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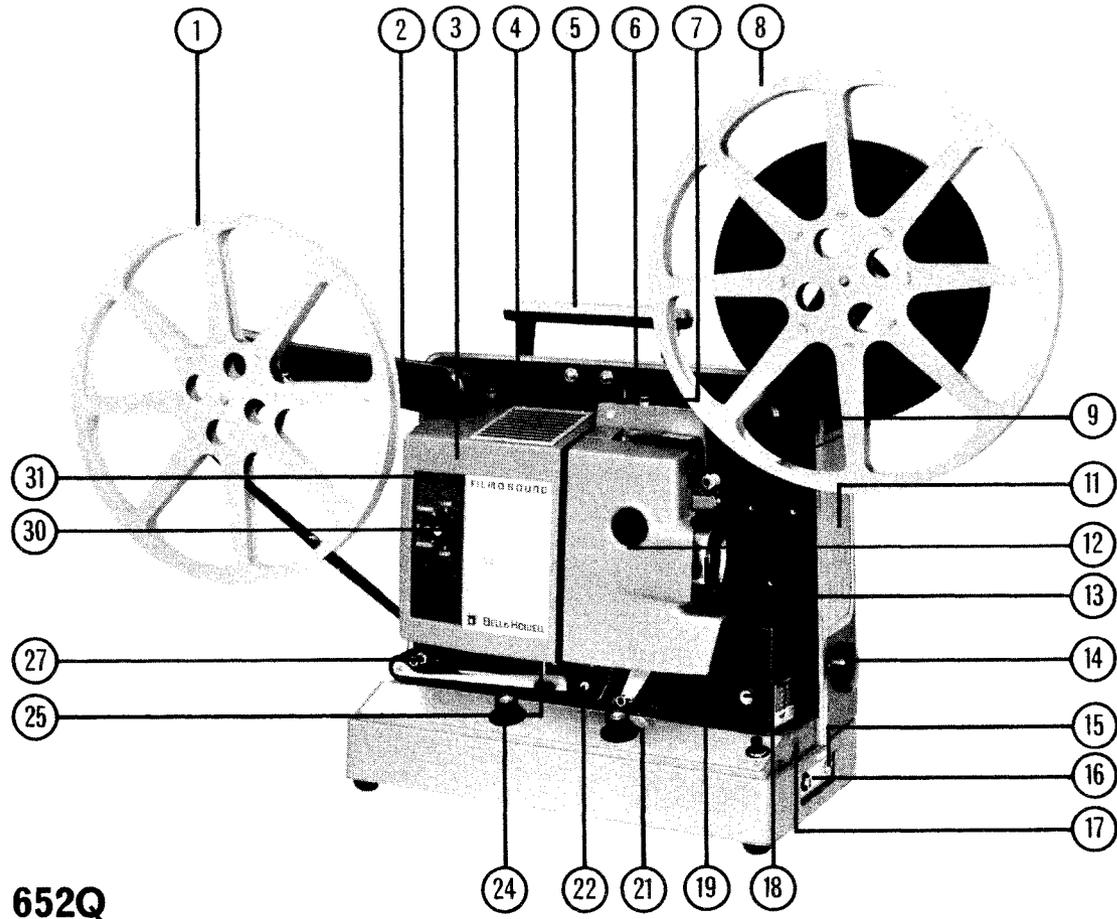
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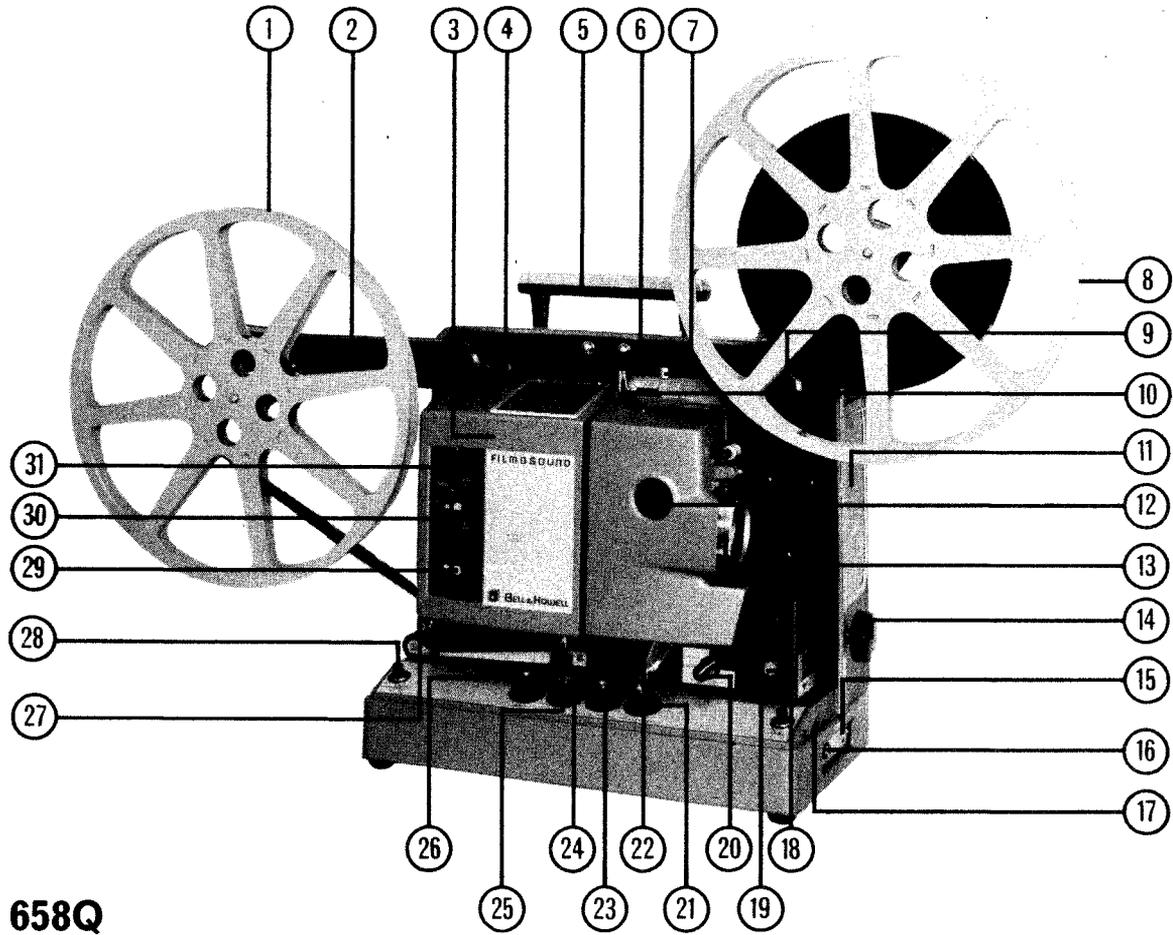
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**TQI FILMOSOUND PROJECTORS 652Q 655Q 658Q INSTRUCTION BOOKLET**  
**MODE D'EMPLOI**  
**BETRIEBSANLEITUNG**  
**MANUALE D'ISTRUZIONE**  
**HANDLEIDING**

 **BELL & HOWELL**



**652Q**



658Q

**KEY TO  
ILLUSTRATIONS**

**TABLES DES ILLUSTRATIONS**

- |   |   |
|---|---|
| 1 Take-up Spool                             | 1 Bobine réceptrice sur l'image (655Q et 658Q uniquement)     |
| 2 Rear Spool Arm                            | 2 Bras de la bobine réceptrice                                |
| 3 Lamphouse Cover                           | 30 Commutateur général  |
| 4 Arm Release Button                        | 31 Panneau de contrôle  |
| 5 Carrying Handle                           |   |
| 6 Framing Control                           | 4 Bouton de déblocage du bras                                 |
| 7 Rewind Button                             | 5 Poignée de transport  |
| 8 Feed Spool                                | 6 Bouton de cadrage   |
| 9 Front Spool Arm                           | 7 Bouton de rebobinage  |
| 10 Speed Selector                           | 8 Bobine débitrice  |
| 11 Speaker                                  | 9 Bras de la bobine débitrice                                 |
| 12 Focusing Knob                            | 10 Sélecteur de vitesse (655Q et 658Q uniquement)             |
| 13 Projector Lens                           | 11 Haut-parleur   |
| 14 Tilt Control                             | 12 Bouton de mise au point                                    |
| 15 Accessory Speaker Output                 | 13 Objectif   |
| 16 Microphone Input                         | 14 Bouton d'inclinaison                                       |
| 17 Film Cutter                              | 15 Prise de haut-parleur extérieur                            |
| 18 Securing Screw                           | 16 Prise microphone   |
| 19 Exciter Lamp Cover                       | 17 Coupe-film   |
| 20 Selector Switch (Mag./Opt.) (658Q only)  | 18 Ecrou  |
| 21 Optical Volume Control                   | 19 Couverture de la lampe excitatrice                         |
| 22 Guide Roller                             | 20 Bouton de sélection (Mag./Opt) (658Q uniquement)           |
| 23 Microphone Volume Control (655Q only)    | 21 Potentiomètre de puissance                                 |
| 24 Treble Control                           | 22 Galet guide  |
| 25 Lamphouse Knob                           | 23 Potentiomètre de puissance du microphone (655Q uniquement) |
| 26 Bass Control (655Q & 658Q only)          | Potentiomètre puissance du mag./mic. (658Q uniquement)        |
| 27 Guide Roller 'Snubber'                   | 24 Contrôle de aiguës   |
| 28 Animation Button (655Q & 658Q only)      | 25 Bouton du couvercle de la lampe                            |
| 29 Still Picture Control (655Q & 658Q only) | 26 Contrôle de basses (655Q et 658Q uniquement)               |
| 30 Direction Switch                         | 27 Galet Guide  |
| 31 Control Panel                            | 28 Bouton d'animation (655Q et 658Q uniquement)               |
|   | 29 Commande d'arrêt   |

**ERKLÄRUNGEN  
ZU DEN  
ABBILDUNGEN**

- |  |  |
|--|--|
| 1 Aufwickelpule                              | 1 Hinterer Spulennarm                                      |
| 2 Lampenhaustür                              | 3 Druckknopf für Spulennarm                                |
| 4 Tragegriff                                 | 5 Bildstrichverstellung                                    |
| 6 Rückspulknopf                              | 8 Abwickelpule   |
| 7 Vorderer Spulennarm                        | 10 Geschwindigkeitswähler (nur 655Q u. 658Q)               |
| 11 Eingebauter Lautsprecher                  | 12 Scharfeinstellung                                       |
| 13 Objektiv                                  | 14 Höhenverstellung  |
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- |   |   |
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| 13 Obiettivo                                      |   |
| 14 Comando di inclinazione                        |   |
| 15 Altoparlante supplementare                     |   |
| 16 Ingresso per microfono                         |   |
| 17 Taglierina                                     |   |
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| 19 Coperchio della lampada eccitatrice            |   |
| 20 Commutatore Mag./Opt. (solo 658Q)              |   |
| 21 Controllo di volume ottico                     |   |
| 22 Rullo guida                                    |   |
| 23 Controllo del volume del microfono (solo 655Q) |   |
| Controllo di volume Mag./Mic. (solo 658Q)         |   |
| 24 Controllo dei toni acuti                       |   |
| 25 Fermo del                                      |   |

**LIJST DER  
AANDUIDINGEN**

- |   |
|---|
| 1 Oprolspoel  |
| 2 Achterarm   |
| 3 Lamphuisdeksel                                      |
| 4 Drukknop spoelarm                                   |
| 5 Draaggreep  |
| 6 Beeldsnitregeling                                   |
| 7 Drukknop voor terugspoelen                          |
| 8 Ledig spoel   |
| 9 Voorarm   |
| 10 Snelheidsselektor (alleen 655Q & 658Q)             |
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| 19 Deksel eksitatielamp                               |
| 20 Selektorknop Mag/Opt. (alleen 658Q)                |
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| 25 Knop van lamphuisdeksel                            |
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| 28 Controleknop animatie (alleen 655Q & 658Q)         |
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## TECHNICAL INFORMATION

Power Supply	200-250 volts, 50 hertz, a.c. only
Input Wattage	450 watts
Projection Lamp	Tungsten-halogen Type A1/235. 24 volts, 250 watts
Exciter Lamp	Pre-aligned Type G/29. 4 volts, 0.75 amps
Control Panel Lamp	Festoon. 24 volts, 5 watts
Fuse, main	2 amps, time-lag, 5mm × 20mm
Fuses, auxiliary	1 amp (Internal Relays, Control Panel Lamp) 1.6 amps (Exciter Lamp) 2 amps (Amplifier)

	652Q	655Q	658Q
Amplifier Output	10 watts	25 watts	25 watts
Output Load Impedance	16 ohms	8 & 16 ohms	8 & 16 ohms
Transistors	2N3707 (3) 2N3705 (2) 2SD147 (2) 2SD146 (1) TIS 59 (1)	2N3707 (4) 2N3705 (1) 2SC826 (2) 2SD117 (2) 2SD146 (1)	2N3707 (6) 2N3705 (1) 2SC826 (2) 2SD117 (2) 2SD146 (1)
Diodes	7	8	8
Weight	42lb/19kg	44lb/20kg	46lb/21kg

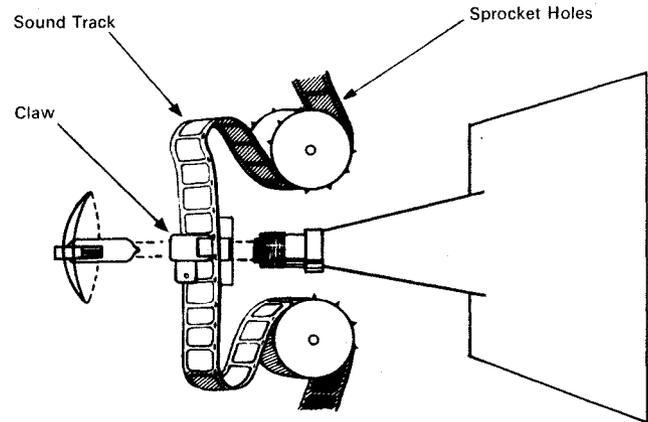
Dimensions: Length: 15 $\frac{7}{8}$ in/40.3cm    Width: 9 $\frac{3}{4}$ in/24.7cm    Height: 15 $\frac{1}{2}$ in/39.4cm  
 Spool Capacity: 2,000ft/600m

# INTRODUCTION

Before studying the operating instructions and using the equipment, you may find it helpful to read these introductory notes on the basic principles of film projection.

If, however, you already understand these principles and merely need to know how to use your Bell & Howell Filmosound projector, turn straight to page 4.

The 16mm projector shows sound or silent films. The film is made up of a large number of still picture frames. The frames are pulled down one at a time and halted momentarily before an opening called the gate. Behind the gate is a light source which illuminates each frame and, through a lens system, projects an enlarged image of it on to a screen. The film is pulled down by a claw. This engages with perforations, one to each frame, down the side of the film. While the film is moving, a shutter is automatically positioned between it and the light source so that the film is not then projected on the screen (this would cause a blurred image). Because of our ability to retain an image for a fraction of a second after it has disappeared, the quick succession of stationary frames, each slightly different from the one before, gives the impression of continuous movement on the screen.



Some films are silent films.

Some films are sound films.

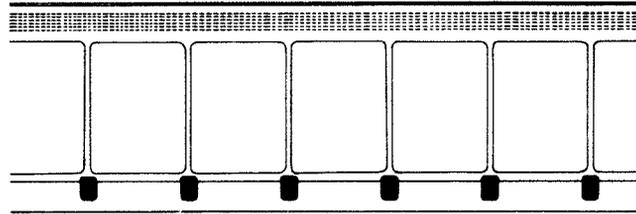
Silent films are moved past the gate at the rate of 18 frames per second.

Sound films are moved past the gate at the rate of 24 frames per second.

Silent films usually have two sets of perforations, or sprocket holes, one set on either side of the film, while sound films have only one set.

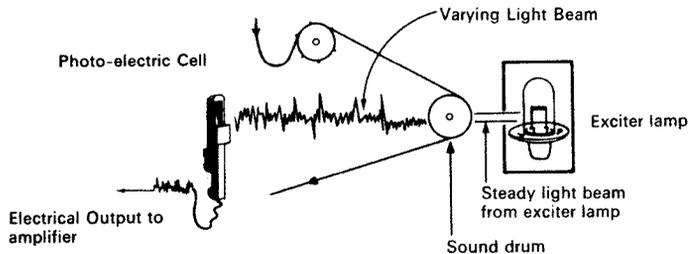
The sound is recorded on a strip along the side of the film opposite the sprocket holes and usually takes the form of a varying pattern of light and shade corresponding to the original sound and recorded photographically on the film. Moving at a constant speed between a light source (the exciter lamp) and a photo-electric cell, this pattern causes the cell to produce an electrical output which varies in sympathy with the original recording. This output is made many times greater by an amplifier, after which it is passed to a loudspeaker and converted to sound.

Such recordings are known as optical sound tracks. Some films use another kind of recording medium called a magnetic stripe. On this, the sound is recorded as a varying pattern of magnetism on a coating which is applied in a continuous strip along the side of the film. Reproduction is by a magnetic head (as on a tape recorder), which performs the functions of the exciter lamp and photo-electric cell. Both types of recording – optical and magnetic – can be reproduced on model 658Q.



16 mm OPTICAL SOUND FILM

Films come on spools.  
Some spools hold 400 ft/120m of film and run for about 10 minutes at sound speed.  
Some spools hold 800ft/240m of film and run for about 20 minutes at sound speed.  
Some spools hold 1,200ft/360m of film and run for about 30 minutes at sound speed.  
Some spools hold 1,600ft/480m of film and run for about 40 minutes at sound speed.



REPRODUCTION OF OPTICAL SOUND

## NORMAL OPERATION

### Preparation

Inside the front cover of this manual are three illustrations with text. Further illustrations are arranged in the same way inside the back cover. These instructions will be easier to follow if you unfold the illustrations before you read on. Numbers in brackets in the text below refer to the corresponding numbers on the illustrations at the front.

1. Place the projector on a stand or other firm support with the TILT CONTROL (14) facing the screen.
2. Slide the Cover Latch Button to the rear (see Fig. 1). Pull the top of the cover slightly towards you with the other hand and lift it away from the projector.
3. Raise the FRONT SPOOL ARM (9) until a click is heard.
4. Raise the REAR SPOOL ARM (2) until, just above the horizontal, a click is heard.

### Electrical Connections

The Filmosound projector is designed to operate on 50Hz alternating current supplies within a range of 200 to 250 volts. It can be used outside these limits *only* in conjunction with an external transformer.

5. Pull the LAMPHOUSE KNOB (25) and swing open the hinged lamphouse cover.
6. Set the Voltage Selector (see Fig. 2) to match the supply voltage by lifting the Selector, rotating it until the arrow is pointing to the correct voltage range, and then pressing the Selector firmly down again.
7. Close the lamphouse door. A click indicates that the lock has engaged.

8. Fit the moulded rubber plug of the mains lead into the socket (see Fig. 3a) at the other side of the projector. It will fit only one way.
9. If no mains plug has been fitted, attach a suitable plug to the three bare ends of the lead. These connections should be made with:

#### UK type lead

*(until end 1969)*

GREEN to Earth  
RED to Live  
BLACK to Neutral

#### International type lead

*(introduced during 1969)*

GREEN/YELLOW to Earth  
BROWN to Live  
BLUE to Neutral

If a fused plug is used, the fuse should have a value of 5 amps.

### Preliminary Test

10. Set the DIRECTION SWITCH (30) to OFF and (on models 655Q and 658Q) the STILL CONTROL (29) to RUN. Turn all the knobs on the sloping control panel (two on model 652Q, four on models 655Q and 658Q) fully anti-clockwise. On model 658Q, set the MAG/OPT SELECTOR SWITCH (20) to position 3.
11. Connect the mains lead plug to the supply. The Control Panel Lamp will light, indicating that the connections made are correct. (If the lamp does not light, see page 17).
12. Turn the knob of the TONE CONTROL (24) (model 652Q) or BASS CONTROL (26) (655Q and 658Q) to switch on the Exciter Lamp. The red indicator above the SECURING SCREW (18) will glow. (If it does not, see page 17).

13. Listen to the loudspeaker. A faint "hissing" noise will confirm that the sound system is functioning. (If no sound is heard, see page 17.)
14. Turn the DIRECTION SWITCH (30) to FORWARD, and the projector mechanism will start.
15. Turn the DIRECTION SWITCH one step further to LAMP. The projection lamp will now light. (If it does not, see page 18.)
16. Two-speed models only. With the projector running, set the SPEED SELECTOR (10) to the correct Silent or Sound setting for the type of film you intend to show. *Do not attempt to alter the setting of the speed selector unless the projector is running.*
17. Adjust the FOCUSING KNOB (12) until the illuminated picture aperture on the screen has a sharp outline.
18. Turn the TILT CONTROL (14) and move the projector sideways until the illuminated "picture" is centred on the screen.  
  
**Note:** The picture should just fill the screen without leaving an unlit white area inside any masking around the outside of the screen. To achieve this it may be necessary to alter the distance between projector and screen or change the PROJECTOR LENS (13). A table on the back cover gives the relationship between picture size and projector lens at varying distances from projector to screen.
19. Return the DIRECTION SWITCH to OFF. The projector is now ready for the film to be threaded.

### Pre-Threading Procedure

The automatic threading system gives a high degree of security for the film and the minimum of complications for the user. But the system may not work if the film is in a bad state. Nor will the performance be successful if the film is incorrectly wound or the spool warped.

Is the spool holding the film distorted? If so, straighten gently by hand.

Is the film correctly wound? With sound film, the perforations should be nearest the operator when the spool is mounted as in the illustrations on the inside front cover of this book.

Is the film in good condition? Check the first few feet of film (the "leader") for:

#### Torn Perforations

If up to three consecutive perforations are torn, cut a notch with scissors as shown in Fig. 4. If four or more are torn, the leader should be replaced, or threading be done manually after winding the film on beyond the point of damage. (See stages 48-59.)

#### Dry Film

With age, film becomes brittle and may crack as it passes through the threading system. Fit new leader or thread manually.

#### Shrunk Film

An old leader may have shrunk to the point where the separation between sprocket holes is insufficient for automatic threading. Fit new leader or thread manually.

**Buckled or Warped Film**

Buckled film must not be used for automatic threading. Warped film (see Fig. 5) may cause difficulty. If so, fit new leader or thread manually.

**Curled Film**

If curls are tighter than in Fig. 6, correct by curling the other way. If this does not help, fit new leader or thread manually.

**Tape, etc.**

Remove from the film any adhesive tape, staples, grease pencil marks, or anything else likely to do damage or introduce dirt into the threading path.

**Splices**

Buckled, stepped and taped splices (see Fig. 7a, b and c) may cause trouble and should preferably be re-made. If this is not practicable, thread manually and, if necessary, use the System Restorer (stage 68).

**Automatic Threading**

20. On model 658Q, ensure that the MAG/OPT SELECTOR SWITCH (20) is set to position 3.
21. Attach an undistorted empty spool to the REAR SPOOL ARM (2). The spool must be of sufficient capacity to hold the film which is to be projected.

The sequence in which the following operations are carried out is shown by six circled numbers engraved in red on the machine itself.

22. Turn the DIRECTION SWITCH (30) to FORWARD (1)
23. Insert about 1in/2.5cm of film in the FILM CUTTER (2) at the front of the projector. Ensure that a perforation

engages on the Locating Pin, then press firmly downward on the FILM CUTTER to trim the film end (see Fig. 8a).

24. Move the AUTO THREAD LEVER (3) to the right until it locks in the vertical position.
25. Insert the tip of the film in the FILM ENTRY CHANNEL (4) (see Fig. 8) and push gently until a sprocket hole engages with the moving sprocket teeth. The projector now threads itself automatically. (If it does not, see page 17).
26. As soon as approximately 2ft/60cm of film have run clear of the projector beyond the exit roller, turn the DIRECTION SWITCH (30) to OFF.
27. Pull the film to the rear to release the threading mechanism. The AUTO THREAD LEVER now springs back to the left. Then, raising the GUIDE ROLLER (5) thread the film as in Fig. 8b and attach to the hub of the TAKE-UP SPOOL (1), gently rotating the spool clockwise to take up slack.

The projector is now ready for the film to be projected.

**Sound Film Projection**

28. (Two-speed models only.) Check that the SPEED SELECTOR (10) is set to the SOUND position. Remember that speed must be changed *only* when the projector is running. Check that the STILL PICTURE CONTROL (29) is set to RUN.
29. Set all sound controls fully anti-clockwise.
30. Turn the TONE CONTROL (652Q) or the BASS CONTROL (655Q and 658Q) clockwise to switch on the Exciter Lamp, and set to position 5.

31. Turn the DIRECTION SWITCH (30) to FORWARD.
32. As soon as the first picture frame after the leader enters the gate, turn the DIRECTION SWITCH to LAMP ⑥
33. Make final adjustments to the FOCUSING KNOB (12) and TILT CONTROL (14).
34. If a frame line appears above or below the picture, turn the FRAMING CONTROL (6) until the line disappears.
35. Make final sound adjustments with the VOLUME and TONE controls (652Q) or the OPTICAL VOLUME, TREBLE and BASS controls (655Q and 658Q).
36. At the end of the film turn the DIRECTION SWITCH to FORWARD (switching off the lamp) and set the VOLUME CONTROL to zero. As soon as the film has run clear of the projector, turn the DIRECTION SWITCH to OFF.

#### **Silent Film Projection**

37. (Two-speed models only). Set the DIRECTION SWITCH (30) momentarily to FORWARD and, whilst the projector is running, turn the SPEED SELECTOR (10) to SILENT. Turn all sound controls fully anti-clockwise. Then proceed as under 31-34 and 36 above.
38. (One-speed model). On this projector silent films cannot be projected at their correct speed; apart from this, the procedure is as in stage 37 above.

#### **Still Picture Projection**

39. On models 655Q and 658Q, the film can be stopped

at any time to project a still picture by moving the STILL PICTURE CONTROL (29) to STOP. This automatically places a safety screen between the lamp and film to protect it from heat damage; because of this, the brightness of the picture is reduced. It is necessary to refocus a still picture, and to refocus again when normal operation is resumed.

#### **Animation**

40. On models 655Q and 658Q, the stationary frame obtained in stage 39 can be changed by pressing the ANIMATION BUTTON (28). Brief pressures on this button will advance the film one frame at a time, allowing a detailed analysis of movement to be made either in the FORWARD or REVERSE direction.

#### **Reverse Projection**

41. The movement of the film through the projector can be reversed. Turn the DIRECTION SWITCH (30) to REVERSE, pausing briefly at OFF until the mechanism stops to prevent strain. To project reverse movement on the screen, move the switch past REVERSE to the bottom LAMP position. (There is no need to turn the volume control down during reverse running, as the sound is automatically switched off).

#### **Rewinding**

42. While supporting the REAR SPOOL ARM (2) with your left hand, press the ARM RELEASE BUTTON (4) and move the arm upwards. Remove pressure from the button and continue to raise the arm until it clicks in the vertical position.

43. Lead the free end of the film from the TAKE-UP SPOOL (1) to the underside of the FEED SPOOL (8) and engage it in the slot or other fixing device on the spool hub. Rotate the spool two or three turns anti-clockwise to take up slack.
44. Turn the DIRECTION SWITCH (30) to REVERSE and press the REWIND BUTTON (7), holding it down momentarily until an internal clutch engages and fast rewind begins.
45. As soon as all film has been wound off from the rear spool, switch to OFF. Remove the full spool from the front arm by inserting fingers in two of the holes in the spool and pulling the spool off the spindle, at the same time pressing on the tip of the spindle with your thumb.
46. Press the rear ARM RELEASE BUTTON (4) to unlock the REAR SPOOL ARM and lower it to the normal (horizontal) operating position.

### Closing the Projector

47. After the performance, remove both spools and, using the Spool Arm Release Buttons, fold both arms downwards and inwards as far as they will go. Turn the TILT CONTROL (14) fully anti-clockwise. Remove all leads from their sockets. Lift the cover and, holding it slightly away from the projector at the top, lower it on to the pedestal in such a way that the small lugs at the front and rear of the pedestal enter the slots on the inside of the cover. Then close the gap at the top until, with a click, the cover latch engages.

## THREADING - NON-AUTOMATIC

### Manual Threading

When manual threading is necessary, proceed as follows:

48. Remove the door covering lens and film path by pulling it outward at the front until it is almost at right angles to the projector. Press on the plated flat spring near the top inside the door and lift the door off its two hinges and away from the projector.
49. Firmly grasp the front of the lens barrel (13) and swing it away from the projector until the lens mount is released from its catch, and open fully.
50. Bring the AUTO THREAD LEVER (3) to its rearward-facing running position by pressing the GUIDE ROLLER (22) towards the rear.
51. Open all three sprocket guards (A, D and K on Fig. 9) until they lock in the open position. This requires upward pressure at the front of A and D, downward pressure at the rear of K.
52. Pull off about 3ft/1m of film from the feed spool.
53. Following the path marked in red on Fig. 9, guide the film under the roller marked (4) under the roller B and then between the Upper Sprocket Guard and Sprocket Wheel until the teeth engage with the perforations. Close the Sprocket Guard by pressing it downwards at the front until a click is heard.
54. Leaving enough slack in the film so that it forms a curve between the guides C, seat it centrally against the Aperture Plate and under the guide E.

55. Holding the film flat against the Aperture Plate with the left hand, loop it under roller H and ease it between the underside of the Sprocket Guard D and the top of the Sprocket Wheel. Lead the film forward under roller F and the spring-loaded roller G (which can be lifted upward while this is being done) to the top of the Sound Drum N. Push the film into the space between the Sound Drum and the Exciter Lamp Cover as far as the "3 o'clock" position, leaving the remainder free.
56. After ensuring that the perforations have engaged with the teeth at the top of the lower Sprocket Wheel, if necessary adjusting the position of the film until they do, close the lens mount firmly until it engages with its spring catch. This action automatically closes the Sprocket Guard D.
57. Continue threading the film around the Sound Drum N, over roller I and, without engaging the sprocket holes, between the Lower Sprocket Guard K and the Sprocket Wheel. Still without engaging the sprocket holes, lead the film over roller J, downwards under the roller L and along the horizontal channel to the underside of the rear roller M.
58. Pull the film gently but steadily to the rear at M until the stabilising rollers G and I have opened to their extreme positions and push the film inwards between the Lower Sprocket Guard K and the Sprocket Wheel until the perforations are in line with, but not entered by, the sprocket teeth. Release the tension at M, allowing the film to be pulled backwards by the

spring-loaded rollers G and I until, with a slight click, the perforations engage with the teeth on the Sprocket Wheel. Close the Sprocket Guard K by pushing it upwards at the rear.

59. Rotate the Inching Knob (see Fig. 3b) at the rear of the projector for a few turns in an anti-clockwise direction. If the threading procedure has been correctly carried out, the upper and lower loops of film above and below the gate will not change in size as the film passes through the projector and the two spring-loaded rollers G and I will move up and down simultaneously. Loop the film over the roller M and round the guide roller ⑤ (see Fig. 8b) and attach it to the hub of the take-up spool. Rotate the spool clockwise to take up the slack. Turn now to stage 28.

#### **Removing the Film from the Threading Path**

60. To remove film in the middle of a spool, take off the hinged door as described in stage 48. The AUTO THREAD LEVER ③ should be in the rearward-facing running position. If it is not, set it there by pushing the GUIDE ROLLER (L in Fig. 9) toward the rear.
61. Open the Lens Mount (see stage 49) and all three Sprocket Guards (see stage 51).
62. Unscrew the SECURING SCREW (18) and remove the Exciter Lamp Cover.
63. Turn the FEED SPOOL (8) clockwise to slacken the film at roller ④.
64. With the left hand holding the upper loop between the guides C on Fig. 9, and the right hand holding it

- to the right of roller ④, bring both hands slightly together and carefully ease the loosened film clear of the Sprocket Wheel, the rollers A and B and the roller ④.
65. Grasping the lower loop under the Loop Restorer Roller (H in Fig. 9), push the film forward and slightly upward to ease it off the top of the Sprocket Wheel and – preferably in a continuous movement – pull it under the rollers F and G and away from the Sound Drum (N in Fig. 9).
  66. Holding the film on either side of the Lower Sprocket Guard K, bring the hands slightly together to disengage the perforations and ease the film away from the sprocket wheel and roller L.
  67. Disengage the film from the two Guide Rollers M at the rear. If it is intended to rewind immediately, leave the spools in position and revert to stage 42. If rewinding is to be done later, make sure that the film is not caught anywhere and then remove both spools, winding the slack film on to one or other of them before putting the spools to one side.

### Loss of Loop

Damaged perforations or poor splices may result in the tightening of the lower loop below the gate. On Filmosound projectors this loop is automatically and instantaneously restored by the small roller below the gate (H in Fig. 9) and there is no need for any action on the part of the projectionist.

68. If, as a result of an imperfection in the film, tension is lost around the sound drum, this will make itself

apparent by distorted sound. A unique device is incorporated to restore tension without interrupting the performance. Press down firmly on the lever marked "System Restorer" above the roller ④ and, with the motor still running, keep the lever pressed for at least one second. If the sound does not return to normal when the lever is released, it is probable that the damage extends over an unusually long length of film. The remedy then is to stop the projector, unthread (see 60-67) and rethread manually (see 48-59) beyond the point of damage. Loop restoration with the System Restorer is not possible during reverse projection.

### Film Escape Hatch

69. For added protection of films, there is a spring-loaded flap to the rear of the Upper Sprocket Guard. This opens automatically, allowing film to escape from the projector, to prevent further damage in the event of: (a) a broken splice; (b) misthreading; (c) an obstruction in the threading system; (d) failure to trim film end in the cutter. If film is seen emerging from the flap, switch off the projector immediately, carry out any necessary repairs and rethread. If it is impracticable to repair the film at the time, thread manually beyond the point of damage.

## SPECIAL APPLICATIONS

### Public Address System

#### 70. Microphone

To make announcements, or to supply a commentary to silent films, connect a crystal or high-impedance dynamic microphone by inserting the jack plug into the MICROPHONE INPUT (16). Adjust volume by means of the VOLUME CONTROL (652Q) or MAG/MIC VOLUME CONTROL (655Q and 658Q). If the system "howls" – caused by sound from the loudspeaker entering the microphone and being re-amplified – hold the microphone in such a position that it is shielded from the loudspeaker. If this is not sufficient, the volume setting should be reduced until stability is achieved.

**Note:** The two independent volume controls on models 655Q and 658Q allow comments spoken into the microphone to be superimposed on the sound from the film. This facility can be useful for making urgent announcements or for adding supplementary explanations.

#### 71. Record Player

A record player with a crystal or high-impedance dynamic pick-up may be used to provide music before and after the performance or during a silent film. It should be connected into the MICROPHONE INPUT socket (16) and the volume adjusted as for a microphone. If there is a separate volume control on the record player, it is worth experimenting with different settings of this and the projector Volume

Control to determine which combination gives the most satisfactory results.

### Accessory Loudspeaker

72. The 6in/15cm elliptical loudspeaker built into the Filmosound projector provides good-quality sound reproduction for rooms and small halls but cannot take full advantage of the substantial power and frequency range of the amplifier. For optimum sound reproduction, an accessory speaker (obtainable from your Bell & Howell dealer) should be used. This is provided with a 50ft/17m lead terminating in a plug which is inserted in the ACCESSORY SPEAKER OUTPUT Socket (15) of the projector amplifier. Insertion of this plug automatically disconnects the internal loudspeaker.

For the best sound quality, the accessory speaker should be located above or high up on side of the screen and aimed toward the centre of the audience. It should not be below the level of the heads of the audience, or behind the screen.

The lead to the accessory speaker should be positioned, on its run from the projector to the screen, so that it is not likely to become entangled with the feet of the audience. Keeping it above ground level eliminates this risk and also prevents the lead from becoming dirty.

### Auditorium Loudspeaker

73. The Filmosound projector can also be connected to an existing auditorium loudspeaker system if the total impedance of the speaker(s) is from 8 to 16

ohms. Such a connection requires a special plug (obtainable from your Bell & Howell dealer) to fit the ACCESSORY SPEAKER OUTPUT Socket (15) on the projector.

Note: The 25 watt amplifiers of Models 655Q and 658Q deliver more power than a single accessory loudspeaker can handle. If the volume control is advanced beyond the point where distortion is heard, damage to the speaker may occur.

#### Use of Magnetic Track Facilities (658Q only)

Model 658Q will reproduce tracks recorded magnetically on striped film in addition to optically recorded sound tracks. Such films are recognised by having a band of brown oxide at the side of the film, opposite the sprocket holes, or, in the case of double-perforated film, on the outer edge of the film. (Both types of film have a second band on the edge opposite to the active magnetic sound track. This is solely to make the film stack evenly on the spools and does not carry a recording).

Reproduction of magnetic sound is done by a magnetic head plug located below the sound drum and behind the exciter lamp cover. Although removable (see stages 81-82), this plug can be left in position when projecting optically recorded films.

#### Reproducing Full-Width and Half-Width Tracks

Full-width and half-width magnetic tracks are found only on single-perforated sound film.

74. Ensure that the Full Track Magnetic Head plug is in

position, and that the MAG/OPT SELECTOR SWITCH (20) is set to position 3. Turn the OPTICAL VOLUME CONTROL (21) and MAG/MIC VOLUME CONTROL (23) to 0.

75. Thread the film as in stages 20-27.

76. Move MAG/OPT SELECTOR SWITCH to position 2.

77. Project film as in stages 28-36 but with the OPTICAL VOLUME CONTROL at 0 and the MAG/MIC VOLUME CONTROL set to give a satisfactory level of sound.

Note: It is possible on the 658Q to reproduce simultaneously, by using both volume controls, from the magnetic and optical sound tracks of a half-striped film.

#### Reproducing Quarter-Width (Edge Striped) Tracks

Sound from quarter-width tracks can be reproduced only with the special quarter-stripe magnetic head plug, which should be fitted as described in stages 81-82.

78. Ensure that the correct magnetic head plug is fitted and set the MAG/OPT SELECTOR SWITCH (20) to position 3. Turn the OPTICAL VOLUME CONTROL (21) and MAG/MIC VOLUME CONTROL (23) to 0.

79. Thread the film as in stages 20-27.

80. Move the MAG/OPT SELECTOR SWITCH to position 1. Project film as in stages 28-36 but with the OPTICAL VOLUME CONTROL at 0 and the MAG/MIC VOLUME CONTROL set to give a satisfactory level of sound.

### Changing Magnetic Head Plug

81. To remove a magnetic head plug, undo the SECURING SCREW (18) and take off the exciter lamp cover. Press in the plug by the plate (numbered 1 in Fig. 10) as far as it will go and rotate the plug fully anti-clockwise. Withdraw the plug from the projector locating pin.
82. To insert a magnetic head plug, hold the plug with the stud (2 in Fig. 10) horizontal and pointing to the right and engage the hole at the rear of the plug with the projector locating pin. Push the plug fully in, then rotate it clockwise as far as it will go. Remove pressure from the plug, allowing it to locate in the working position.

### Cleaning Magnetic Head

83. Particles from the magnetic coating on the film may in time accumulate on the magnetic head on the underside of the "rocking" section of the plug, where they may affect reproduction. The head should therefore be cleaned with a soft brush to remove loose dirt. Dirt still adhering to the polished surface of the head after brushing can usually be eased off with a piece of sharpened wood or plastic but may, in obstinate cases, first need to be softened with one of the solvents made for cleaning the magnetic heads of tape recorders.

NEVER USE A METAL OBJECT WHEN CLEANING THE MAGNETIC HEAD AND, BECAUSE OF ITS EXTREME PRECISION AND DELICACY, ALWAYS HANDLE THE HEAD WITH GREAT CARE.

## CARE AND MAINTENANCE

### Storage

84. Store the projector away from moisture and excessive heat and, whenever possible, keep it in a carton or other enclosure to prevent the entry of dust. A protective cover (obtainable from your Bell & Howell dealer) is available as an accessory and will keep your Filmosound projector clean and free from scratches.

### Periodic Inspection

85. It is recommended that periodic inspections be carried out by a Bell & Howell service agent. This will ensure that the equipment remains in first-class condition.

### Lubrication

86. DO NOT OIL or lubricate in any other way your Filmosound projector, which has a permanent factory-sealed lubrication system.

### Cleaning

#### (a) Projection Lens

The coated surfaces of a high-quality lens are easily damaged and it is best not to touch them until inspection of the exposed front and rear elements of the lens shows that cleaning is required.

87. To remove the lens, turn the FOCUSING KNOB (12) anti-clockwise until the lens stops moving; then, grasping the lens firmly, pull it out.
88. With a camel-hair brush, carefully remove dust from the front and rear surfaces. Polish the surfaces lightly with a fresh lens tissue (obtainable from your dealer

or any optician) or a clean, soft and lintless cloth; avoid excessive pressure on the glasses, as scratching will impair definition. If marks are still present after polishing, a lens cleaning fluid may be used.

89. To replace the lens, insert it in its mount and, pressing it to the rear, rotate the FOCUSING KNOB (12) clockwise to engage.
90. Avoid touching the glass with the fingers. If this happens, however, remove any fingerprints; they will spoil definition and may, if allowed to remain, leave a permanent trace on the surface coating.

**Important.** The high efficiency of the dichroic reflector around the projection lamp depends upon a surface coating which is extremely delicate. In no circumstances should this be touched with bare hands or cleaned by any of the usual lens-cleaning methods. After long periods of running, dust may be visible on the front surface. It can safely be removed by light strokes with a clean camel-hair or sable brush of the type made for cleaning lenses but *no* other method of cleaning should be used.

(b) Pressure Shoe and Aperture Plate

91. Film is delicate and easily scratched if dirt, introduced by a previous film, is allowed to remain in the region of the picture gate. Always, before threading a film, open the door covering the lens, then the lens mount, and, with a gate brush or clean cloth, remove all foreign matter from the pressure shoe attached to the lens mount and from the aperture plate which guides the film past the projection aperture.

92. Occasionally, films will cause a deposit to accumulate in the pressure shoe/aperture area, especially on the runners. Inspect this area at intervals, or whenever the projector begins to run noisily, and remove any deposit with a piece of hard wood or plastic.

**NEVER USE METAL OBJECTS FOR THIS PURPOSE.**

(c) Other Areas

93. All other parts of the projector which the film touches should be kept clean. Follow the path of the film from spool to spool and from time to time remove all dust and dirt from rollers and stationary surfaces with which it makes contact. Remove the EXCITER LAMP COVER (19) and wipe the curved surface that fits round the drum.

**Lamp Change**

Projection Lamp – Removal

Take great care when changing a lamp not to touch the front surface of the special dichroic reflector, which could be irreparably damaged as a result. For instructions on cleaning this reflector, see the paragraph under stage 90 above.

94. Switch off the projector and disconnect mains supply. Pull the LAMPHOUSE KNOB (25) and swing open the hinged lamphouse cover. Pull the white handle above the lamp towards you and downward through 90 degrees, allowing the lamp assembly to rest in a horizontal position against its stop (see Fig. 11). Gently pull off the two insulated connectors from the pins at the rear of the lamp (arrowed in Fig. 12). Do this by grasping the plastic insulation over the con-

nectors, not by pulling on the leads.

With the thumb and finger, pull down the plated retaining clip on the inner side of the lamp holder until the clip reaches its stop (see Fig. 12).

Holding the pins of the lamp with the left hand, pull down the retaining clip on the outer side of the lampholder until it reaches its stop.

Pull the defective lamp to the rear and discard.

#### Projection Lamp – Replacement

95. With the left hand, hold the new lamp by its contact pins in such a way that the notch in the circular plate is in the six-o'clock position. (Tungsten-halogen lamps may fail prematurely if their quartz bulbs are touched with bare fingers and should therefore be handled only by their metal parts. If the bulb is inadvertently touched, wipe it gently but thoroughly with a soft, clean cloth, or a fresh paper tissue).

Insert lamp through the hole in the holder from the rear, ensuring that the notch in its circular plate corresponds to the "key" on the holder and that the plate is fully seated in its recess.

Keeping gentle forward pressure on the two pins, raise the retaining clip on the inner side of the holder as far as it will go.

Still keeping forward pressure on the pins, raise the outer clip in the same way. The lamp is now secure. Replace the two insulated connectors, pushing them fully home. (There is no "wrong" way of fitting the two connectors to the two pins, but it is advisable to replace them in the position that minimises twisting of the flexible leads).

Using the white handle, raise the swing-down lamp assembly to its working position and push it inward gently but firmly until a click indicates that its spring catch has engaged.

Close lamphouse cover.

Reconnect power supplies and continue projection.

#### Exciter Lamp

96. If the sound fails but electrical noise can still be heard in the loudspeaker when the volume is turned up, glance at the red light in the exciter lamp cover. If this is not illuminated, it is an indication that the exciter lamp has failed.

Loosen the SECURING SCREW (18) and remove the Exciter Lamp Cover. Push the Lamp Lock Lever to the right (see Fig. 13) to release the lamp, then rotate the lamp a few degrees anti-clockwise until it can be lifted clear of the guide pins.

Locate the new lamp over the guide pins (it will fit only in one position), press it down and rotate it clockwise until the narrow ends of the slots reach the pins. Swing the lamp lock lever to the left, replace the exciter lamp cover and tighten the securing screw.

#### Control Panel Lamp

97. Place the REAR SPOOL ARM (2) in the rewind position and open the LAMPHOUSE COVER (3). The lamp is mounted behind the curved extension of the control panel, held between two spring contacts which press inwards upon its metal ends (see Fig. 14). To remove the lamp, ease it out from between the contacts. To fit the replacement, locate it on one of the contacts and then, applying slight pressure, ease

the other end into position at the other contact until it is secure. Close the lamphouse cover. The best working position when replacing this lamp is from the rear of the projector, through the aperture in the lamphouse cover.

### **Fuse Replacement**

#### **Main Fuse**

98. A 2 amp cartridge fuse of the special time-lag type is located next to the Voltage Selector at the top of the lamphouse (see Fig. 15). To remove, disconnect the equipment from the mains supply by pulling the power plug from the projector, open the lamphouse cover, unscrew the fuseholder and lift it out of its recess. Pull out the faulty fuse, replace it with a spare and, pressing lightly downward, screw the holder back into place. Close the lamphouse cover and reconnect the power lead.

#### **Auxiliary Fuses**

99. To gain access to the auxiliary fuses, remove the power plug and lay the projector on its side. Unscrew the four rubber feet, the two screws in the centre of the bottom cover and the spreader bar of the tilt control. The bottom cover can now be lifted away.

The low-voltage supplies to the internal relays and the control panel lamp are protected by a 1 amp tubular fuse, "1 AT". This fuse is removed by easing it from its clips (see Fig. 16a).

There is a separate fuse for the supply to the exciter lamp. Replace, by easing from its clips, the 1.6 amp fuse marked "1.6A" (see Fig. 16b).

There is a third fuse, 2 amp, for the supply to the amplifier. Replace fuse marked "2A" (see Fig. 16c).

## FAULT FINDING

### SYMPTOM

### CAUSE/REMEDY

#### 1. CONTROL PANEL LAMP DOES NOT LIGHT

Turn DIRECTION SWITCH to FORWARD.

- (a) If motor runs, lamp is faulty and should be changed (see stage 97).
- (b) If motor does not run:
  - i Check mains supply and plug.
  - ii Check seating of rubber plug in projector socket.
  - iii Check main fuse in lamphouse (see stage 98).
  - iv Check auxiliary fuse "1 AT" (see stage 99).

#### 2. RED INDICATOR LAMP DOES NOT LIGHT

- (a) Exciter Lamp burned out. Change lamp (see stage 96).
- (b) Fuse blown. Change fuse "1.6A" (see stage 99).

#### 3. NO SOUND

- (a) Amplifier not switched on (see stage 12).
- (b) Amplifier fuse blown. Change fuse "2A" (see stage 99).
- (c) Burned-out Exciter Lamp. Change lamp (see stage 96).
- (d) Exciter Lamp fuse blown. Change fuse "1.6A" (see stage 99).
- (e) Obstruction of sound optical system by dirt. Clean.
- (f) Defective transistors or photo diode.

#### 4. AUTOMATIC THREADING DOES NOT WORK

- (a) Check that Auto Thread Lever is set to right-hand vertical position (see stage 24).
- (b) Check that tip of film is cut (see stage 23).
- (c) Check that STILL PICTURE CONTROL (29) is set to RUN.
- (d) Check that DIRECTION SWITCH (30) is set to FORWARD.
- (e) Check that film is not damaged (see Pre-Threading Procedure after stage 19).

5. PROJECTION LAMP DOES NOT LIGHT	Lamp burned out. Replace (see stage 94).
6. INADEQUATE VOLUME	<ul style="list-style-type: none"> <li>(a) Volume Control insufficiently advanced.</li> <li>(b) Poor sound track on film (check with known film).</li> <li>(c) Obstruction of sound optical system by dirt.</li> <li>(d) Defective transistors or photo diode.</li> <li>(e) Defective, dirty or misaligned exciter lamp.</li> <li>(f) Low mains voltage.</li> </ul>
7. POOR QUALITY SOUND	<ul style="list-style-type: none"> <li>(a) Speed selector set in "silent" position (two-speed models only).</li> <li>(b) Causes listed under "Inadequate Volume".</li> <li>(c) Film is slack around the sound drum. Use System Restorer (see stage 68).</li> <li>(d) Unsuitable setting of tone control(s).</li> </ul>
8. RUN/STOP NOT WORKING	Failure of fuse "1 AT" (see stage 99).
9. PICTURE DULL ON SCREEN	<ul style="list-style-type: none"> <li>(a) Low mains voltage.</li> <li>(b) Extraneous light on screen.</li> <li>(c) Dirty lamp or projection lens.</li> <li>(d) Dense film.</li> </ul>
10. PICTURE UNSTEADY ON SCREEN	Lost loop. Use System Restorer (see stage 68).
11. SCRATCHES APPEARING ON FILM	Dirt in gate or elsewhere along film path (see stage 91).

**Largueur d'image projetee**  
**Breite des projizierten Bildes**  
**Larghezza delle immagini proiettate**  
**Breedte van het geprojecteerd beeld**

Longeur focale de l'objectif  
 Objektivbrennweite  
 Lunghezza focale dell'obiettivo  
 Brandpuntafstand van de lens

	25 mm	32 mm	40 mm	50 mm	64 mm	80 mm	100 mm
*m	cm						
2	77	60	48	39	30	24	19
3	116	90	72	58	45	36	29
4	154	121	97	77	60	48	39
5	193	151	121	97	75	60	48
6	232	181	145	116	90	72	58
7	270	211	169	135	106	84	68
8	309	241	193	154	121	97	77
9	347	271	217	174	136	109	87
10	386	301	241	193	151	121	97
15	579	452	362	290	226	181	145
20		603	483	386	302	241	193
25			603	483	377	302	241
30				579	452	362	290
35					528	422	337
40						483	386

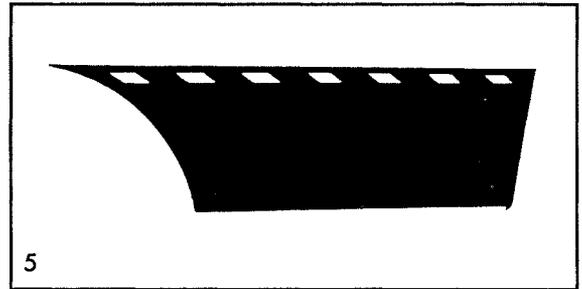
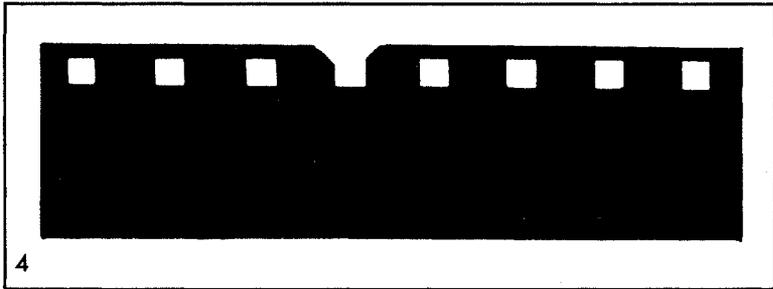
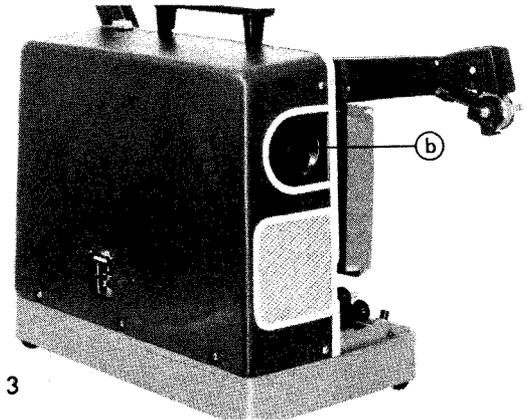
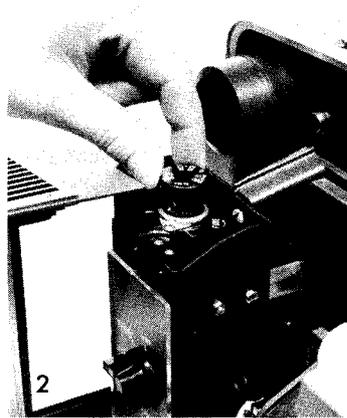
\*Distance du projecteur à l'écran  
 Entfernung Projektor – Leinwand  
 Distanza del proiettore dallo schermo  
 Afstand van projektor tot scherm

**Projected picture widths**

Lens focal length

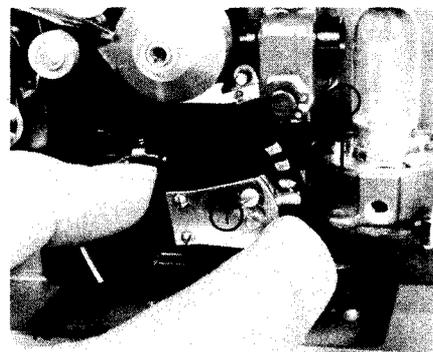
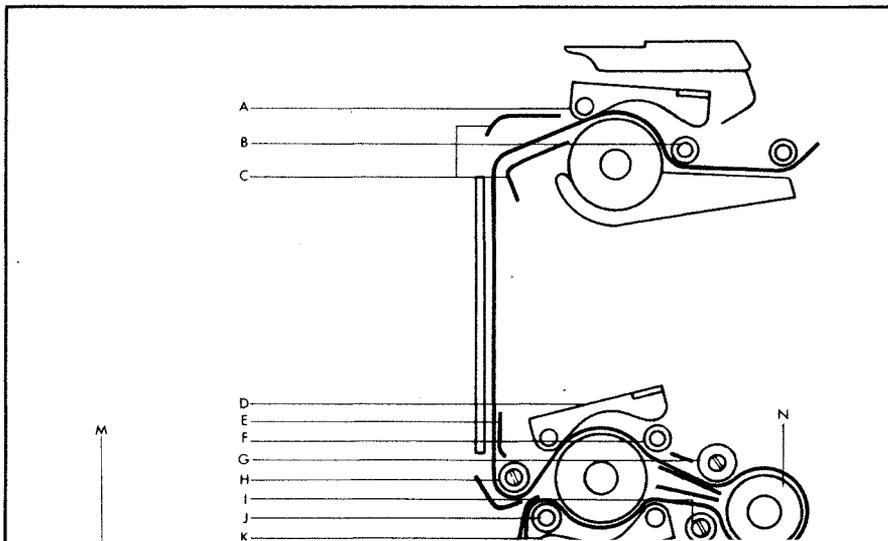
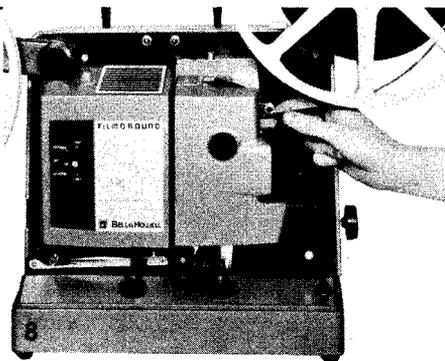
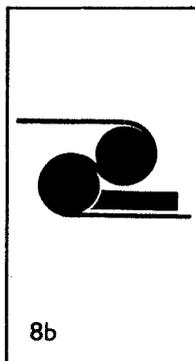
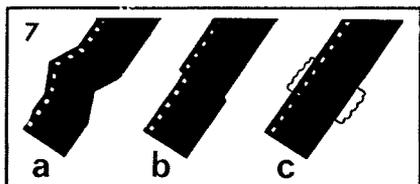
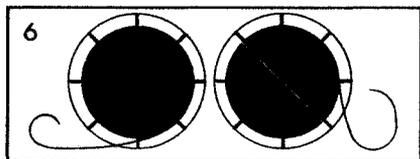
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*ft.	ft. in.						
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12	4 6	3 10	2 10	2 3	1 11	1 5	1 2
15	5 9	4 9	3 6	2 10	2 5	1 9	1 5
20	7 8	6 4	4 9	3 10	3 2	2 5	1 11
25	9 6	7 11	5 11	4 9	3 11	3 0	2 4
30	11 5	9 6	7 2	5 9	4 9	3 7	2 11
35	13 4	11 1	8 4	6 8	5 6	4 2	3 4
40	15 2	12 8	9 6	7 8	6 4	4 9	3 10
45		14 3	10 8	8 6	7 1	5 4	4 3
50		15 10	11 11	9 6	7 11	6 0	4 9
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100					15 10	11 11	9 6
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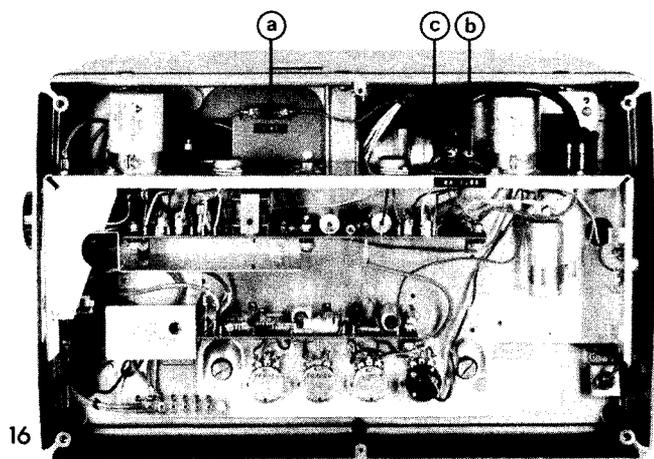
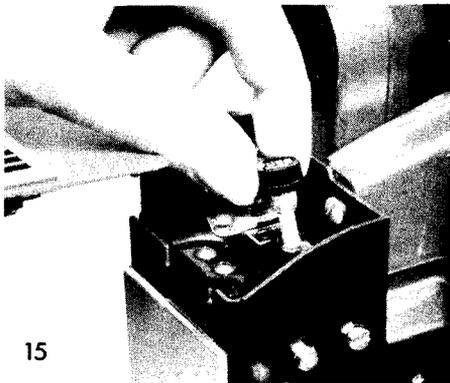
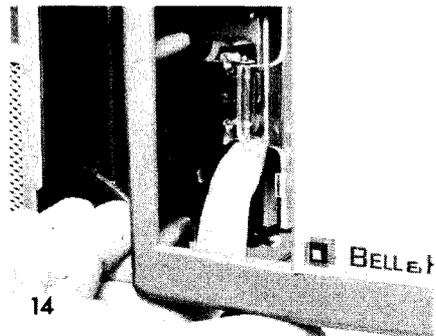
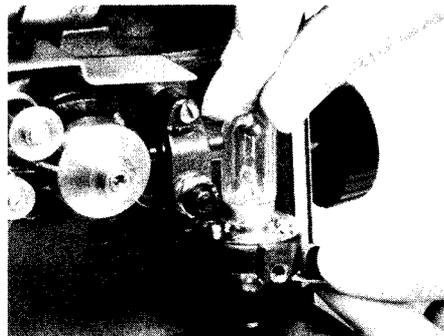
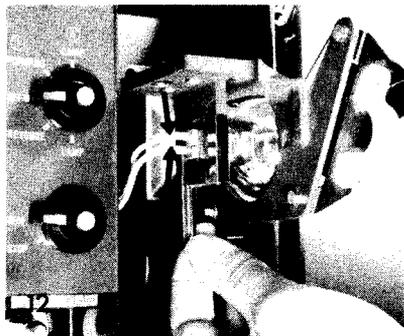
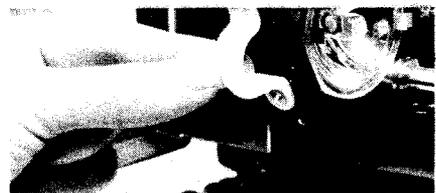
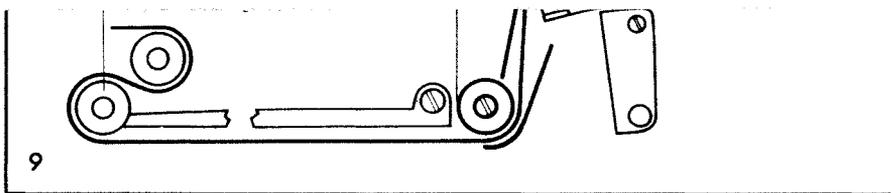
\*Distance from projector to screen



Largueur d'image projetée  
Breite des projizierten Bildes  
Larghezza delle immagini proiettate

Projected picture widths





## GUARANTEE

This new Bell & Howell product is guaranteed to be free from imperfections in both material and workmanship for one year from date of original purchase. Should any part of this equipment be defective, it will be replaced or repaired free of charge (except for transportation), providing the equipment has been operated according to the instructions accompanying it. No liability is assumed for film which is damaged or is unsatisfactory for any reason and no liability is assumed for interruptions in operation of equipment.

This guarantee is void:

- A If equipment has been damaged by accident or mishandling.
- B If equipment has been serviced by other than the Bell & Howell approved service stations.
- C If adaptations or accessories other than Bell & Howell have been made or attached.

## GARANTIE

Ce produit Bell & Howell est garanti de tout vice de construction pour un an à partir de sa date d'achat. Si quelque partie de l'appareil s'avérait être défectueuse, elle serait réparée ou remplacée et ce, gratuitement, exception faite des frais de transport, à condition qu'aucune fausse manoeuvre n'ait été réalisée.

Cette garantie ne s'étend pas aux films et aucun dommage ne peut être réclamé pour l'impossibilité d'utiliser la caméra.

La garantie tombe:

- A si l'appareil a été abîmé lors d'un accident ou en cas de fausse manoeuvre.
- B si une intervention de réparation a été faite par un service autre que les services Bell & Howell reconnus.
- C si des adaptations ou l'utilisation d'autres accessoires que Bell & Howell ont été réalisés ou adaptés.



**BELL & HOWELL**

## GARANTIE

Für dieses neue Bell & Howell Gerät wird eine Garantie für die Dauer eines Jahres – vom Kauftag an gerechnet – geleistet, solange irgendwelche Mängel auf Herstellungs- oder Materialfehler zurückzuführen sind. Sollte irgendein Teil dieses Gerätes schadhaft sein, so wird es kostenlos ersetzt oder repariert (Transportkosten werden nicht ersetzt), vorausgesetzt, daß das Gerät vorschriftsgemäß bedient worden ist. Keine Gewähr wird für beschädigten Film oder für irgendwelche Ausfälle während des Gebrauchs übernommen. Diese Garantie wird ungültig:

- A wenn, nach unserer Ansicht, das Gerät durch einen Unfall oder unsachgemäße Handhabung beschädigt wurde.
- B wenn Reparaturen außerhalb des anerkannten Bell & Howell Kundendienstes vorgenommen wurden.
- C wenn Zusatzgeräte verwendet oder Änderungen vorgenommen wurden, die nicht von Bell & Howell stammen bzw. empfohlen worden sind.

## GARANZIA

Questo nuovo prodotto Bell & Howell è garantito per un anno dalla data dell'acquisto originale contro i difetti di materiale o di fabbricazione.

Nel caso in cui una parte di questo apparecchio risultasse difettosa sarà sostituita o riparata gratuitamente, a condizione che la cinespresa sia stata manolata secondo le istruzioni che l'accompagnano. Le spese di trasporto sono sempre a carico del cliente.

Non viene assunta alcuna responsabilità per le pellicole che risultassero danneggiate né per eventuali perdite o interruzioni nell'uso della cinespresa.

Questa garanzia non è valida:

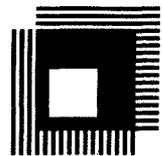
- A Se l'apparecchio è stato danneggiato in seguito a incidente o a manomissione.
- B Se la macchina è stata riparata da un laboratorio di riparazione non riconosciuto da Bell & Howell.
- C Se sono stati applicati dispositivi o accessori diversi da quelli originali Bell & Howell.

## WAARBORG

Dit nieuw Bell & Howell produkt is gewaarborgd tegen alle konstruktiefouten gedurende één jaar vanaf de aankoopdatum. Elk defekt onderdeel zal gratis worden hersteld of vervangen, met uitzondering van de transportkosten, op voorwaarde dat het toestel werd gebruikt overeenkomst met de bijgevoegde instructies. Deze waarborg dekt niet de schade aan filmen en geen enkel vergoeding kan worden vereist door het buitenwerking stellen van het toestel.

De waarborg vervalt:

- A Indien het toestel werd beschadigd door een ongeval of een verkeerde handeling.
- B Indien de herstelling werd uitgevoerd door een dienst buiten de erkende Bell & Howell diensten.
- C Indien wijzigingen werden aangebracht of gebruik van andere dan Bell & Howell toebehoren werden gemaakt of aangepast.



**BELL & HOWELL**

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