

AUDIO VISUAL EDUCATION

SCRIPT BOOK

45 Minutes.

-----  
MODULE III : PROJECTED AIDSUnit .....5 : Motion Picture Projector  
-----

1. MOTION PICTURE PROJECTOR. We shall take up in this unit the motion picture projection and the motion picture projector.
2. Craftsmanship depends upon the best tools kept in prime working order and upon skill and imagination in their use.
3. In the field of audio visual education effective use of the various materials is essential. Selection of proper equipment, care of equipment, and efficient training of personnel who operate the equipment, are necessary.
4. We have cases where expensive equipment purchased are allowed to deteriorate because of the indifference of those who use it. Many a time instructors find it difficult to understand how to use it.
5. Many instructors though they just understand how to operate projectors, know little about maintenance. Repairs are needed. Instructors must have a rudimentary knowledge of the mechanics of projection equipment and the methodology of using them systematically. This is true of any audio visual material.

6. NOW OPEN THE WORKBOOK and go through the objectives for this unit. STOP FOR 2 MINUTES AND RESTART.
7. We have the 35 mm film projector in the 20's, the 16 mm projector still continues to rule the educational scene, and the 8 mm projectors have become popular in recent years.
8. We will consider the 16 mm motion picture projector in this unit, as we generally have 16 mm films and projectors in our country. Generally the 16 mm projectors are of two kinds, the optical sound projector which is extensively used and the magnetic sound projector which again is not common in our country.
9. The magnetic sound projector allows you to record sound in a magnetic track. You can record the language you want. Your voice which is familiar to your students will definitely play a vital role in their understanding of the subject better.
10. Optical sound films are available in the market on many subjects, though many of them may not exactly fit with your requirements, but can be adopted.
11. Motion picture film consists of a series of images. One picture is called a frame, and a series of frames when moves, causes motion to appear as an illusion. For the silent 16 mm films, the speed of projection is 16 frames per second and for sound films this is 24 frames per second.

12. 16 mm film reels which carry sound films are mostly standardised in units of 400 ft. and contains about 16,000 separate pictures. It will take about 11 minutes to project one reel of sound film. The projection speed for sound film is 24 frames per second, which is equivalent to 36 feet per minute.
13. Before we proceed further, we would like to make one thing clear. That is, by showing a film, do not assume that learning has occurred. You may have to show more than once. Method of presentation may be inadequate. The film may not be suited for the group or the objectives.
14. Films or any presentation can be made with built in learner participation, and repetition of key points increase learning. For example, we are trying to repeat certain important aspects, unit after unit, within the same unit and repeat the tests. We like to reinforce our point of view to suit the objectives. If anything is lacking in a presentation, it should be supplied by the instructor during or immediately after the showing of the film.
15. Ability to learn and also to teach with non conventional forms will increase with practice.
16. The combination is clear now. Is in't? First the instructor's ability, then the sound, the projected picture, and lastly the synchronisation of the sound and projected picture.

17. Improvement in one, will lead to increased effectiveness.
18. We shall limit our aims to the film and projector, for the present.
19. REFER YOUR WORKBOOK. Answer questions 1 and 2. STOP FOR 2 MINUTES AND RESTART.
20. Answer to question 1:  
The speed of 16 mm sound film is 24 frames per second.
21. Answer to question 2 :  
The time required to project 400 ft. of 16 mm sound film is 11 minutes.
22. Let us consider basic design of the motion picture projector. We have the photophone and Keltron models.
23. You must be aware of the basic design of the motion picture projector.
24. There is the projection system consisting of the lamp, reflector, condenser lenses, film aperture, gate, and objective lens.
25. The second system is the motion system for transporting the film and third one is audio system for producing the sound.
26. The speaker, is a separate unit in both the photophone and Keltron models, generally placed in front of the class near the screen.

27. The combination of the three systems in the sound motion picture projector requires you to acquaint with several controls and parts.
28. First you have <sup>the</sup> switch for the motor and the switch for the lamp. The lamp in the projector cannot be turned on alone, the motor switch must as well be on because it usually controls a cooling fan.
29. The amplifier switch controls the sound. In some cases this is an ON/OFF switch. In others, this is a knob also controlling volume. Clockwise turning increases volume. Amplifier switch is turned on first, as they require warming up time.
30. There is the reverse switch, this permits the back-ward movement of the film.
31. You may see here the reflector, lamp, and the condenser lenses.
32. The objective lens magnifies and projects the image. Focussing is done by moving this lens, in and out, to get a sharp image.
33. You have the take up and supply reel. Note the supply reel is on the top and the film moves upside down. There are the feed sprocket with a shoe on the top near supply reel and the takeup sprockets with the shoe near the takeup reel. Movement through the sprockets is important, and the film when guided through the sprockets is placed or locked by the shoes.

34. The film moves from supply to take up reel, through the aperture and film channel. The sprockets transport the film through aperture at a uniform rate of 24 frames per second. The framer knob when turned, eliminates split frames.
35. The film is drawn past the aperture by a claw or an intermittent. Each frame is moved in front of the aperture, held there for a fraction of a second, and then moved while the next frame is brought in front of the aperture.
36. A shutter intercepts the light during that split second when one frame is moved out of the aperture and other one is moved in. The shutter and the claw are in perfect synchronisation. If the sprocket holes are not engaged exactly by the intermittent the result is a fluttery picture, on the screen.
37. The claw moves the film past the aperture, in quick short jerks at the rate of 24 frames per second, the rate at which the sprockets transport the film. A loop in the film before and after the aperture, facilitates the free movement of the film past the aperture. The film is positioned between the aperture plate and pressure plate. Several rollers guide and direct the film along proper path.
38. Thus the main parts of the motion transport system are: Supply and take up reels, feed and take up sprockets with shoes, the aperture, film channel plate, shutter, claw (intermittent), the framer, pressure plate and the snubber.

39. We shall now take up the audio system.
40. The audio part is the optical sound track and the sound system. The film has sprocket holes on one side, which fits into the sprockets for movement of the film. On the otherside is the sound track. The major portion of the film, between the sprocket holes and sound track is the frame, which carries the picture.
41. The sound track has recorded sound, either in a magnetic or in an optical track. The magnetic track helps to record sound on locally produced films, or add sound in any desired language. The optical track is divided into two variable area and variable density. As the name indicates, optical image of the sound is recorded by any one of the methods, hence the name. There are other methods of recording sound, but they are not very common.
42. The sound system consists mainly of the sound drum, the photo-electric cell, the exit lamp, the sound lens and the mirror.
43. The photo electric cell is a vacuum tube whose inside surface is coated with a metal sensitive to light. When a beam of light passing through the sound track falls on this tube, it sets up a corresponding electric current and passes it on to the amplifier.

44. The electrical signals are strengthened by passing through several stages of amplification.
45. When fed into a loudspeaker, the electrical signals are strong enough to cause the paper cone speaker to vibrate, thus creating the sound waves which we hear and interpret as the audio portion of sound film. The sound for each frame is not actually recorded opposite to it, but 25 frames ahead. The film moves through film gate in jerky motion. It moves round the sound drum smoothly. It will not be possible to reproduce sound while in jerky motion.
46. The film must be tightly or at least snugly fitted to the heavy sound roller. Film loosely wound around the drum will result in a disturbed quality sound.
47. Several rollers identified as snubbers, stabilisers, guides or pressure rollers keep the film ~~taut~~ prevent the film from rubbing against the projector.
48. REFER THE WORKBOOK and answer questions 3 to 9  
Take 8 minutes.
49. The answer to question 3 can be seen on the screen.  
You may like to verify your answer.
50. The answer to question 4 is shown on this slide.  
If you have marked correctly you have done well.
51. The answer to question 5 is marked on this slide.



52. Here is the answer to question 6.
53. The answer to question 7 :
- a. The focussing of the picture image is done by moving the objective lens in and out.
  - b. The film moves between film channel plate and aperture plate.
  - c. If the sprocket holes are not engaged properly by the claw the image will be fluttery.
  - d. The film is drawn past the aperture by a claw or intermittent.
  - e. The film must be tightly wound round the sound drum to avoid disturbed quality sound.
54. The answer to question 8 is  
MAGNETIC.
55. Answer to question 9 :  
The sound is recorded 25 frames ahead of picture. The reason is that the picture moves in jerks through film gate, and for reproducing sound, it should move smoothly. The sound drum is located ahead the film gate, and while the film passes round it, it does so smoothly.
56. OPERATION OF MOTION PICTURE PROJECTORS requires you to be conversant with the parts and controls. Along with the workbook you are given pictures of the projector with parts and controls. Go through them. Identify the parts of the projector in your visual aid workshop. Get assistance of your Training Officer, if ~~you need~~ any.

57. We present here the basic steps in operating 16 mm motion picture projectors.
58. Set the projector case on a sturdy stand, lens facing screen, open the case, place speaker in front of the class-room near the screen.
59. Tie the power and speaker cord to the leg of the stand, and plug the power and speaker cords into sockets.
60. Attach reel arms and drive belts. They are fixed in the Keltron projector permanently. Set them in position.
61. If there is a film speed selector, set it for the film speed. Some projectors have silent and sound film speed selector. Silent film speed is 16 frames per second and sound film is 24 frames per second. If there is a separate reverse control, set it at forward.
62. Turn on motor and then lamp. Elevate the projector with the knob, to center the light on the screen and move the projector toward or away from the screen, until the light fills the desired area.
63. Focus the light beam by turning the lens - in or out - or use focussing knob if it is provided, until the edges of the lighted area are sharp. Examine the edges for evidence of dirt in the film channel aperture.

64. Turn off projector. Open film channel. Clean all surfaces over which film passes, with a brush. Do this every time you tread of film.
65. CHECK SOUND SYSTEM. Turn on amplifier. Move a paper-bit, back and forth, between sound lens and sound drum. A thumping sound will result if the system is operating properly.
66. CHECK all controls and switches. If they are not in normal position as per the manufacturer's catalogue, bring them to normal position.
67. Now push the reel of film firmly on the spindle. This is called the supply reel. Use proper side to match the spindle. In some machines, you have the square hole which fits in with the square end of the spindle. Lock the reel by pushing the reel on the spindle as far as it will go; on some machines, a snap down catch is used. Locking the reel is important.
68. CHECK and make sure that the film is properly wound on the supply reel. As the film comes off from the wheel the image should be head down, and the sound track should be on the side nearest to the projector.
69. On the take up arm spindle attach an empty reel, as large as, or larger than the supply reel.

70. ~~TH~~READING THE FILM. Check whether the feed reel or supply reel has film in it, and is correctly wound. Take up reel should be empty.
71. Open the feed and take up sprocket clamps. Swing open the film gate. Unroll about  $1\frac{1}{2}$  metre of film from the supply reel, in a clockwise direction.
72. Sprocket holes should be on the right next to you. Remember images on the film frames should be upside down and reversed.
73. Thread the film on the sprocket and close the cover. Thread the film channel, adjusting the upper loop to the marking on the projector. Close the gate.
74. Teeth on each sprocket wheel must fit through holes in the film. The film must lie smoothly in the film channel, between aperture plate and the pressure plate.
75. Take the free end of the film over the guide roller, forming a loop as indicated by the guide marker on the projector.
76. Depress the sound drum pressure roller arm. Thread film around the sound drum and stabilizer roller. Take care to draw film taut around the sound drum and stabiliser before engaging the sprocket holes. Then close the sprocket shoe. In the Keltron projector the film passes over upper side of sprocket wheel, then passing around the sound drum it is taken through lower side of the take up sprocket wheel.

77. Continue threading through snubber to the take up reel. Remember reel should turn in clockwise direction. Wrap a full turn on the reel.
78. Be careful about establishing loops above and below the film channel according to lines or embossings on the projector. The lower loop must be made accurately to ensure proper synchronisation of sound and picture.
79. If loop is lost during a show the picture will vibrate on the screen; to correct, stop the projector and reform the loop, or use a loop-setting lever, if provided and follow manufacturer's instructions.
80. The film must be under tension as it passes around the sound drum and if it is loose, the sound will be distorted. Some projectors have special devices to ensure proper tension, on others extra care must be taken in threading around the sound drum to prevent distortion.
81. Set volume control at about one-third or one-half of full volume. Set tone control at midpoint.  
TURN OFF ROOM LIGHTS.
82. Start showing film in the following order:
  - a. Turn on motor,
  - b. Turn on lamp when title nears aperture
  - c. Adjust focus, the instant an image appears on the screen,
  - d. Adjust volume, then tone,
  - e. Correct the framing if necessary,

83. During the entire showing, you must stay with the projector to:
- a. Correct focus and adjust sound, if necessary.
  - b. Shut off the machine immediately in case of faulty operation.
84. To reshow, any portion, stop projector motor, pushing the switch to reverse position and restart motor. The film will run backward to the desired point. Controls are then reset for regular projections.
85. To close the show, as the end title fades, turn off the lamp. As the sound fades or ends, turn the volume down to zero. When the film is on the take up reel, turn off the motor. Switch on room light.
86. Turn off the amplifier if no more films are to be shown.
87. REWINDING. Follow instructions given in the projector. When rewinding, the reels must turn in the opposite direction. In the photophone projector the feed reel and take up reel move counter clockwise.
88. Set the master control lever at REVERSE/REWIND position. Thread the film straight across from the take up to feed reel straight from one reel to another. Switch off the motor.

89. For PUTTING AWAY THE PROJECTOR, coil all cords, and place in spaces provided. Keep speaker and cables separately.
90. Set the reel arms and drive belt in position in the Keltron model. For photophone model remove them and store on the lid. Keep the spare reel in position or store at proper place.
91. Unplug power cord, and place it in its storage compartment. Retract (lower) the elevating mechanism.
92. Make certain, that all switches and controls, are off, and all levers in their normal forward operating position.
93. CARE AND MAINTENANCE: The lens aperture and gate of the projector should be cleaned before and after every showing. Use special lens tissue which is available. DO NOT USE YOUR HANDKERCHIEFS FOR CLEANING LENS.
94. The gate aperture area and film channel should be cleaned with a brush before projection. This would remove dirt that would wear and scratch the film. The dirt, if not removed, will be projected as a fuzzy edge.
95. Pulley belts, lamps, fuses, can be replaced easily. Make sure, you have **always** spare for these. Remember the make, wattage and size of these.

96. The lamp can be changed by opening the projection lamp house. The exciter lamp can also be reached by loosening the set screw of the lamp house. In both projectors you can easily change the lamps i.e. projection lamp and exciter lamp.
97. Never use pins, staples, clips or tape to hold broken films together. Use film cement and splicer to overlap and join films.
98. The ends are trimmed evenly. Use the cutter provided on the machine or a separate trimming cutter. A small area say 2.5 mm of the end surface is scraped and wiped clean. Liquid cement is applied to the cleaned area. The end of the other film is immediately clamped down over the cemented surface and fused together. After 30 seconds, replace the clamp.
99. REFER TO YOUR WORKBOOK and answer question 10. Take 10 minutes. The answer is on the screen. Check correctness.
100. Are you ready to operate the projector. With the WORKBOOK you are provided with the diagrammes. Go through the diagramme, study the parts. Identify parts of the projector in visual aids workshop. Approach Training Officer in the visual aids workshop, for scheduling the time for operation.



101. Take note of the checklist for the projector operation, which will be used for the performance assessment of your work. The time factor is most important. You will be given three chances to practice and should be prepared to take a test. Total time given will be 10 minutes for the final performance.

102. You will be also required to change the  
(a) projection lamp; and (b) clean the lens.  
You will take practical exercise No.37

103. The test for change of lamp will be, your projector must work with the changed bulb.  
We now come to the end of the unit and we hope that you will perform well in your unit test, including the practical test. Do self evaluation.

GOOD LUCK.

104 END

## AUDIO VISUAL EDUCATION

-----  
Module III

Projected Aids

Unit 5

Motion Picture Projection  
-----Instructional Objectives:

1. Classify the types of 16 mm projectors on the basis of sound recording system.
2. Differentiate 16 mm silent and sound film by their speed.
3. Determine the time required for projecting a film reel of standard length.
4. Name the parts of three different systems in a movie projector.
5. Identify the part of a movie projector, which draws the film past the aperture.
6. Give reason for a fluttery image on a screen.
7. State the function of the objective lens.
8. Identify the parts contained in the film transportation system of the movie projector.
9. Indicate how a film is placed in the film transportation system.
10. Identify frame, sound track and sprocket holes of a film.
11. Distinguish between different types of sound recordings.

12. Identify the controls contained in the sound system of a 16 mm movie projector.
13. Explain the effect of improperly wound films on the sound roller.
14. Describe the method adopted to avoid sound distortion due to the jerky movement of the film at the gate.
15. Describe the steps in the order to be followed for setting up, threading the film and project a 16 mm movie film projector.
16. Explain the importance of looping the film above and below the film channel.
17. State the two important parts to be cleaned as a part of maintenance.
18. List materials required for joining broken film.
19. Enumerate in order the sequence of setting up, threading and projecting 16 mm film including packing up.
20. Set, load film and operate a 16 mm movie projector.
21. Replace a fused projection lamp of a 16 mm movie projector.
22. Clean lens and aperture gate of a movie projector.
23. Fit the exciter lamp of a movie projector.

## AUDIO VISUAL EDUCATION

## WORK BOOK

Module III

Projected Film

Unit 5

Motion Picture Projector

1. Which one of the following is the speed of the 16 mm sound motion picture projector ?
- ☐ a. 24 frames per sec.
  - ☐ b. 16 frames per sec.
  - ☐ c. 36 frames per sec.
  - ☐ d. 42 frames per sec.
2. What is the time required to run 400 ft. of 16 mm sound film ?
- ☐ a. 10 minutes
  - ☐ b. 11 minutes
  - ☐ c. 36 minutes
  - ☐ d. none of the above
3. Mark the following parts of the projection system by writing the appropriate alphabets, by referring to the figure given at the end.
- ☐ 1. Reflector
  - ☐ 2. Projection lamp
  - ☐ 3. Condenser lenses
  - ☐ 4. Objective lens

4. Mark the following parts of the film transportation system by writing the appropriate alphabets given on the figure given at the end.

- \_\_\_\_\_ 1. take up reel
- \_\_\_\_\_ 2. take up spool
- \_\_\_\_\_ 3. claw
- \_\_\_\_\_ 4. shutter
- \_\_\_\_\_ 5. aperture
- \_\_\_\_\_ 6. frame
- \_\_\_\_\_ 7. Film channel plate
- \_\_\_\_\_ 8. pressure plate
- \_\_\_\_\_ 9. feed sprocket
- \_\_\_\_\_ 10. supply reel.

5. Mark the following parts of the sound system, by writing the appropriate alphabets given in the figure given at the end.

- \_\_\_\_\_ 1. Speaker.
- \_\_\_\_\_ 2. amplifier
- \_\_\_\_\_ 3. sound drum
- \_\_\_\_\_ 4. sound lens
- \_\_\_\_\_ 5. exciter lamp
- \_\_\_\_\_ 6. photo-electric cell
- \_\_\_\_\_ 7. mirror

6. Mark the following parts of the different rollers by writing the appropriate alphabets given in the figure at the end.

- \_\_\_\_\_ 1. snubber.
- \_\_\_\_\_ 2. stabilizer
- \_\_\_\_\_ 3. pressure roller.
- \_\_\_\_\_ 4. guide roller
- \_\_\_\_\_ 5. sprocket wheels (upper and lower)

7. Fill in the blanks:

- a. Focussing of the picture image is done by moving the \_\_\_\_\_ in and out.
  - b. Film moves between film \_\_\_\_\_ and \_\_\_\_\_ plate.
  - c. If sprocket holes are not spaced properly \_\_\_\_\_ the \_\_\_\_\_ the \_\_\_\_\_ flutter.
  - d. Film is drawn past the aperture by a \_\_\_\_\_ or \_\_\_\_\_.
  - e. Film must be tightly wound round the \_\_\_\_\_ to avoid distorted quality sound.
8. Which type of sound recording allows you to record sound on a 16 mm film in your class-room or institution ?
- a. magnetic
  - b. variable area optical
  - c. variable density-optical
  - d. all the above.
9. The sound in a 16 mm film is recorded \_\_\_\_\_ frames \_\_\_\_\_ the actual picture frame.

Choose the answer from 25, 20, 26, 35

ahead, along, after.

10. Arrange in the sequential order, each of the following four stages separately, for operating a 16 mm film projector.

Each stage is marked A, B, C and D. Against each one of them mark the sequential order as 1, 2, 3, 4 etc.,

A. SETTING UP: Number 1, 2, 3 etc., separately for A in sequential order.

- \_\_\_\_\_ a. Place projector on stand, open case, connect power cord.
- \_\_\_\_\_ b. Place speaker near the set screen, attach speaker cords.
- \_\_\_\_\_ c. Turn on amplifier
- \_\_\_\_\_ d. Turn on lamp/ motor
- \_\_\_\_\_ e. Attach set reel arms and drive belts.
- \_\_\_\_\_ f. Set film speed for sound film.
- \_\_\_\_\_ g. Set control to 'forward' position
- \_\_\_\_\_ h. Focus image of aperture.
- \_\_\_\_\_ i. Move projector toward or away from the screen to fill the screen with image to desired area.
- \_\_\_\_\_ j. Elevate projector to center the image.
- \_\_\_\_\_ k. Open film channel and clean all surfaces over which the film passes with a brush.
- \_\_\_\_\_ l. Turn off projector
- \_\_\_\_\_ m. Check sound system.
- \_\_\_\_\_ n. Attach or set both reels to spindle and lock them.
- \_\_\_\_\_ o. Check that film is wound properly on feed reel.

B. THREADING: (Number 1, 2, 3 etc., separately for B in sequential order)

- \_\_\_\_\_ a. Swing film gate open
- \_\_\_\_\_ b. Swing sprocket shoe open
- \_\_\_\_\_ c. Place film in the film channel
- \_\_\_\_\_ d. Thread film over feed sprocket and close shoe.

- \_\_\_ e. Unroll 1½ metres of film.
- \_\_\_ f. Take film through guide rollers
- \_\_\_ g. Thread film over take up sprocket and close shoe
- \_\_\_ h. Establish lower loop as per projector markings.
- \_\_\_ i. Establish upper loop as per projector markings.
- \_\_\_ j. Attach film to take up reel through snubber.
- \_\_\_ k. Check that tooth on feed and take up sprocket fit the hole in film.
- \_\_\_ l. Thread film through sound drum and stabilizer roller, keeping film intact.

C. SHOWING FILM: Number 1,2,3 etc., for items in C in sequential order.

- \_\_\_ a. Set sound volume and tone control at mid-points
- \_\_\_ b. Turn on lamp
- \_\_\_ c. Turn on motor
- \_\_\_ d. Adjust focus
- \_\_\_ e. Adjust volume and tone control
- \_\_\_ f. Adjust frame control
- \_\_\_ g. Turn off room lights
- \_\_\_ h. Turn off volume when sound fades or end
- \_\_\_ i. Turn off lamp.

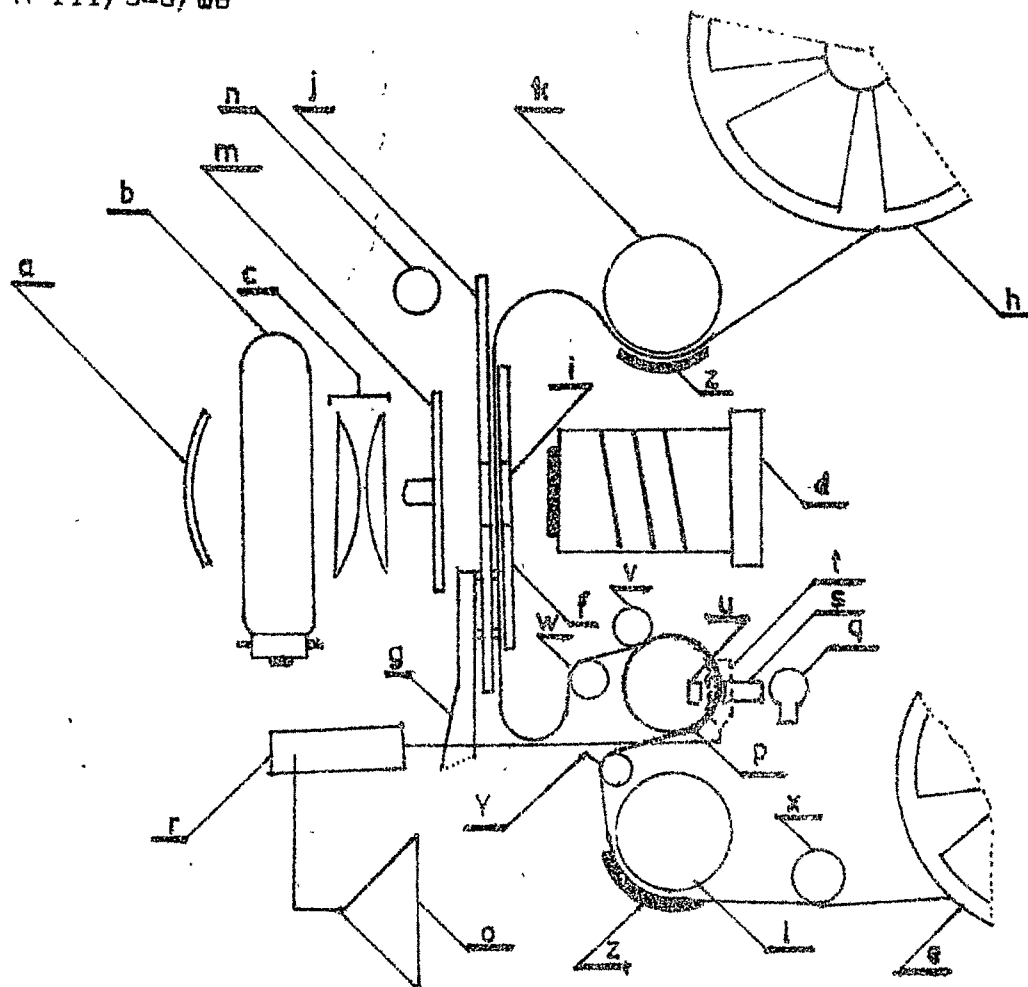
D. REWINDING: Number 1,2,3 etc., for items in D in sequential order.

- \_\_\_ a. Attach free end of film to hub of feed reel.
- \_\_\_ b. Turn several turns counter clock-wise.
- \_\_\_ c. Turn control switch on
- \_\_\_ d. Adjust rewind/reverse lever to position for rewind.
- \_\_\_ e. Lower projector with elevation control knob or bring to normal.
- \_\_\_ f. Un plug speaker cord, wind cable, and store
- \_\_\_ g. push in arms, drive belts, or if to be removed, remove and place at appropriate place.
- \_\_\_ h. Position all switches and controls to normal.



- \_\_\_\_\_ i. Place speaker in normal position.
- \_\_\_\_\_ j. Close and lock the lid.
- \_\_\_\_\_ k. Unplug power cord and place in position after winding.

M III/5-6/WB



MODULE - III.

Projected Aids

Time: 15 mts.

Unit - 5.

Motion Picture Projector

Practical Exercise No.37 : Operating a 16 mm Projector  
(Photophone or Keltron model)

A. PROBLEM. Set up a 16 mm. projector, thread 16 mm. optical sound film, run the film for one minute. Change projection lamp. Clean lens and aperture gate. Then rewind & pack up.

- |                            |                         |
|----------------------------|-------------------------|
| a) Setting up              |                         |
| b) Threading               | Plan as per performance |
| c) Showing                 | Check list.             |
| d) Rewinding & packing up  | Total time allowed for  |
| e) Change lamp             | final presentation      |
| f) Clean lens with tissue, | 15 minutes.             |
| and                        |                         |
| g) Aperture with brush.    |                         |

B. EQUIPMENT & MATERIALS

- 1) 16 mm Projector, with speaker.
- 2) Screen
- 3) 16 mm film.

C. GRADING POINTS

- 1) Setting up
- 2) Threading
- 3) Showing - 60 secs.
- 4) Rewinding.
- 5) Change projection lamp
- 6) Clean lens and aperture.
- 7) Packing up.

(Up to three trials are allowed for practice)

D. Deadline for completion:

June 1st



-----  
MODULE - III.      Projected aids

Unit - 5.      Motion Picture Projector  
-----

Practical Exercise No. 37 : Performance Check List for  
operating 16 mm Projector.

SETTING UP

- 1) Place projector on stand, open case and plug in power cords.
- 2) Place the screen, speaker near the screen, attach speaker cable to the projector.
- 3) Turn on amplifier.
- 4) Attach or set reel arms/drive belts.
- 5) If there is film selector, set it for sound film 24 f.p.s.
- 6) If there is reverse control, set it for 'forward' position
- 7) Turn on motor, lamp. Check if lamp is burning. If not change lamp.
- 8) Elevate the projector to center the image
- 9) Move the projector toward or away from the screen to fill the screen with desired area of image.
- 10) Focus aperture image
- 11) Turn off projector.
- 12) Open film channel, and clean all surfaces over which film passes with a brush.
- 13) Turn on amplifier. Adjust volume/tone.
- 14) Attach or set both reel firmly on to spindle and lock them in position. Both reels should be of same size, or take up reel shall be bigger than feed reel.
- 15) Check to make sure that film is properly wound on supply reel. (image head down, sound track nearest projector)

THREADING

- 1) Swing open film gate.
- 2) Open sprocket shoes.
- 3) Unroll  $1\frac{1}{2}$  metres of film and place film in the feed sprocket.
- 4) Thread film over feed sprocket and close shoe.
- 5) Place the film in the film channel; close gate
- 6) Leave an upper loop as per markings on the projector, close film gate.
- 7) Take film and through guide roller, forming a lower loop as per markings on the projector.
- 8) Thread around sound drum and stabiliser.
- 9) See film is taut or draw the film taut around the sound drum before engaging sprocket holes of sprocket wheel.
- 10) Close sprocket shoe.
- 11) Check once again, that teeth on each sprocket fits the holes in the film.
- 12) Established loops must be accurate as per markings.
- 13) Attach film to the take up film through snubber.
- 14) Check if threading is okay by hand operation knob.

SHOWING FILM

- 1) Set sound/volume and tone control at mid points.
- 2) Turn off room lights.
- 3) Turn on motor.
- 4) Turn on lamp.
- 5) Adjust focus when image is visible on screen

- 6) Adjust volume and then tone.
- 7) Correct framing if necessary.
- 8) Correct focus and adjust sound whenever necessary during projection.
- 9) Shut off projector, when faults are noticed and cannot be rectified during showing, e.g. snapping of film, very bad sound.
- 10) Turn off lamp, when title fades.
- 11) Turn off volume when sound fades and ends.

#### REWINDING AND PACKING UP.

- 1) Attach end of film to the hub of the feed (supply) reel which is empty now.
- 2) Turn several turns counter clockwise, direction.
- 3) Position operate-rewind lever at REVERSE/REWIND. Turn control switch to projector, "on" position
- 4) After film is rewound, turn control switch to OFF.
- 5) Lower front of the projector by turning the elevator knob.
- 6) Unplug speaker cable, wind the cable, and attach to case or speaker as the case may be.
- 7) Unplug power cord and place cord after winding in the space provided.
- 8) Push in or remove the arms attach these at proper position.
- 9) Push in the drive belts into the interior of the projector case.
- 10) Retract lens mechanism, elevator mechanism and make certain all switches and controls are normal.
- 11) Close and lock lids firmly, after fitting speaker case over projector (if your projector is so designed).

## Module III

## Projected Aids

## Unit 5

## Motion Picture Projector

## Pr. Ex. 37.

The check list given under are not in a sequence. Put numbers 1,2,3 ... etc., against each step in the correct sequence for a,b,c ...

A. SETTING UP

- \_\_\_\_\_ a. Place the projector on stand, open the case and plug in the power cords.
- \_\_\_\_\_ b. Turn on the motor/lamp, change lamp if required.
- \_\_\_\_\_ c. If there is a reverse control, set it for 'forward' position.
- \_\_\_\_\_ d. If there is a film selector, set it for sound film 24 f.p.s.
- \_\_\_\_\_ e. Place the screen, speaker near the screen, attach the speaker cable to the projector.
- \_\_\_\_\_ f. Turn on amplifier.
- \_\_\_\_\_ g. Move the projector towards or away from the screen to fill the screen with desired area of image.
- \_\_\_\_\_ h. Elevate the projector to centre the image.
- \_\_\_\_\_ i. Turn off the projector.
- \_\_\_\_\_ j. Focus the aperture image.
- \_\_\_\_\_ k. Check the sound system. Adjust the volume and tone control.
- \_\_\_\_\_ l. Open the film channel, and clean all the surface over which the film passes with a brush.
- \_\_\_\_\_ m. Check to make sure that film is properly wound on the supply reel. (image head down, sound track near projector).
- \_\_\_\_\_ n. Attach or set the reel arms/ drive belts.
- \_\_\_\_\_ o. Attach or set both the reels firmly on to the spindle and lock them in position.

B. THREADING:

- \_\_\_\_\_ a. Unroll  $1\frac{1}{2}$  metres of film and place it in film sprocket.
- \_\_\_\_\_ b. Open sprocket shoes.
- \_\_\_\_\_ c. Swing open film gate.
- \_\_\_\_\_ d. Close sprocket shoes.

- 151
- \_\_\_ e. Thread around sound drum and stabiliser.
  - \_\_\_ f. See that film is taut or draw the film taut around the sound drum before engaging sprocket holes of the sprocket wheel.
  - \_\_\_ g. Check once again, that teeth on each sprocket fits the holes in the film.
  - \_\_\_ h. Thread the film over feed sprocket and close shoes.
  - \_\_\_ i. Take the film and through guide roller, forming a lower loop as per markings on the projector.
  - \_\_\_ j. Leave the upper loop as per markings on the projector, close film gate.
  - \_\_\_ k. Place the film in the film channel.
  - \_\_\_ l. Check if threading is okay by hand operation knob.
  - \_\_\_ m. Established loops to be accurate as per markings.
  - \_\_\_ n. Attach film to the take up film through snubber.

#### C. SHOWING:

- \_\_\_ a. Adjust focus when image is visible on screen.
- \_\_\_ b. Turn off room lights.
- \_\_\_ c. Set sound volume and tone control at mid points.
- \_\_\_ d. Turn on lamp.
- \_\_\_ e. Turn on motor.
- \_\_\_ f. Correct the framing if necessary.
- \_\_\_ g. Adjust the volume and then tone.
- \_\_\_ h. Shut off projector, when faults are noticed that cannot be rectified during showing, e.g. snapping of film, very bad sound.
- \_\_\_ i. Correct focus and adjust the sound whenever necessary during projector.
- \_\_\_ j. Turn off the volume when sound fades and ends.
- \_\_\_ k. Turn off the lamp, when title fades away.

#### D. REWINDING & PACKING UP

- \_\_\_ a. Position the operate/rewind lever at REVERSE/REWIND. Turn control switch of the projector to on.
- \_\_\_ b. Attach end of film to the hub of the feed (supply) reel which is empty now.
- \_\_\_ c. Turn several turns counter clockwise.
- \_\_\_ d. Unplug the speaker cable, wind the cable and attach to case or speaker as the case may be.
- \_\_\_ e. After the film is rewound, turn the control switch to OFF.
- \_\_\_ f. Lower front of the projector by turning the elevator knob.



- \_\_\_\_\_ g. Push in the drive belts into the interior of the projector case.
- \_\_\_\_\_ h. Push in or remove the arms attach these at proper position.
- \_\_\_\_\_ i. Unplug the power cord and place cord after winding in the space provided.
- \_\_\_\_\_ j. Retract the lens mechanism, elevator mechanism and make certain that all switches and controls are normal.
- \_\_\_\_\_ k. Close and lock the lids firmly, after fitting speaker case over projector (if your projector is so designed).

M III/5/Pr.Ex.37 (iii)

Module III	PROJECTED AIDS	Key to
Unit 5	Motion picture projector	Pr.Ex.37

The check list given under are not in a sequence. Put numbers 1,2,3 etc. against each step in the correct sequence for a,b,c .....

#### A. SETTING UP

- 1 a. Place the projector on stand, open the case and plug in the power cords.
- 7 b. Turn on the motor/lamp, change lamp if required.
- 6 c. If there is a reverse control, set it for 'forward' position.
- 5 d. If there is a film selector, set it for sound film 24 f.p.s.
- 2 e. Place the screen, speaker near the screen, attach the speaker cable to the projector.
- 3 f. Turn on amplifier.
- 9 g. Move the projector towards or away from the screen to fill the screen with desired area of image.
- 8 h. Elevate the projector to centre the image.
- 11 i. Turn off the projector.
- 10 j. Focus the aperture image
- 13 k. Check the sound system. Adjust the volume and tone control.
- 12 l. Open the film channel, and clean all the surfaces over which the film passes with a brush.
- 15 m. Check to make sure that film is properly wound on the supply reel. (image head down, sound track near projector).
- 4 n. Attach or set the reel arms/drive belts.
- 14 o. Attach or set both the reels firmly on to the spindle and lock them in position.

#### B. THREADING

- 3 a. Unroll 1½ metres of film and place it in film sprocket.
- 2 b. Open sprocket shoes.
- 1 c. Swing open film gate.
- 10 d. Close sprocket shoes.
- 8 e. Thread around sound drum and stabiliser.
- 9 f. See that film is taut or draw the film taut around the sound drum before engaging sprocket holes of the sprocket wheel.

- 11 g. Check once again, that teeth on each sprocket fits the holes in the film.
- 4 h. Thread the film over feed sprocket and close shoes.
- 7 i. Take the film and through guide roller, forming a lower loop as per markings on the projector.
- 6 j. Leave an upper loop as per markings on the projector, close film gate.
- 5 k. Place the film in the film channel.
- 14 l. Check if threading is okay by hand operation knob.
- 12 m. Established loops to be accurate as per markings.
- 13 n. Attach film to the take up film through snubber.

#### C. SHOWING FILM

- 5 a. Adjust focus when image is visible on screen.
- 2 b. Turn off room lights.
- 1 c. Set sound volume and tone control at mid points.
- 4 d. Turn on the lamp.
- 3 e. Turn on motor.
- 7 f. Correct the framing if necessary.
- 6 g. Adjust the volume and then tone.
- 9 h. Shut off projector, when faults are noticed that cannot be rectified during showing, e.g. snapping of film, very bad sound.
- 8 i. Correct focus and adjust the sound whenever necessary during projector.
- 11 j. Turn off the volume when sound fades and ends.
- 10 k. Turn off the lamp, when title fades away.

#### D. REWINDING AND PACKING UP

- 3 a. Position the operate-rewind lever at REVERSE/REWIND. Turn control switch of the projector to on.
- 1 b. Attach end of film to the hub of the feed (supply) reel which is empty now.
- 2 c. Turn several turn counter clockwise.
- 6 d. Unplug the speaker cable, wind the cable and attach to case or speaker as the case may be.
- 4 e. After the film is rewound, turn the control switch to OFF.
- 5 f. Lower front of the projector by turning the elevator knob.

- 9 g. Push in the drive belts into the interior of the projector case.
- 8 h. Push in or remove the arms attach these at proper position.
- 7 i. Unplug the power cord and place cord after winding in the space provided.
- 10 j. Retract the lens mechanism, elevator mechanism and make certain that all switches and controls are normal.
- 11 k. Close and lock the lids firmly, after fitting speaker case over projector (if your projector is so designed).

MIII/5/37 Key

## AUDIO VISUAL EDUCATION

## CRITERION TEST

-----  
Module III

Projected Aids

Unit 5

Motion Picture Projector  
-----

1. Which one of the following is the speed of the 16 mm sound motion picture projector ?  
☐ a. 24 frames per sec.  
☐ b. 16 frames per sec.  
☐ c. 36 frames per sec.  
☐ d. 42 frames per sec.
2. What is the time required to run 400 ft. of 16 mm sound film ?  
☐ a. 10 minutes  
☐ b. 11 minutes  
☐ c. 36 minutes  
☐ d. None of the above
3. Mark the following parts of the projection system by writing the appropriate alphabets, by referring to the figure given at the end.  
☐ 1. Reflector  
☐ 2. Projection lamp  
☐ 3. Condenser lenses  
☐ 4. Objective lens

4. Mark the following parts of the film transportation system by writing the appropriate alphabets given on the figure given at the end.

\_\_\_\_ 1. Take up reel  
\_\_\_\_ 2. Take up sprocket  
\_\_\_\_ 3. Claw  
\_\_\_\_ 4. Shutter  
\_\_\_\_ 5. Aperture  
\_\_\_\_ 6. Framer  
\_\_\_\_ 7. Film channel plate  
\_\_\_\_ 8. Pressure plate  
\_\_\_\_ 9. Feed sprocket  
\_\_\_\_ 10. Supply reel.

5. Mark the following parts of the sound system, by writing the appropriate alphabets given on the figure given at the end.

\_\_\_\_ 1. speaker  
\_\_\_\_ 2. amplifier.  
\_\_\_\_ 3. sound drum  
\_\_\_\_ 4. sound lens  
\_\_\_\_ 5. exciter lamp  
\_\_\_\_ 6. Photo-electric cell  
\_\_\_\_ 7. mirror

6. Mark the following parts of the different rollers by writing the appropriate alphabets given in the figure at the end.

\_\_\_\_ 1. snubber  
\_\_\_\_ 2. stabiliser  
\_\_\_\_ 3. pressure roller  
\_\_\_\_ 4. guide roller  
\_\_\_\_ 5. sprocket shoes (upper and lower)

7. Fill in the blanks:

- a. Focussing of the picture image is done by moving the \_\_\_\_\_ in and out.
- b. Film moves between film \_\_\_\_\_ plate and \_\_\_\_\_ plate.
- c. If sprocket holes are not engaged properly by the \_\_\_\_\_ the image will be fluttery.
- d. Film is drawn past the aperture by a \_\_\_\_\_ or \_\_\_\_\_.
- e. Film must be tightly wound round the \_\_\_\_\_ to avoid disturbed quality sound.

8. Which type of sound recording allows you to record sound on a 16 mm film in your class-room or Institution?

- \_\_\_\_\_ a. magnetic
- \_\_\_\_\_ b. variable area optical
- \_\_\_\_\_ c. variable density optical
- \_\_\_\_\_ d. all the above.

9. The sound in a 16 mm film is recorded \_\_\_\_\_ frames \_\_\_\_\_ the actual picture frames.

Choose the answer from: 25, 20, 26, 36

ahead, along, after.

10. Arrange in the sequential order, each of the following four stages separately, for operating a 16 mm film projector.

Each stage is marked A, B, C and D. Against each one of them mark the sequential order is 1, 2, 3, 4, etc.,

A. SETTING UP : Number 1, 2, 3 etc., separately for A is sequential order.

- \_\_\_\_\_ a. Place projector on stand, open case, connect power cord.
- \_\_\_\_\_ b. Place speaker near the set screen, attach speaker cords.

- \_\_\_ c. Turn on amplifier
- \_\_\_ d. Turn on lamp and motor
- \_\_\_ e. Attach set reel arms and drive belts
- \_\_\_ f. Set film speed for sound film
- \_\_\_ g. Set control to 'forward' position
- \_\_\_ h. Focus image of aperture
- \_\_\_ i. Move projector toward or away from the screen to fill the screen with image, to desired area.
- \_\_\_ j. Elevate projector to center the image.
- \_\_\_ k. Open film channel and clean all the surfaces through which the film passes with a brush.
- \_\_\_ l. Turn off projector
- \_\_\_ m. Check sound system
- \_\_\_ n. Attach or set both reels to spindle and lock them
- \_\_\_ o. Check that film is wound properly on feed reel.

**B. THREADING:** (Number 1,2,3 etc, separately for B, in sequential order)

- \_\_\_ a. Swing film gate open
- \_\_\_ b. Swing sprocket shoe open
- \_\_\_ c. Place film in the film channel
- \_\_\_ d. Thread film over feed sprocket and close shoes
- \_\_\_ e. Unroll  $1\frac{1}{2}$  metres of film
- \_\_\_ f. Take film through guide rollers
- \_\_\_ g. Thread film over take up sprocket and close shoe
- \_\_\_ h. Establish lower loop as per projector markings
- \_\_\_ i. Establish upper loop as per projector markings
- \_\_\_ j. Attach film to take up reel through snubber
- \_\_\_ k. Check that tooth on feed and take up sprocket fit the hole in film.
- \_\_\_ l. Thread film and through sound drum and stabiliser roller, keeping film taut.

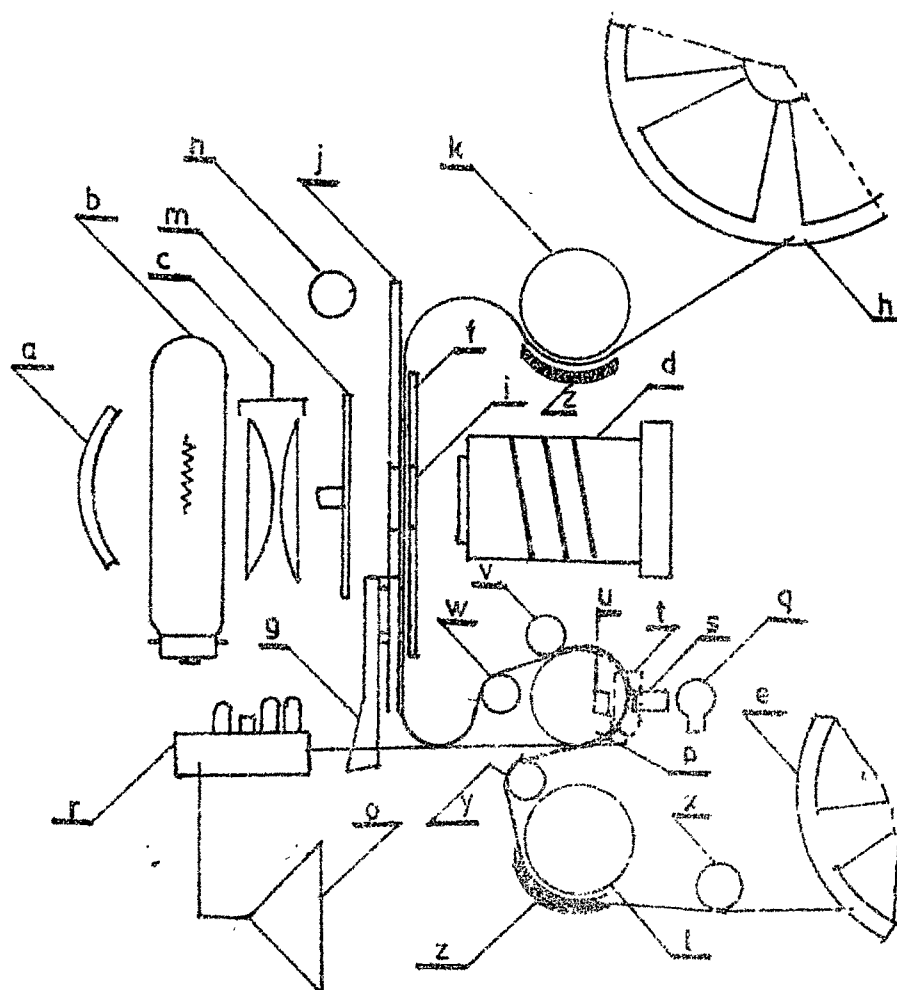


C. SHOWING FILM: Number 1,2,3 etc., for items in C in sequential order.

- \_\_\_\_\_ a. Set sound volume and tone control at mid-points.
- \_\_\_\_\_ b. Turn on lamp.
- \_\_\_\_\_ c. Turn on motor
- \_\_\_\_\_ d. Adjust focus
- \_\_\_\_\_ e. Adjust volume and tone control
- \_\_\_\_\_ f. Adjust frame control
- \_\_\_\_\_ g. Turn off room lights
- \_\_\_\_\_ h. Turn off volume when sound fades or end
- \_\_\_\_\_ i. Turn off lamp

D. REWINDING: Number 1,2,3 etc., for items in D in sequential order.

- \_\_\_\_\_ a. Attach free end of film to hub of feed reel
- \_\_\_\_\_ b. Turn several turns counter clock-wise.
- \_\_\_\_\_ c. Turn control switch on
- \_\_\_\_\_ d. Adjust rewind/reverse lever to position for rewind.
- \_\_\_\_\_ e. Lower projector with elevation control knob or bring to normal
- \_\_\_\_\_ f. Unplug speaker cord, wind cable, and store.
- \_\_\_\_\_ g. Push in arms, drive belts, or if is to be removed, remove and place at appropriate place
- \_\_\_\_\_ h. Position all switches and controls to normal
- \_\_\_\_\_ i. Place speaker in normal position.
- \_\_\_\_\_ j. Close and lock the lid.
- \_\_\_\_\_ k. Unplug power cord and place in position after winding.



III/5-6/CT

## AUDIO VISUAL EDUCATION

KEY TO  
CRITERION TEST-----  
Module III

Projected Aids

Unit 5

Motion Picture Projector  
-----

1. Which one of the following is the speed of the 16 mm sound motion picture projector ?
  - \*      a. 24 frames per sec.
  - b. 16 frames per sec.
  - c. 36 frames per sec.
  - d. 42 frames per sec.
2. What is the time required to run 400 ft. of 16 mm sound film ?
  - a. 10 minutes
  - \*      b. 11 minutes
  - c. 36 minutes
  - d. none of the above
3. Mark the following parts of the projection system by writing the appropriate alphabets, by referring to the figure given at the end,
  - a   1. Reflector
  - b   2. Projection lamp
  - c   3. Condenser lenses
  - d   4. Objective lens

M III/5-1/KCT

4. Mark the following parts of the film transportation system by writing the appropriate alphabets given on the figure given at the end.

<u>e</u> 1. take up reel	<u>n</u> 6. framer
<u>l</u> 2. take up sprocket	<u>j</u> 7. film channel plate
<u>g</u> 3. claw	<u>f</u> 8. pressure plate
<u>m</u> 4. shutter	<u>k</u> 9. feed sprocket
<u>i</u> 5. aperture	<u>h</u> 10. supply reel

5. Mark the following parts of the sound system, by writing the appropriate alphabets given on the figure given at the end.

<u>o</u> 1. speaker	<u>q</u> 5. exciter lamp
<u>r</u> 2. amplifier	<u>t</u> 6. photo-electric cell
<u>p</u> 3. sound drum	<u>u</u> 7. mirror
<u>s</u> 4. sound lens	

6. Mark the following parts of the different rollers by writing the appropriate alphabets given in the figure at the end.

<u>x</u> 1. snubber
<u>y</u> 2. stabiliser
<u>v</u> 3. pressure roller
<u>w</u> 4. guide roller
<u>z</u> 5. sprocket shoes (upper and lower)

## 7. Fill in the blanks.

- a. Focussing of the picture image is done by moving the objective lens in and out.
- b. Film moves between film channel plate and aperture plate.
- c. If sprocket holes are not engaged properly by the claw the image will be fluttery.
- d. Film is drawn past the aperture by a claw or intermittent.
- e. Film must be tightly wound round the sound drum to avoid disturbed quality sound.

## 8. Which type of sound recording allows you to record sound on a 16 mm film in your classroom or institution

- \*   a. magnetic
- b. variable area-optical
- c. variable density optical
- d. all the above

9. The sound in a 16 mm film is recorded 25 frames ahead the actual picture frame.

Choose the answer from: 25, 20, 26, 36

ahead, along, after.

## 10. Arrange in the sequential order, each of the following four stages separately, for operating a 16 mm film projector.

Each stage is marked A, B, C and D. Against each one of them mark the sequential order as 1, 2, 3, 4 etc.

A. SETTING UP: Number 1, 2, 3 etc. separately for A in sequential order.

- 1   a. Place projector on stand, open case, connect power cord.
- 2   b. Place speaker near the set screen, attach speaker cords.
- 12   c. Turn on amplifier

- 6 d. Turn on lamp and motor
- 3 e. Attach set reel arms and drive belts.
- 4 f. Set film speed for sound film
- 5 g. Set control to 'forward' position.
- 9 h. Focus image of aperture
- 8 i. Move projector toward or away from the screen to fill the screen with image, to desired area.
- 7 j. Elevate projector to center the image.
- 11 k. Open film channel and clean all surfaces over which film passes with a brush.
- 10 l. Turn off projector
- 13 m. Check sound system
- 14 n. Attach or set both reels to spindle and lock them.
- 15 o. Check that film is wound properly on feed reel.

B. THREADING: (Number 1,2,3 etc separately for B, in sequential order)

- 1 a. Swing film gate open
- 2 b. Swing sprocket shoe open
- 3 c. Place film in the film channel
- 5 d. Thread film over feed sprocket and close shoe
- 4 e. Unroll  $1\frac{1}{2}$  metres of film
- 7 f. Take film through guide rollers
- 10 g. Thread film over take up sprocket and close shoe
- 8 h. Establish lower loop as per projector markings
- 6 i. Establish upper loop as per projector markings
- 12 j. Attach film to take up reel through snubber.
- 11 k. Check that teeth on feed and take up sprocket fit the holes in film.
- 9 l. Thread film end through sound drum and stabilizer roller, keeping film taut.

C. SHOWING FILM: Number 1,2,3 etc for items in C in sequential order.

- 1 a. Set sound volume and tone control at mid points
- 4 b. Turn on lamp
- 3 c. Turn on motor
- 5 d. Adjust focus
- 6 e. Adjust volume and tone control
- 7 f. Adjust frame control
- 2 g. Turn off room
- 9 h. Turn off volume when sound fades or ends.
- 8 i. Turn off lamp.

D. REWINDING: Number 1,2,3 etc., for items in D in sequential order.

- 1 a. Attach free end of film to hub of feed reel.
- 2 b. Turn several turns counter clockwise.
- 3 c. Turn control switch on
- 4 d. Adjust rewind/reverse lever to position for rewind.
- 5 e. Lower projector with elevation control knob or bring to normal
- 6 f. Unplug speaker cord, wind cable, and store.
- 8 g. Push in arms, drive belts, or if to be removed, remove and place at appropriate place.
- 9 h. Position all switches and controls to normal
- 10 i. Place speaker in normal position
- 11 j. Close and lock the lid.
- 7 k. Unplug power cord and place in position after winding.

6. But the visual tools, designed by expert designers to achieve predetermined objectives, with proper practice can expand the abilities of a creative instructor to greater proportions and enlarge the effectiveness of a less creative instructor.
7. We have been using the common term, that all these Audio Visual materials are aids. It produces an impression that these devices supplement instruction. It is more accurate to say that these are instructional tools, that enhance learning, making learning a pleasant task, helps you to remember longer and less tedious.
8. These audio visual materials complement the instructor's efforts rather than supplementing them.
9. The OVERHEAD PROJECTOR, is one such tool, which responds to the imagination of the instructor and enjoys advantages not shared by other projection equipment.
10. Before going into the construction of the projector, its parts and maintenance problems, we will examine the advantages of overhead projection. A departure from other units. Isn't? Let us examine.
11. The projector is positioned in front of the classroom.
12. What if? Do you see this as an important item? Yes indeed. The instructor faces his trainees, maintaining eye contact at all times ..... he can observe reactions and adjust his presentation accordingly. This is number one plus point.



13. Your classroom need not be darkened. You get bright image in a fully illuminated room. ( ... )  
So you can watch your trainees' reaction and hold their attention. No time is lost in darkening room, turning off or switching on the lights.
14. There is a school of thought, that because slide, filmstrip and motion picture, being projected from the back of the class, the teacher requires some assistance but here, the teacher himself controls the presentation.
15. It is most versatile and responds to your creativity and imagination. You can use your own transparencies, project transparent or opaque objects, animated devices.
16. The instructor can point to the details of particular points on the transparency or add information by writing on the transparency.
17. As you have seen, this can substitute chalkboard, Repetitive work on the chalkboard can be eliminated by using prepared transparency with the facility of addition to it, as situation demands.
18. The use of prepared transparencies, like other projected materials, make available more class time for discussion and review. You can project transparent thin objects like gear mechanisms, four stroke cycle, slide rule upto 10" x 10".

19. Complex subjects can be simplified. Techniques of overlays, and masking make it possible to build a concept step by step or break the whole into parts.
20. Colour, as in other cases, can present reality and bring in aesthetic and emotional values. You can also project small objects as silhouettes.
21. The OHP create a good environment for learning, focus attention of the students, facilitate comprehension of abstract and complex subjects and improve retention. These aspects are true for other projected and non-projected visuals as well.
22. REFER TO your WORKBOOK and answer questions 1 to 3.  
STOP PRESENTATION FOR THREE MINUTES & RESTART.
23. Question 1.  
The main advantage of the overhead projector over other projectors is that, it can be used in a fully illuminated room.  
Is that clear?
24. Question 2.  
The instructor can write on the transparency and use the projector as a substitute for chalkboard which is not available with the other aids.
25. Question 3.  
Techniques of overlays, masking, and progressive disclosure is possible in the overhead projector, which is difficult in the slide, filmstrip and motion picture projector.

## 26. Question 4.

Transparent objects that are less than 25 x 25 cm in size can be projected from the overhead projector.

27. Let us now examine the constructional features of the overhead projector. Here is the schematic diagram. This projector is based on indirect reflection principles.
28. You have the lamp, reflector, condenser lenses and the objective lens. Note the position of the condenser lenses.
29. You have two mirrors, one reflecting light on to the projectual and the other at the top, deflects the image on to the screen. This twin mirror facility, helps you to place the projectual right side facing up and all other advantages of writing over it, pointing important aspects, and other facilities.
30. The top mirror position can be adjusted by the mirror adjusting knob. The position of the image can be lowered or raised by moving this.
31. The focussing knob helps you to focus the picture with sharp images. It has a rack and pinion arrangement.
32. You have the fresnel lens on which you place the transparencies. The fresnel lens is one of the condenser lenses, a flat piece with grooves or concentric circles on one surface. The angles of the grooves vary, causing changes in the angle of refraction.

33. The fresnel lens which is the projection stage, handles transparencies from 100 x 100 mm to 250 x 250 cm.
34. Two pins on the stage of the projector are used to steady transparencies that are set over the pins.
35. Provision is also available for use of acetate rolls. The roll can be fixed either to move from front to back, left to right or vice versa. The roller knob moves the acetate.
36. A slide guide attached to OHP can project slides.
37. There is a front surface mirror on one side. When you face the class, project visuals on to a screen, you can see the projected image on this mirror, without looking back.
38. The image can also be adjusted on the screen by the tilting foot screws of the front legs.
39. Some models are provided with a cooling fan to cool the system.
40. For operating the projector, you should be aware of the adjustments of ON/OFF fan and light switch, levelling screws, focussing knob, mirror adjusting knob, acetate roller knob, transparency guide pins and other accessories.
41. REFER to your WORKBOOK. Answer question 5.

42.

You have the picture

173

on the screen. The parts are marked as a,b,c,d,  
.....etc., The names of these parts are  
given in the WORKBOOK with space for writing  
the letters a,b,c,d ..... etc. corresponding  
to appropriate parts. Now go ahead and answer  
STOP FOR 3 MINUTES AND RESTART.

43. If your answer corresponds to this picture, you  
are right. If not you are advised to go again  
with this part of the lesson until you become  
fully conversant with all parts. This is most  
important for enabling you to operate the  
projector.

44. Now refer to your WORKBOOK and answer  
questions 6 to 9.  
STOP FOR FOUR MINUTES AND RESTART.

45. Question 6.

The position of the image on the screen is  
adjusted or centered by

- a. operating the mirror adjusting knob i.e.  
raising or lowering;
- b. raising or lowering the foot screws of the  
front legs; and
- c. tilting the head of the top mirror assembly,  
if the projector is provided with this  
mechanism.

46. Question 7.

The size of the image that could be projected on  
Overhead projector are:

maximum size 250 mm x 250 mm

minimum size 100 mm x 100 mm

## 47. Question 8.

To steady the transparency from moving on the projection stage two pins are provided on the stage.

## 48. Question 9.

The overhead projector can project in silhouette non-transparent objects.

## 49. OPERATING THE OVERHEAD PROJECTOR is simple.

50. The overhead projector is generally placed permanently in the classroom, normally at a distance one-and-a-half the width of the screen used, i.e. for 2 metre width screen it is placed 3 metres away from the screen, the projection head facing the screen.

51. If not, use a trolley with the projector on it, move in the trolley to the desired place, unwind the power cord end from its position and plug into a wall outlet.

52. Turn on the power switch, both the fan and the light will be on..

53. Place the transparency on the projection stage, so that you can read what is written. If your transparency is mounted on commercial mounts., there will be two holes, that will fit onto the guide pins.

54. The image is raised or lowered by tilting the mirror in the projection head by the knob, or by adjusting the front foot leg screws.

55. Focus the image now with the focussing screw.  
This screw raises or lowers the objective lens, by a rack and pinion adjustment. Get a sharp, bright picture on the screen.
56. Most projectors are provided with roll film (scroll) attachments. You may prepare the lesson in serialtim - in the proper order - well in advance, and use them. The acetate roller knob can be turned to move the acetate either way, thus enabling you, to bring back a previous picture or information, for review or further discussion.
57. You must remember that the ratio of letter size to the height of the artwork shall be in the ratio of 1: 50 i.e. minimum letter size of your writings for a 25 cm x 25 cm transparency, shall not be less than  $\frac{1}{2}$  cm or 5 mm.
58. You may use the wing on either side of the projector, or in front of the projector for use of
- a. an overlay book with ring binding.
  - b. placing your lesson plan on one side and the transparency sets on the other, in the serial order.
59. You may tilt the projector to a vertical position to show any chemical experiment, with fluid in a beaker.
60. You may use the Overhead projector to add overlays on single transparencies thus, and if necessary, add more information. You may use coloured ink or pencil.

61. Use the poloroid spinner to show fluid motion or models that are transparent. You can show the movement of the gears and other parts. Coloured transparent materials will add to the effectiveness.
62. You may show demonstrations such as magnetic fields,
63. and there are far too many applications, the limit for which is your imagination.
64. Coming back to the operation, few very important hints:
  - Do not keep the lights on hours together when you are giving long explanations. The heat generated will damage the fresnel lens,
  - Use the picture again when it is required, as otherwise, the effect will be lost.
  - Use pointer to emphasise your points on the pictures, which will appear on the screen.
65. AVOID KEYSTONING EFFECT. You must be careful to tilt the mirrors or projection head or front leg screws. We have already told you about this.
66. Turn off the switch after use, remove power cord from wall socket, and cover the projector with a cover or wheel it to a corner.
67. Now a word about maintenance. Keep lenses and glass surfaces clean.  
Use only lens tissues for cleaning.
68. Never touch the glass elements of lenses with your fingers.



69. When you want to replace the lamp, remember to choose lamps of proper voltage, amperage, and contact--check the manufacturer's manual.
70. Remember to turn off and disconnect power cord from power source before you change lamp. Watch the type of projection lamp bases. They are not like the domestic bulb base.
71. It is necessary to make certain that the lamp filament is perpendicular to axis of projection.
72. Clean fresnel lens with carbon tetrachloride.
73. REFER TO WORKBOOK and answer question 10.  
STOP FOR A MINUTE AND RESTART.
74. Condenser lens, is your answer.
75. Now, write the procedure for operating the overhead projector and submit to your Training Officer in the visual aid workshop.
76. You may familiarise with parts and procedure according to the checklist that have been provided to you, and take the practical exercise No. 38
77. End.