

Disclaimer

The information contained in this Adobe PDF file is for general information purposes only. Due to the age of the information and the difficulty in converting it to computer formats it may not be up to date or correct, we make no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, suitability or availability with respect to the Adobe PDF or the information, products, services, or related graphics contained in the Adobe PDF document for any purpose. Any reliance you place on such information is therefore strictly at your own risk.

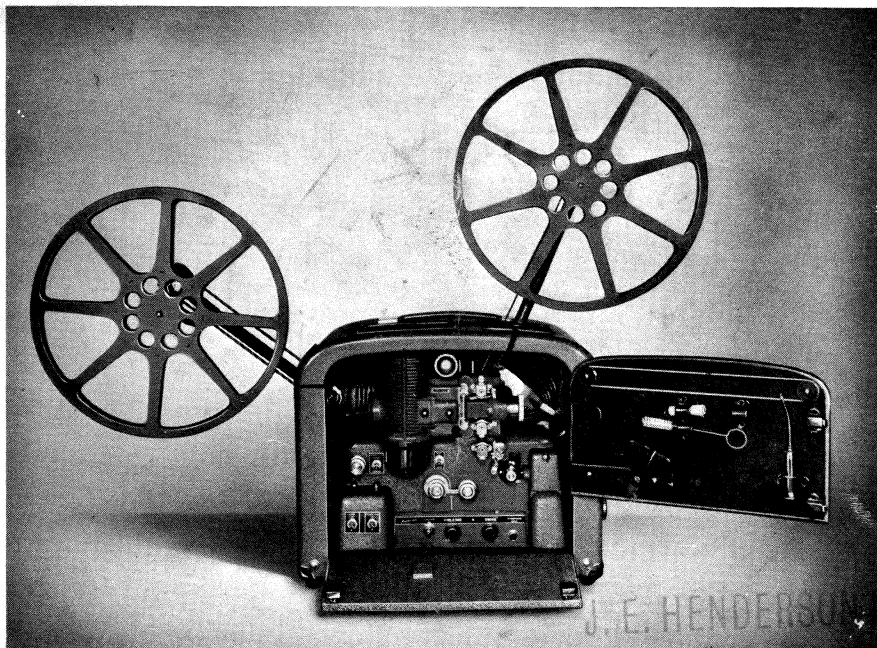
In no event will we be liable for any loss or damage including without limitation, indirect or consequential loss or damage, or any loss or damage whatsoever arising from loss of data or profits arising out of, or in connection with, the use of this Adobe PDF.

This document is available free from cineinformation.org.

OWNER'S MANUAL
OF OPERATION and MAINTENANCE

for

G.B.—BELL & HOWELL



MODEL 621

16mm. Sound-on-Film Projector

G.B. EQUIPMENTS LTD.

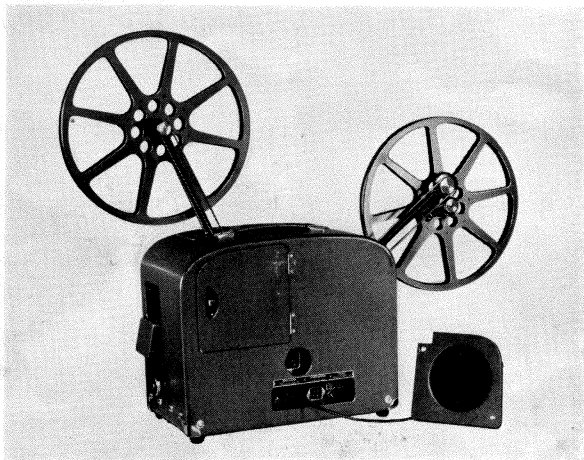
MORTIMER HOUSE

37-41 MORTIMER STREET

LONDON W.1

PROFESSIONAL RESULTS WITH AMATEUR EASE

MODEL 621 COMPACT



This equipment is similar in all respects to the Standard Model 621, except that the one case contains a 6-in. loudspeaker and connecting lead.

The loudspeaker is fitted to a small baffle which is carried inside the small door on the side of the projector opposite to the operating side. The method of attachment of the speaker to this door, for carrying purposes, is by "keyhole" slots and pegs; the speaker is carried with the grille side toward the door, and the cable side toward the projector. A 25-ft. speech lead is attached to the speaker; the free end,

which is fitted with a standard speech plug, must be connected to the 8-ohm. (or two speaker) outlet of the amplifier.

The speech lead, when not in use, is wound around the brackets fitted to the speaker; these brackets, when the speaker is in use, enable it to stand up independently.

Always keep the "speaker door" closed whilst the machine is in use to restore the normal casing of the projector.

Owners of Model 621 Compact may at any time use Standard GB-Bell & Howell Speaker Equipment.

Contents

	<i>Page</i>		<i>Page</i>
Model 621 Compact	2	Operating on 200/250-volt	
General Information	4	D.C.	15
Preparing to operate the		Operating from 110-volt D.C.	15
projector	4		
Cautions before proceeding...	5	Projection Defects and	
Electrical connections.....	5	Causes	16-18
Adjusting the projector to		Emergency trouble guide	16, 17
the screen	6	Removing the amplifier from	
Threading the film.....	6	the chassis.....	17
Operation	10-15	Special models and extra	
Projecting	10	equipment	17
Framing	10	Check list	17
Sound volume and tone		Valve testing	18
control	10	Correct valves for amplifier	18
Projecting silent film	10	Replacement valves.....	18
Still picture projection.....	10		
Reversing	11	Care and Maintenance of	
Rewinding.....	11	Model 621	20-23
Microphone	11	Cleaning optical parts.....	20
Record players	14	Cleaning film handling parts	20
Pilot light.....	14	Projector lubrication	21
Operating on 200/250-volt		Exciter lamp replacement...	22
50-60-cycle A.C.	14	Fuse replacement	22
Operating on 110-volt		Projector lamp replacement	23
50-60-cycle A.C.	14	Reflector	23
Polarity Changer.....	14		

Instructions for Operating the **G.B.-BELL & HOWELL MODEL 621**

16mm. Sound-on-Film Projector

General Information

THE projector is equipped with still picture clutch, a sound-silent speed (24 F.P.S. and 16 F.P.S.) switch, and a reverse switch, permitting the film to be run forward or backwards without re-threading. It is factory equipped with the faster 2-inch F 1.6 lens as well as the light-increasing Magnilite Condenser.

Locate arms in sockets, the smaller one in front, and the other arm (with take-up pulley) at the upper rear of projector case, as shown in Figure 1.

Loop the rear spring belt, without a twist, from the drive pulley P, Figure 1, at the rear of the projector motor, to the take-up pulley Q, Figure 2, at the end of the spool arm.

Preparing To Operate the Projector

The removable spool arms are carried inside the projector case, one on the door and the other at bottom of case.

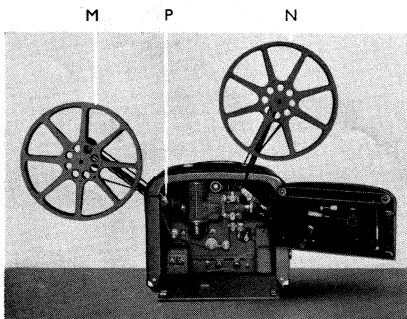


Figure 1
M. Take-up spool N. Feed spool
P. Take-up drive pulley

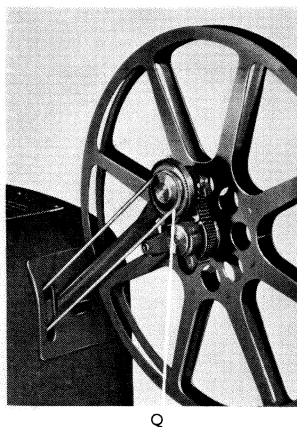


Figure 2
Q. Take-up pulley

Loop the front belt, without a twist, over the small pulley at the top of the feed spool arm.

Cautions Before Proceeding

Be sure that:

1. The mains to which you are connecting your equipment is A.C. (alternating current). See page 14 for the use of polarity changer on direct current.
2. If your mains supply is A.C. of more than 110 volts, a transformer is used to supply 110 volts to the projector.
3. The fuse in the power lines is rated at least at 15 amperes, provided that no other equipment is on the same circuit.
4. All controls on the projector are in "off" position.
5. That the transformer tapping or the resistance is set to the voltage of the mains supply before making any connection to the projector. If there is any doubt as to the exact voltage, consult the local electricity undertaking.
6. Before making any connections or alterations to connections make sure that your wall-plug switch is off.
7. It is important that the equipment be earthed by connecting the third lead in the mains cable to the earthing pin on the wall-plug or other suitable point.

Electrical Connections *(See also Page 14)*

After removing the speaker grille cover and all accessories from the speaker case, carry the speaker and the speaker cable to the front of the room. Place the speaker as nearly as possible at the centre of the screen and above the heads of the audience. Where this is not possible the speaker may be positioned at the side of the screen and tilted downwards slightly towards

the back of the audience. Locate the speaker at least 18 inches in front of any obstructing surface, but *not* behind the screen unless this is of the perforated type. The door of the speaker case should be closed. The speaker cable comes out of the case through the slot in the lower right side of the case door.

Connect the end of the speaker lead into the inlet on the speaker chassis.

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

Insert the speaker connector into the "single 16" inlet on the speaker chassis.

Connect the appropriate leads to the projector and amplifier or polarity changer inlets according to the type of supply. Full information as to the type of step-down device, if necessary, and method of connection is given in detail on page 15.

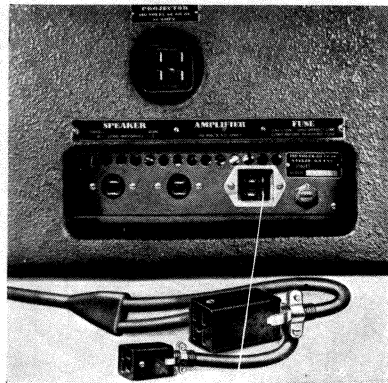


Figure 4

**P. Amplifier Input 110 Volts A.C. only
Projector lamp and Motor Input
110 volts A.C. or D.C.
Single speaker connection 16 ohms
Dual speaker connection 8 ohms
Amplifier fuse 1½ amps.**

Adjusting the Projector to the Screen

The small case door in front of the projection lens must be opened. Turn on the projector switch, C1, Figure 5, and the lamp switch, C2, Figure 5.

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 the clutch control X, Figure 5, is turned to the 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 in a clockwise direction. The tilt knob is located on the front of the projector case (23, page 12).

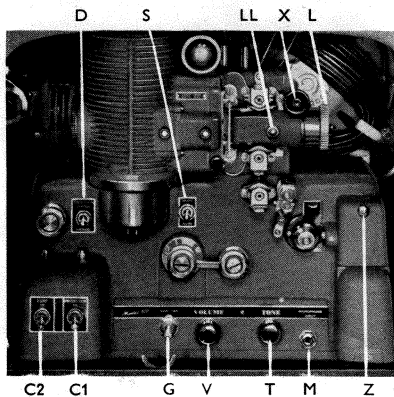


Figure 5

- C1. Projector switch
- C2. Lamp switch
- D. Direction switch
- G. Amplifier switch
- V. Volume control
- T. Tone control
- M. Microphone jack
- L. Lens
- LL. Lens locking screw
- S. Sound-silent switch
- X. Clutch control
- Z. Exciter lamp cover

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 the table on page 19.

With the projector operating and the lamp turned on, loosen lens locking screw LL, Figures 5 and 16 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 sharpen further the focus, revolve the lens first in one direction then in the other, relocking the lens when sharp focus is obtained.

Now turn off the projector and turn on the amplifier switch G, Figures 5 and 15. Allow about one minute for the valves to heat, then move the volume control V, Figures 5 and 15, in a clockwise direction until a hiss is heard in the speaker. At the same time, light should be seen from behind the exciter lamp cover Z, Figures 5 and 18.

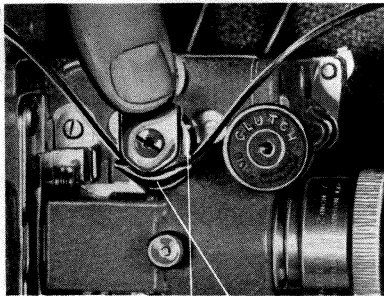
If the above conditions exist, the electrical connections are properly made and the projector is ready for threading.

Threading the Film

Place the practice reel, supplied with your projector, on the top spool arm spindle with perforations toward the operator, and an empty "take-up" spool on the rear spindle. Press each of these spools firmly on the spindle until the small retaining spring-balls lock the spools on the spindles. Pull off about four feet of leader film for threading.

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

Slip the film into the slot at the base of the spool arm and over the roller. Lead the film below sprocket S1, Figure 6. Slide the film as far toward the machine as it will go. Holding the film snugly as in Figure 8, press on tab T1, Figure 6, 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.

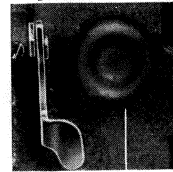


S1 T1

Figure 6
S1. Safe-lock sprocket
T1. Sprocket guard tab

Swing lever A, Figure 7, 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 8. Pass the film through the channel behind the lens as in Figure 8, being certain that it is fully seated in this channel. Then close the gate by pressing down lever A, Figure 7, 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 9. Again press the film as far toward the projector as it will go, and, while maintaining correct loop size, lock the film as for S1.

Now turn the hand setting knob B, Figure 7, several clockwise revolutions. This will engage the film with the

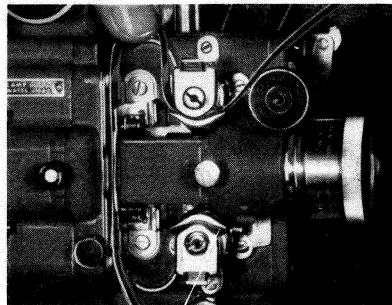


A B

Figure 7

A. Gate lever
B. Hand setting knob

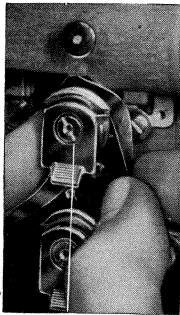
shuttle teeth. Should the lower loop slide upward, continue to turn the hand setting knob until the claw teeth are withdrawn, when the film may be pulled down to re-set the loop to the outline on the gear case. It is not possible to move the film downward through the gate unless the claw teeth are withdrawn. Again test the threading with the hand-setting knob.



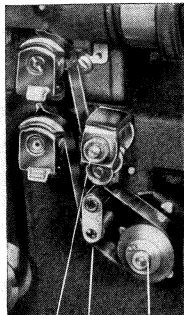
T2

Figure 8
T2. Sprocket tab

Lead the film from the second sprocket S2, Figure 9, under the top roller of the Oscillatory Stabilizer, R1, Figure 10, around the sound drum D, Figure 10, under the bottom stabilizing roller R2, Figure 10, and over the

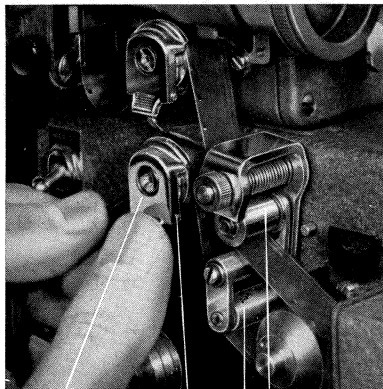


S2
Figure 9
S2. Second sprocket



R1 R2 D
Figure 10
D. Sound drum
R1 and R2. Stabilizer rollers

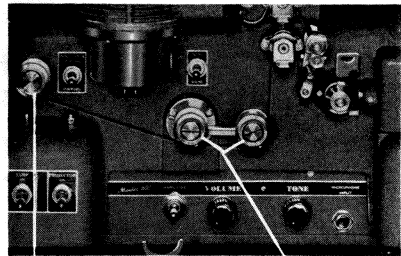
third sprocket S3, Figure 11. Press the film as far toward the projector as it will go over the sprocket S3, and pull down on the film as it passes over this sprocket. When the Oscillatory Stabilizer is moved to its extreme position by the tension on the film, open the film guard by pressing on tab T3, Figure 11. Then, free the film just sufficiently to permit the Oscillatory Stabilizer to pull it back to



S3 T3 R2 R1
Figure 11
R1 and R2. Stabilizer rollers
S3. Third sprocket
T3. Sprocket tab

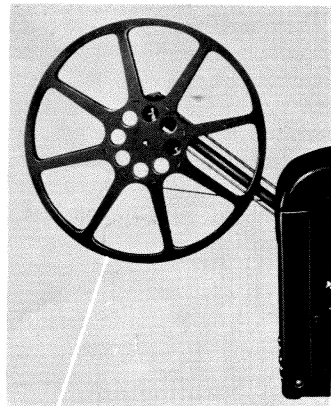
the first available set of perforations. Release tab T3, permitting the guard to lock the film in place on the third sprocket.

Pass the film under the snubber SN, and the roller K, Figure 12, and thence to the take-up spool. The film must be inserted in the slot in the case and over the roller on its path to the take-up spool. The film should pass around the bottom of the take-up spool, Figure 13.



K SN
Figure 12
SN. Snubber **K. Rear idler roller**

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

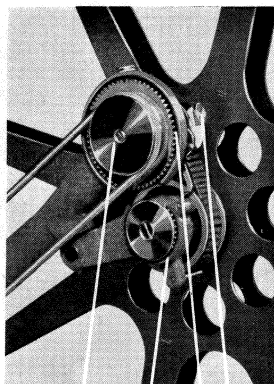


M
Figure 13
M. Take-up spool

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 spool arm is a combination take-up and rewind device. Set this for take-up by pressing lever U, Figure 14, while the spool is on the spindle.

No adjustment or compensation is necessary for various spool sizes, since the flat fabric belt between pulleys Q and Q1, Figure 14, provides complete and automatic compensation without any manual adjustments. The projector is now ready for operation.



Q Q1 V U

Figure 14

Q. Take-up pulley Q1. Re-wind gears
U. Take-up lock lever V. Re-wind gears

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

1. Have you read, and carefully followed, the preceding instructions?
2. Have you cleaned the aperture, gate plates, and optical components? (See page 20.)
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 spool, with all slack removed?
7. Is the take-up re-wind assembly set to *take up* film?
8. Is the direction switch D, Figure 5, set for forward operation?
9. Have you selected the correct speed for the film you are projecting (sound or silent)?
10. Is the transformer or resistance voltage tapping screw in the correct position for the voltage of your electric supply?
11. Have you tested the threading by turning the hand setting 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, is the amplifier turned on?
14. Have you learned from the ensuing pages of this manual how to use a microphone and a turntable; how to use the still picture clutch; the tone control; how to re-wind the film; and how to operate the projector in reverse? (After you have become adept at threading the film through the mechanism, turn on the amplifier before threading. The amplifier valves will 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 valves warmed and the film volume control at zero, start the projector using switch C1, Figure 5. Immediately after the motor has started, turn on the lamp switch C2, Figure 5.

As the title appears on the screen, carefully revolve the lens in one direction or the other until the title or the first picture appears in sharp focus. Lock in focus with screw LL, Figure 5.

Framing

If the picture frame line shows on the screen, turn the framer knob E, Figure 16, to make the frame line disappear. If framing moves the picture off the screen, readjust the tilt control.

Sound Volume and Tone Control

The volume control knob V, Figure 15, may now be advanced or retarded. The volume control operates 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 T, Figures 5 and 15, is also operated similarly to a tone control on a radio receiver. By means of this control, frequency range can be compensated for in accordance with the acoustical conditions under which the equipment is being used.

It should be set up by the operator for the most desirable reproduction at each showing. The practice film should now be projected in its entirety. Run this practice film until you are thoroughly familiar with every phase of operation

and threading. As "The End" title appears on the screen, turn off the projector lamp and, as the end of the narration or music is reached, reduce the volume control until no sound is heard. Run the remaining "trailer" of film completely through the machine.



Figure 15

- G. Amplifier switch
- V. Volume control
- T. Tone control
- M. Microphone jack

Projecting Silent Film

To project silent film, thread the machine in the usual way. Set the speed control switch S, Figure 5, at "silent". Do not turn on the amplifier unless oral comments are to be made through the speaker by means of a microphone, or musical accompaniment is to be reproduced by means of a turntable.

Still Picture Projection

To project a still picture, the clutch control knob X, Figures 5 and 16, is revolved to a 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 hand setting knob B, Figure 7, will bring the open section of the shutter into correct position, thus permitting the projection of single frames of film. It will be necessary to

adjust the lens to focus a still picture. Re-focus when motion is resumed.

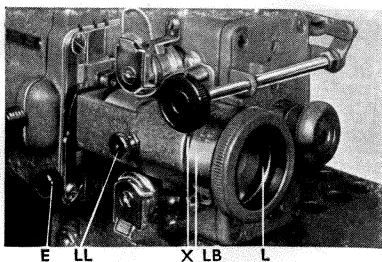


Figure 16

- E. Frammer control
- L. Lens
- LB. Lens barrel
- LL. Lens locking screw
- X. Clutch control

Reversing

Turn the volume control until the sound is inaudible. Switch off the projector motor before moving the direction switch, D, Figure 5, to "reverse". The motor must be stationary before operating this switch.

Always advance the volume control to the working position after switching from "reverse" to "forward".

Re-winding

The take-up spool, which has now received the entire film, should be removed from its spindle on the rear or take-up spool arm. The empty reel should be removed from the top reel arm, and the two spools interchanged so that the film leaves the full spool from the top. Use a hand re-winder where possible, to save wear on the mechanism.

The end of the film is led over the top of the empty spool. The lever U, Figure 14, is pressed forward, and the take-up spool lifted up as far as it will go to engage the two re-wind gears V, Figure 14. Then, while still holding the spool in the lifted position, the pressure should be released from lever U, thus

locking the assembly in the re-wind position, as shown in Figure 17. With direction switch in "forward" position, turn the projector switch on, allowing the motor to run until all of the film has been re-wound on the original spool. To save wear on the mechanism, the clutch should be disengaged. Immediately after re-winding, and before removing the loaded reel, again press lever U, Figure 14, thus restoring the assembly to take up position, as shown in Figure 14.

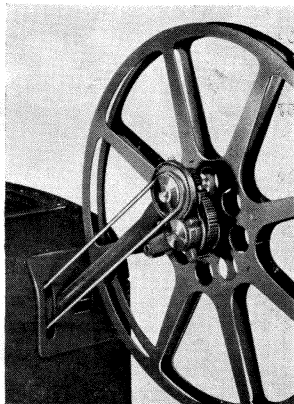


Figure 17

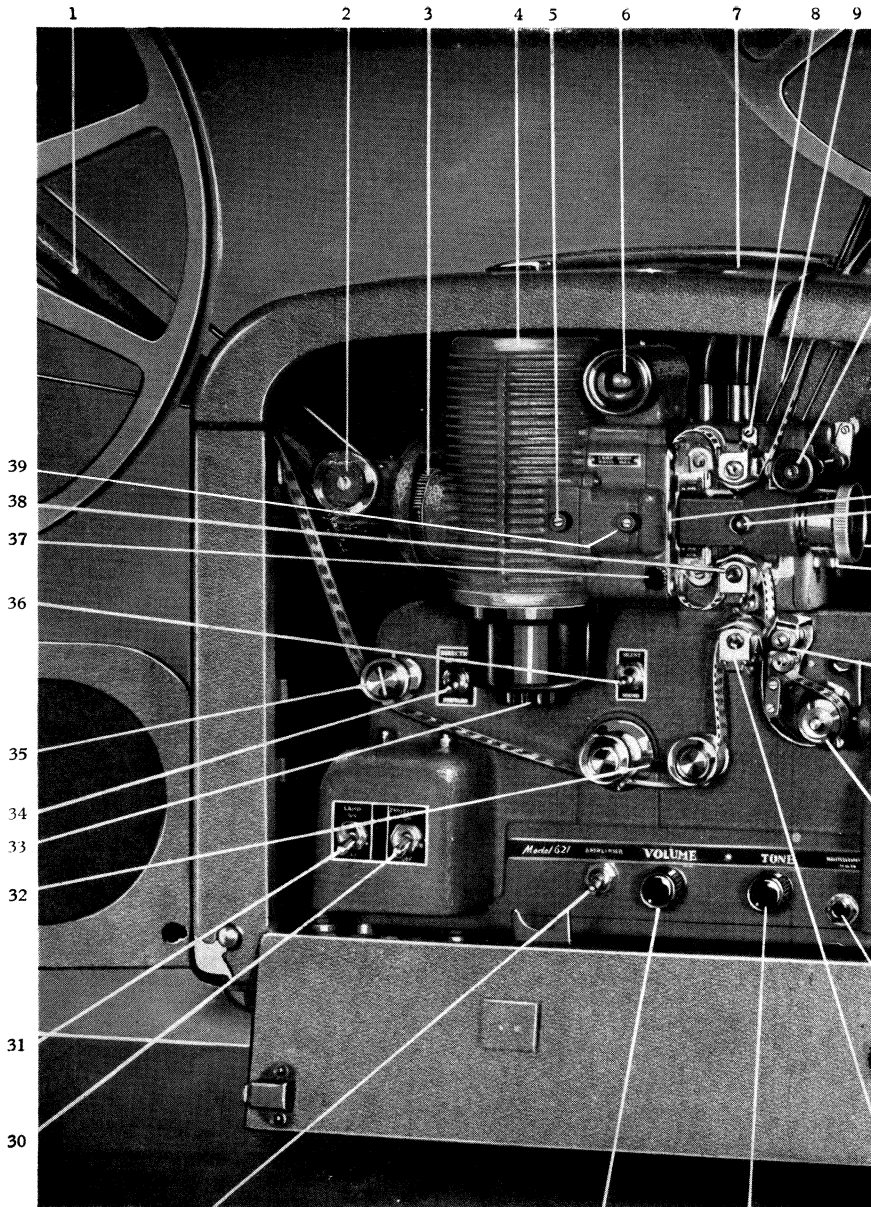
Gears on take-up arm locked in re-winding position

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

Microphone

A high-grade crystal microphone or high impedance dynamic microphone may be used with any model. The microphone is plugged into the jack, M, Figure 15. Volume control V, Figure 15, controls volume for microphone.

If the volume control is advanced too far howl may be set up in the speaker; this is caused by acoustic feed-back and can be eliminated by reducing the volume or altering the position of the microphone in relation to the speaker.



- 1. Take-up spool arm
- 2. Take-up drive pulley
- 3. Reflector
- 4. Projector lamphouse
- 5. Main condenser
- 6. Pilot lamp
- 7. Oil cups
- 8. 1st sprocket

- 9. Reverse belt
- 10. Feed spool arm
- 11. Clutch operating control
- 12. Spare belt
- 13. Removable gate shoe
- 14. Lens locking screw
- 15. Spare exciter lamp
- 16. Aperture cleaning brush

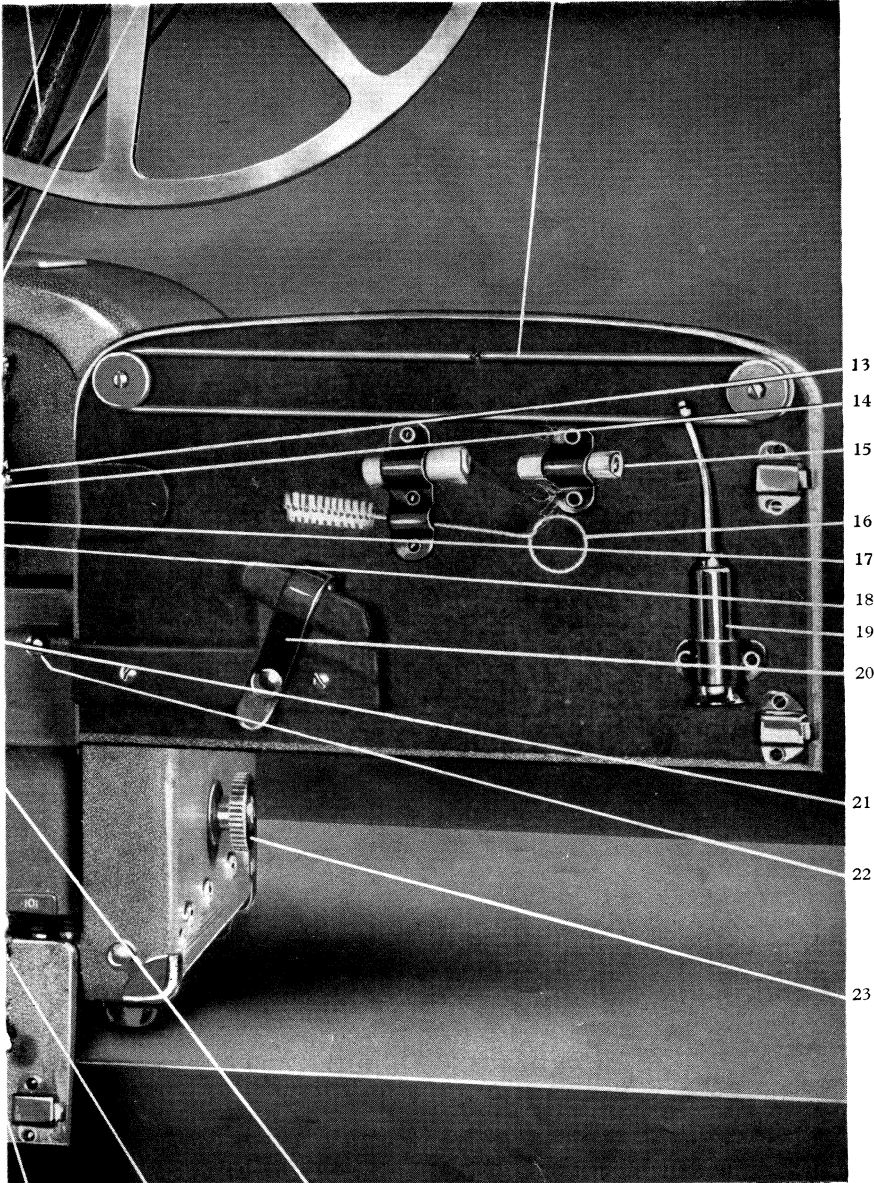
- 17. Lens
- 18. Gate operating
- 19. Oil can
- 20. Spool arm holder
- 21. Oscillatory stop
- 22. Exciter lamp
- 23. Tilt control
- 24. Sound drum

Figure

10

11

12



13

14

15

16

17

18

19

20

21

22

23

26

25

24

lever
 ing strap
 ilizer
 ver screw

25. Microphone jack
 26. Third sprocket
 27. Tone control
 28. Volume control
 29. Amplifier switch
 30. Projector operating switch
 31. Lamp switch
 32. Take-up snubber rollers

33. Lamp lock screw
 34. Forward-reverse switch
 35. Guide roller
 36. "Sound-silent" control switch
 37. Framer
 38. Second sprocket
 39. Magnilite Condenser.

8.

Record Players

Any record player with crystal pick-up or high impedance magnetic pick-up arm may be used. The jack is plugged into the receptacle M, Figure 15, and the volume is controlled by the volume control V, Figure 15. It is important to note that the equipment be earthed as described on page 5, para. 7, when using a microphone or record player, otherwise a hum may be reproduced.

Pilot Light

The pilot light is identified by the disk cap mounted on top of the projector casting (6, page 12). (See large illustration in centre of book.) To operate the pilot light, pull the cap forward; to turn it off, push the cap back. The pilot light should ALWAYS be off when the projector is in operation. To replace the lamp, turn the cap counter-clockwise until it can be removed, then insert the new lamp (120 v., 6 w.) and replace cap.

When the projector is supplied by 200/250 D.C. through the normal resistance the 110-volt pilot lamp must be replaced by a 230/250-volt lamp of suitable wattage. The brilliance of a pilot lamp of 200/250-volts, used as stated above, will be greatly reduced when the projection lamp is switched on.

Operating on 200/250-volt 50- to 60-cycle Alternating Current

To operate on 200/250-volt alternating current, a 1,250-watt, 200/250-volt to 110-volt transformer is required. Plug the 200/250-volt side, using the mains lead provided, into the wall socket, first making sure that the earthing lead is properly connected as already instructed. Plug the 6 ft. "Y" lead into the 110-volt socket on the transformer. Connect the two sockets to amplifier and projector lamp and motor input as shown in Figure 4.

Make sure that the transformer voltage tapping screw is set to correspond with the voltage of the mains supply in use. The method of connection is as shewn in Figure 19B. The transformer is fitted with a voltage selector panel carrying two tapping screws. The panel is marked 10/0/200/220/240-volts. One tapping screw must always be in the 0- or 10-volt tapping. When in the 0 tapping the voltage selected is as indicated by the second tapping screw. When in the 10-volt tapping the voltages as selected by the second tapping screw are increased by 10-volt, *i.e.* 210/230/250-volts. The life of the lamp can be conserved by utilizing a voltage tapping on the transformer or resistance above that of the voltage of the mains supply, *e.g.* mains supply voltage 220, tapping 230. This results in under-running the projector lamp. In order to make certain of the exact voltage of the mains supply it is advisable to consult the local electrical authority or, if this is not practicable, to measure the mains voltage with a voltmeter. It is not sufficient to examine the house meter or a lamp in use and take the presumed voltage from these.

Operating on 110-volt, 50/60-cycle Alternating Current

To operate from this supply no transformer is necessary and the projector is connected to the mains supply by a 25 ft. "Y" lead, as shown in Figure 19A.

Polarity Changer

When operating from 200/250-volts or 110-volts direct current supply, a polarity changer is used to provide A.C. for the amplifier. Where a polarity changer is not fitted to a machine it can, of course, be used as a separate unit, using the method of connection as described.

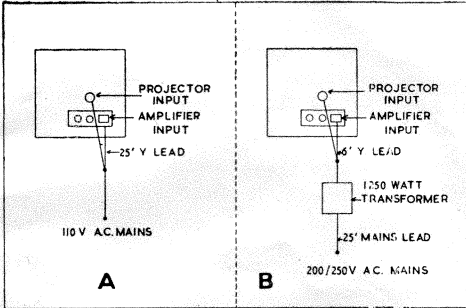


Figure 19
Arrangement and connection of units for 110-volt and 200/250-volt A.C.

Operating on 200/250-volt Direct Current

A special lamp motor and polarity changer resistance is available. This unit is tapped to enable the equipment to be adjusted to accommodate the various mains voltages which may be encountered. The method of connection is shown in Figure 21B.

In all cases the resistance unit tapping must be adjusted to correspond with the voltage of the mains in use.

The standard resistance unit supplied is suitable only for 750-watt projector lamp. If 1,000-watt lamp is to be used, a special resistance unit will be required for use only with this lamp.

Operating from 110-volt Direct Current

A 25 ft. "Y" lead provides the means of connection between the mains supply and the projector lamp and motor and polarity changer input, as shown in Figure 21A.

It is important that under no circumstances should the D.C. mains be connected directly to the input of the amplifier without the use of a polarity changer or converter. A rotary converter may be used in place of a polarity changer, if necessary; connections are as shown in Figure 20A for 110 D.C. mains or Figure 20B for 200/250 D.C. mains. It is pointed out, however, that the polarity changer has the advantage of extreme portability and much greater economy of current consumption.

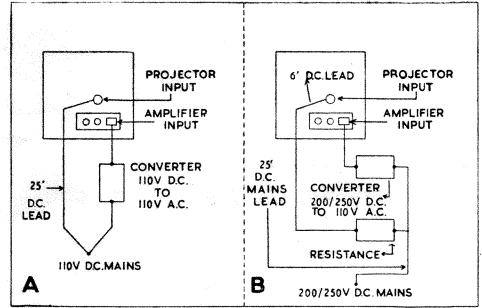


Figure 20
Arrangement and connection of units without polarity changer for 110-volt or 200/250-volt D.C.

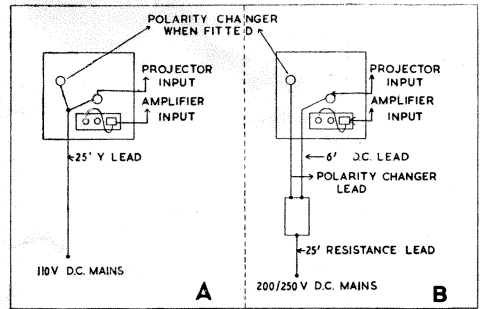


Figure 21
Arrangement and connection of units with polarity changer for 110-volt and 200/250-volt D.C.

Operation from main supplies other than those already described

In cases where it is required to use the projector on frequencies outside 50/60 cycles, a special amplifier and specially wound 1,250-watt transformer will be required.

A.C. voltages of 50/60 cycles outside the normal ranges can be accommodated by using a transformer of suitable rating wound for the particular voltage of the supply.

For the non-standard D.C. voltages either a specially wound resistance unit or rotary converter is necessary.

Advice on any of the above problems can be obtained from G.B. Equipments Ltd.

Section 3

PROJECTION DEFECTS AND CAUSES

Emergency Trouble Guide

1. **Equipment will not operate. This may be due to:**

- (a) Mains leads not making proper contact.
- (b) No current at mains socket (test with ordinary lamp).
- (c) Main fuse blown.

2. **No sound:**

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

- (a) Burned out exciter lamp. Check by replacing with the spare.
- (b) Amplifier not turned on.
- (c) Amplifier fuse blown (see page 22).
- (d) Any defective valve in amplifier.
- (e) Exciter lamp lead wire LW, Figure 24, not connected.
- (f) Valves in wrong sockets or valves not fully seated in correct sockets.
- (g) Exciter lamp not making contact in holder.

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. Re-check threading.
- (c) Grid clip not attached to the cap on the top of the 6J7GT valve. (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 20.

(e) Absence of sound record on the film. To prove that the trouble is not with the equipment, 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

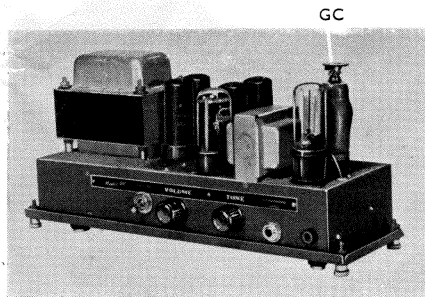


Figure 22
Amplifier removed from projector
GC. grid clip

the sound drum. If a loud “thumping” sound is heard from the speaker, the equipment itself is operating properly. The lack of sound under this condition would be due to the film.

- (f) Defective valves or photo-cells. Have all valves and photo-cells tested and replace any which prove to be defective.
- (g) Speaker lead not connected at both ends.

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 spool supplied with the machine.

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

(d) Defective valves or photo-cells. Have all valves and photo-cells tested and replace any which prove to be defective.

(e) Defective, dirty, or poorly adjusted exciter lamp (see page 22).

(f) Low mains voltage.

4. Unsatisfactory sound quality may be caused by:

(a) "Speed" switch set in silent position.

(b) See other causes under the heading "Inadequate Volume". Noises such as humming and whistling are usually traceable to defective valves. Failure to fasten the amplifier firmly in base may also cause noises as may the photo-cell or the first stage valve. (See check list.)

(c) Static-like sound may occur if the valve base pins are dirty. Clean them with No. 00 sandpaper and wipe them well.

(d) Film incorrectly threaded through oscillatory stabilizer.

(e) Poor acoustic properties of auditorium.

5. No picture:

(a) Power supply is not correctly connected.

(b) Lamp switch not turned on.

(c) Projector lamp burned out. Replace it as directed on page 23.

(d) Projection lens door closed.

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 burns out. Inspect the lamp and replace if necessary.

(c) Dirty projection lens, condenser, or lamp. Clean as directed previously.

(d) Low mains voltage.

Removing the Amplifier from the Chassis

Lay the projector on its side as shown in Figure 23. With a screw driver or a coin remove the four screws H, Figure 23. Pull gently on the lead wire LW, Figure 24, to disconnect the exciter lamp. Remove the amplifier by pulling straight out, being careful not to allow it to drop and damage the valves. Replace the amplifier in a similar manner. Be certain in replacing the amplifier to re-connect the exciter lamp lead LW, Figure 24.

CAUTION—The photo electric-cell must not be subjected to direct rays from daylight or other strong light, for any prolonged period.

Special Models and Extra Equipment

Special models, such as those required for 25-cycle alternating current operation, as well as all other accessories required for the most elaborate show, can be obtained to special order from G.B.-Bell & Howell or accredited agents. The accessories or extra equipment most likely to be required are listed on the Guarantee Card.

Check List

Included in this Instruction Book is a Check List which itemizes with your accessories and spares which are standard equipment with your particular model. Immediately after unpacking be sure to check the material against this list to insure (a) that none of the parts has been discarded with the packing material, (b) that none of the spares has been inadvertently omitted from the shipment.

Valve Testing

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

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

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

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

After the showing has been completed, remove the amplifier from the projector. One at a time the old valves 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-cell when the amplifier is functioning. As soon as the defective valve is placed in it, the noise probably will not be

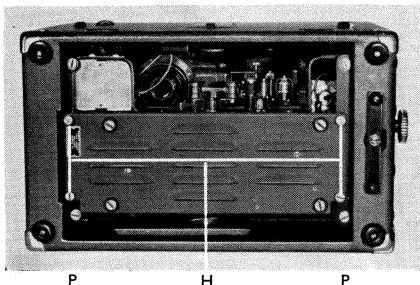


Figure 23

H. Amplifier retaining screws
P. Projector retaining screws

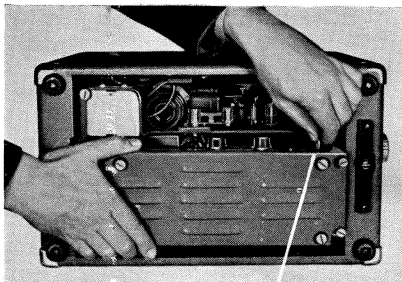


Figure 24

Removing amplifier
LW. Lead wire

heard. This, together with possible new or different noises, will help to identify the defective valve.

If the difficulty with the amplifier was an extraneous noise due to a defective valve, gently tapping each of the valves with the end of a pencil will cause a "rasping" noise when the defective valve is tapped. Discard the defective valve and install a new valve of the same type.

Correct Valves for the Amplifier

Since new types of valves are frequently used in amplifiers as they are made available by the valve manufacturers, and the Model 621 is not necessarily changed because of this, we do not append a list of valves used in this equipment. Refer to your check list, or if it has become lost, remove the amplifier from the chassis and check the labels identifying the sockets.

Replacement Valves

Although the valves used in the amplifier can be obtained from most radio stores, it is advisable to use valves which have been thoroughly tested at our factory, as well as on standard valve testers, to insure finest quality of reproduction.

Projected Picture Sizes Obtained with Various Projection Lenses

LENS FOCAL LENGTH 16 mm. Projector	DISTANCE IN FEET FROM SCREEN TO FILM																	
	8'	10'	12'	15'	20'	25'	30'	35'	40'	45'	50'	60'	75'	100'	125'	150'		
	WIDTH AND HEIGHT OF PICTURE																	
1"	4'9" 3'6"	5'11" 4'5"	7'2" 5'4"	9'0" 6'8"	12'0" 8'11"							Upper Dimension is Width of Picture.						
1 1/2"	3'11" 2'11"	4'11" 3'8"	5'11" 4'5"	7'6" 5'7"	9'11" 7'5"	12'6" 9'3"						Lower Dimension is Height of Picture.						
1"	2'11" 2'2"	3'8" 2'9"	4'5" 3'4"	5'7" 4'2"	7'5" 5'7"	9'4" 6'11"	11'3" 8'4"	13'1" 9'9"										
1 1/2"	1'11" 1'5"	2'5" 1'10"	2'11" 2'2"	3'8" 2'9"	4'11" 3'8"	6'2" 4'7"	7'6" 5'7"	8'9" 6'6"	10'0" 7'5"	11'3" 8'4"	12'6" 9'4"							
2"	.....	1'10" 1'4"	2'2" 1'8"	2'9" 2'1"	3'8" 2'9"	4'8" 3'5"	5'7" 4'2"	6'6" 4'10"	7'5" 5'7"	8'5" 6'3"	9'4" 6'11"	11'3" 8'4"	14'0" 10'5"	18'9" 13'11"	23'5" 17'6"	28'2" 21'0"	
2 1/2"	.....	1'5" 1'1"	1'9" 1'3"	2'2" 1'8"	2'11" 2'2"	3'8" 2'9"	4'5" 3'4"	5'3" 3'11"	5'11" 4'5"	6'8" 5'0"	7'5" 5'7"	9'0" 6'8"	11'3" 8'4"	15'0" 11'2"	18'9" 13'11"	22'6" 16'9"	
3"	.....	.....	.....	.....	.....	3'1" 2'3"	3'8" 2'9"	4'4" 3'3"	4'11" 3'8"	5'7" 4'2"	6'2" 4'7"	7'5" 5'7"	9'4" 6'11"	12'6" 9'3"	15'7" 11'7"	18'9" 14'0"
3 1/2"	.....	.....	.....	.....	.....	2'7" 1'11"	3'2" 2'4"	3'8" 2'9"	4'3" 3'2"	4'9" 3'7"	5'4" 3'11"	6'5" 4'9"	8'0" 5'11"	10'8" 7'11"	13'4" 9'11"	16'1" 12'0"
.....	.....	.....	.....	.....	.....	2'3" 1'8"	2'9" 2'1"	3'3" 2'5"	3'8" 2'9"	4'2" 3'1"	4'8" 3'5"	5'7" 4'2"	7'0" 5'2"	9'4" 6'11"	11'8" 8'8"	14'0" 10'5"

IMPORTANT

This Instruction Book should reach you complete with
GUARANTEE, REGISTRATION and LIBRARY CARDS

*It is important, in your own interest, that
you fill in and post the Registration and
Library Cards AT ONCE. Postage is
prepaid.*

If, when you receive this book, the Cards are incomplete
(i.e. one or more Cards missing), please communicate
immediately with:—

G.B-EQUIPMENTS LTD.,
MORTIMER HOUSE,
37/41 MORTIMER ST.,
LONDON, W.1

Telephone: MUSEUM 5432

Telegrams: GEBEQUIP WESDO LONDON

Section 4

CARE AND MAINTENANCE OF MODEL 621

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 equipment with this device, must be kept scrupulously clean and free from dirt and oil. For cleaning, use lens cleaning kit or lens cleaning tissue, either of which may be secured from your dealer at small expense.

The greatest care must be taken when cleaning bloomed lenses, to avoid scratching or rubbing the surfaces. Dust may be removed with a soft camel hair brush applied very lightly and carefully, or alternatively lens cleaning tissue may be used with equal care.

The projector lens, L, Figure 16, is removed by loosening lens locking screw LL, Figure 16, and pulling forward on the lens barrel LB, Figure 16.

The same treatment should be given the Magnilite Condenser, 39, Figure 18, and the main condenser lens, 5, Figure 18.

The condenser lens and the Magnilite Condenser are removed from the projector by pulling on the holder handles. 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 machine, 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 lens cleaning tissue wrapped around the end of a toothpick, as should the mirror, already described.

Cleaning Film Handling Parts.

Preparatory to cleaning the aperture, open the film gate, remove the lens, and the removable gate shoe.

To remove the gate shoe grasp the metal frame F, Figure 26, and withdraw. *Use no tools.* Clean and polish 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

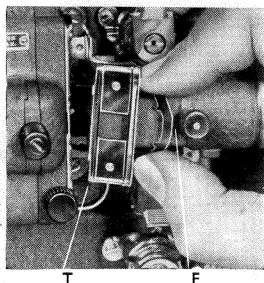


Figure 26

polished surface, use no sharp tools.

To clean the aperture, insert the brush supplied with the projector through the opening, being careful to stop forward motion of the brush at the first sign of contact with the safety shutter. Slowly withdraw the brush, turning it in a clockwise and counter-clockwise direction to remove all dust and dirt.

Clean the film channel by opening the gate and inserting the brush into the channel in a vertical position. With the gate partially closed, move the brush up and down to remove all dirt and emulsion. **The machine must not be running.**

When replacing the gate shoe, be sure that guides T, Figure 26, are placed in 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.

Projector Lubrication

The application of Projector Oil at the proper points is a simple but very important part of operation.

Correct lubrication will assure long, trouble-free life of the projector. Lack of oil will result in serious damage. Oil cups and holes are readily accessible without removing any part

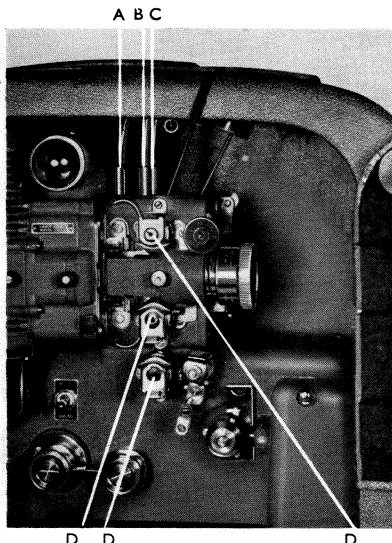


Figure 27
Points requiring lubrication

of the machine whatsoever, and the lubrication points indicated in Figure 27 should be given careful attention according to the chart below.

To saturate the felt reservoirs within the sprocket shafts, disconnect the projector from the line and speaker, and lay it on its side. Insert the tip of the oil can in the holes D, Figure 27, and squeeze the bottom of the oil can three times. After every 100 hours of use, remove thumb screw cap

Lubrication Chart (See Figure 27)

	<i>Silent Speed</i>	<i>Sound Speed</i>
Oil Cup A	One drop of Projector Oil after each 8 hours of operation.	One drop of Projector Oil after each 4 hours of operation.
Oil Cups B and C	One drop of Projector Oil after each 32 hours of operation.	One drop of Projector Oil after each 16 hours of operation.
Oil Holes D	Saturate felt reservoirs every 6 months.	Saturate felt reservoirs every 3 months.

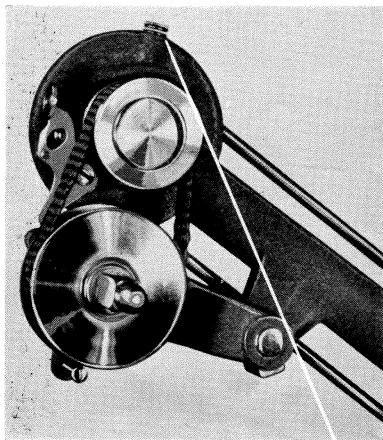


Figure 28
E. Grease cup

and add grease as necessary to spool arm grease cup **E**, Figure 28. After every 100 hours of operation, place one drop of Projector Oil on snubber **SN** and roller **K**, Figure 12, and on idler rollers where film enters and leaves case.

Exciter Lamp Replacement

The exciter lamp is beneath a three-sided metal cover at the front right-hand corner of projector base **Z**, Figures 5 and 18. Unscrew the thumb nut (on the front) and remove the cover of the exciter lamp compartment. Remove the exciter lamp shield. 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 projector.

Ordinarily, no adjustment is required when an exciter lamp is replaced.

However, if the filament is not in line, loosen the fixing screw on the side of the exciter lamp holder immediately facing you. Carefully move the lamp up or down until the maximum volume is obtained whilst running a film through the projector. Care must be taken not to revolve the lamp. Only a turn or two is necessary to loosen the screw which should not be re-tightened too tightly. Make sure that the shield does not screen the light to the photo-cell.

Fuse Replacement

A $1\frac{1}{2}$ -ampere fuse (see Figure 4) 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 mains leads before removing the fuse. Unscrew the insert marked "FUSE" for inspection. Never replace with a fuse larger than the $1\frac{1}{2}$ -ampere size.

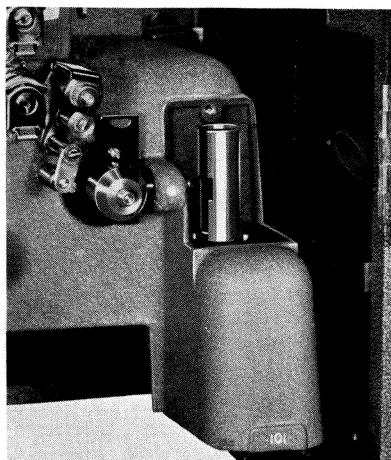


Figure 30

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 as in Figure 29.

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

Insert the new lamp with the vertical tongue on the pre-alignment gauge ring toward the front of the projector and revolve it slightly one way or the other

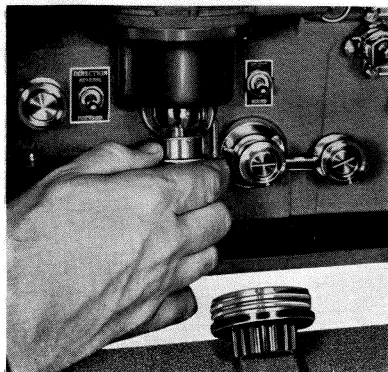


Figure 29
Lamp replacement

until the tongue settles into the pre-alignment gauge 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.

Before attempting to change a lamp, disconnect the mains lead from the wall-socket.

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

The reflector, Figure 30, is permanently adjusted at the factory, and no further adjustments should be attempted.

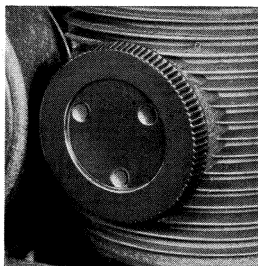


Figure 31

Occasionally it is desirable to polish this reflector in the same manner as the projection lens or the Magnilite condenser. The reflector is removed by turning the holder, Figure 31, counter-clockwise. Polish carefully and replace.

IF YOU NEED ADVICE, ASSISTANCE, OR SPARE PARTS FOR YOUR EQUIPMENT, A COMPLETE SERVICE IS AVAILABLE UPON APPLICATION TO THE AGENT WHO SUPPLIED YOUR EQUIPMENT, OR DIRECT TO THE 16 MM. SERVICE DEPT., WOODGER ROAD, SHEPHERD'S BUSH, LONDON W.12. (TELEPHONE—SHEPHERD'S BUSH 2050.)



TAYLOR-
HOBSON

TAYLOR-HOBSON

*The World's Finest Lens
is fitted to your*

S.B.-Bell & Howell

16 mm. FILM PROJECTOR.