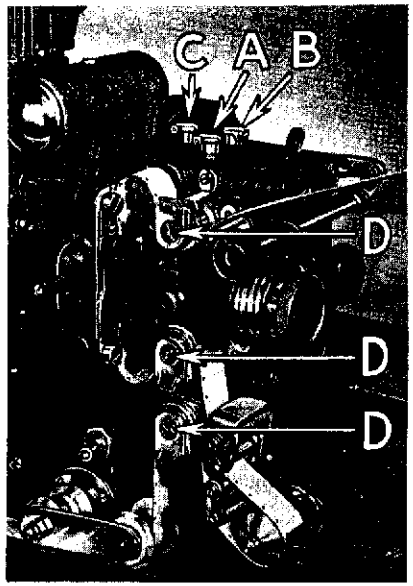


Figure 27
Points requiring lubrication

Projector Lubrication

The addition of oil at the few places provided is a simple but very important part of Filmosound operation. Proper oiling will assure a long trouble-free life. A lack of oil will result in serious damage. See above chart.

To saturate the felts within the sprocket shaft, have the projector disconnected from the line and speaker and lay it on its side. Insert the tip of the Filmo oil can into the holes D, Figure 27, and squeeze the sides of the oil can about three times.

Exciter Lamp Replacement

The exciter lamp is beneath a three-sided metal cover at the front right-hand corner of projector base Z, Figure 19. Unscrew the thumb nut (on the front) and remove the cover of the exciter lamp compartment. Press the lamp down, turn it counter-clockwise slightly, and lift it out. It is not necessary to loosen the set screw which holds the exciter lamp socket in place. After a new exciter is installed and before it is lighted, wipe it (as a lens) to remove all finger marks. An extra exciter lamp is provided with each Filmosound.

Ordinarily, no adjustment is required when an exciter lamp is replaced. However, if the filament is not in line with the inscribed mark directly behind the lamp, loosen the two set screws on the socket. Carefully move the lamp up or down, so that on sighting directly across the top of the filament, the inscribed line, immediately to the rear of the exciter lamp, and the filament coincide.

"BRD" EXCITER LAMP

Care must be taken not to revolve the lamp. Only a turn or two is necessary to loosen the two screws and they should not be re-tightened too tightly, but just enough to hold the socket securely.

Fuse Replacement

A 2-ampere fuse, FU, Figure 6, is provided in the amplifier. It should be checked immediately if the exciter lamp fails to light. The fuse will burn out if direct current is fed into the amplifier supply receptacle.

Always disconnect the line cords before removing the fuse. Never use a fuse larger than the 2-ampere size.

Projector Lamp Replacement

To replace a projector lamp, unscrew the cap at the bottom of the lamphouse and allow the lamp to slide out into the hands.

If a projector lamp is being replaced during a show, be careful as the lamp slides down to grasp it by the relatively cool centering ring. This operation should be performed quickly, since a moment or two after the lamp is disengaged from the socket, the centering ring, acting as a cooling flange, becomes quite warm.

Insert the new lamp with the vertical tongue on the centering ring toward the front of the projector and revolve it slightly one way or the other until the tongue settles into the centering slot in the bottom of the lamphouse.

Replace the screw cap, making sure that it screws in squarely and tightly to lock the lamp in the proper position.

Never attempt to change a lamp with the current on.

Since the lamps are designed to burn base down, the machine must not be turned upside down or laid on its side while the lamp is burning.

Reflector Adjustment

Though the reflector is correctly adjusted for the original lamp, there is some likelihood that readjustment will be required after the lamp has been replaced with a new one. To make the adjustment, remove the lens, and the Magnilite Condenser, CM, figure 19, start the projector and with the lamp on, hold a sheet of paper about 14" from the front of the lens carrier. The image of the lamp filament will be plainly seen and if the entire area is evenly illuminated with no dark or vertical streaks, the adjustment is good and should be left as is.

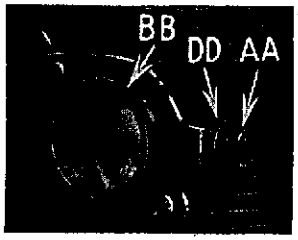
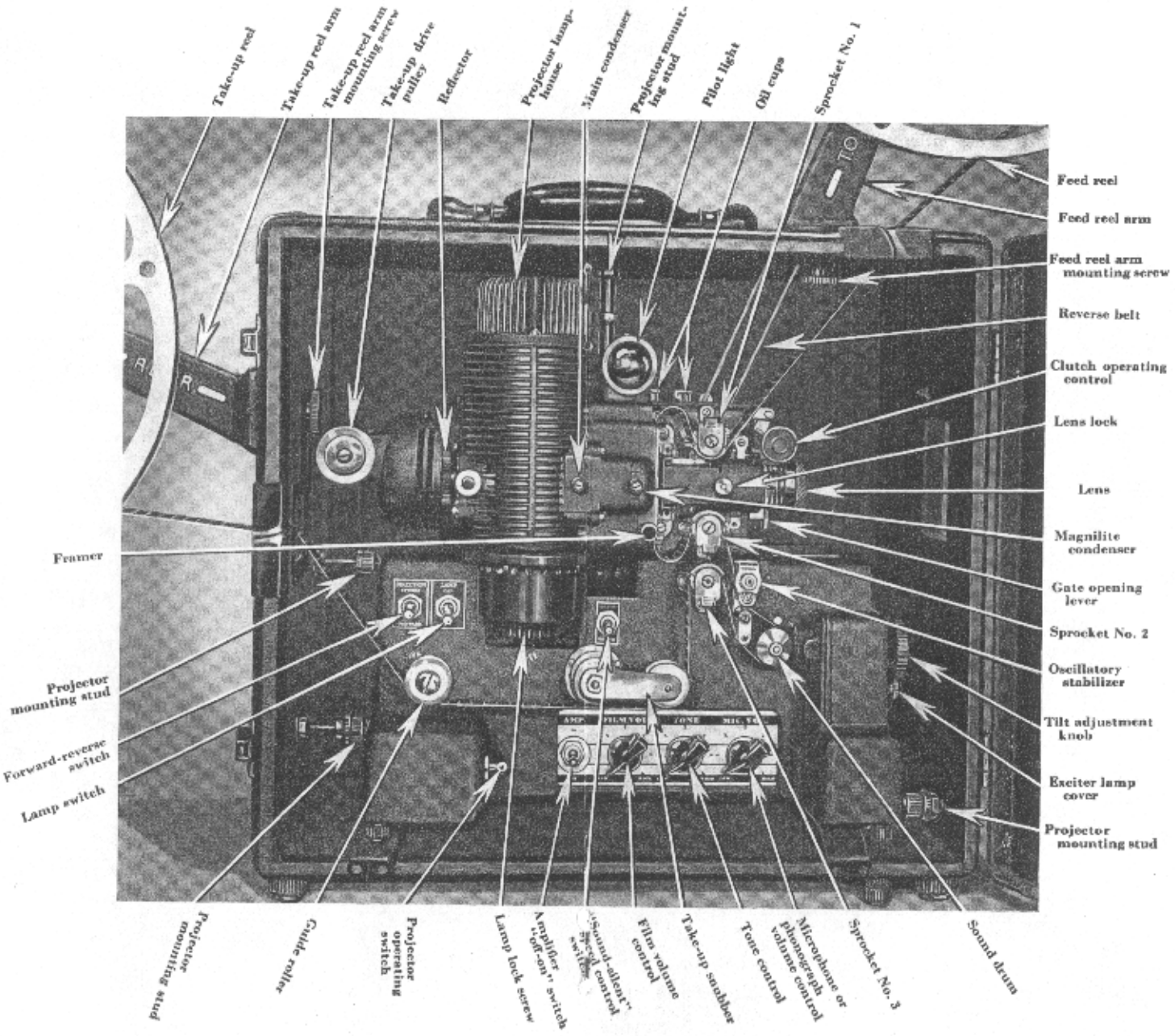


FIGURE 28

AA Reflector adjustment locking screw
BB Reflector jacket
DD Reflector lateral adjustment screw

Should there be dark areas between the filament coils, like spacing in a picket fence, loosen the locking screw AA, figure 28, and turn the lateral adjustment screw DD right or left until the illumination becomes even. If, by turning this screw, the open spaces are not filled up, further adjustment must be made by turning the reflector jacket BB slightly. Do not rotate the reflector jacket unnecessarily. When a tightly fitted succession of vertical coils is seen, tighten the locking screw AA.

NOTE: *On later model Filmosounds, the reflector replacing BB, Figure 28, is permanently adjusted at the factory. No further adjustments should be attempted and the data covering reflector adjustment in the instruction book should be disregarded.*


Take-up reel
Take-up reel arm
Take-up reel arm mounting screw
Take-up drive pulley
Reflector
Projector lamp-house
Main condenser
Projector mounting stud
Pilot light
Oil cups
Sprocket No. 1
Feed reel
Feed reel arm
Feed reel arm mounting screw
Reverse belt
Clutch operating control
Lens lock
Lens
Magnilite condenser
Gate opening lever
Sprocket No. 2
Oscillatory stabilizer
Tilt adjustment knob
Exciter lamp cover
Projector mounting stud
Framer
Projector mounting stud
Forward-reverse switch
Lamp switch
Projector mounting stud
Guide roller
Projector operating switch
Lamp lock screw
Amplifier "off-on" switch
"Sound-silent" record control switch
Film volume control
Take-up snubber
Tone control
Microphone or phonograph volume control
Sprocket No. 3
Sound drum