

BRITISH STANDARD 677:1942

MOTION PICTURE FILMS

THIS BRITISH STANDARD having been approved by the Cinematograph Industry Committee and endorsed by the Chairman of the Engineering Divisional Council was published under the authority of the General Council on 22nd December, 1942.

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CO-OPERATING ORGANISATIONS

The Cinematograph Industry Committee under whose supervision this British Standard was prepared consists of representatives of the following Government Departments and Scientific and Industrial Organisations :

Board of Trade
Home Office
War Office

*Associated Photographic Film Manufacturers

British Film Production Association

*British Kinematograph Society

*Cinematograph Exhibitors Association of Great
Britain and Ireland

*Sub-Standard Cinematograph Association

The Scientific and Industrial Organisations marked with an asterisk in the above list, together with the following, were represented on the Committee entrusted with the preparation of this British Standard :

British Acoustics Films

British Sub-Standard Cinematograph Association

Federation of British Industries

Incorporated Association of Kinematograph Manufacturers

Gaumont-British Picture Corporation

BRITISH STANDARD SPECIFICATION FOR MOTION PICTURE FILMS

FOREWORD

Close co-operation exists between the British and American Committees engaged in the preparation of standards for use in cinematography.

B.S. 677 was first issued in 1936 to give effect to the arbitration of Lord Riverdale with regard to the dimensions of 16 mm. sound film, viz., that they should be in line with the standards prepared by the Society of Motion Picture Engineers in the U.S.A.

The present revision has been undertaken to give effect to modifications to the 16 mm. film standard which have been made by the S.M.P.E. and the opportunity has been taken to include dimensions for 35 mm. and 8 mm. film. Standards have also been included for the cores for 16 mm. and 35 mm. film and reels for 8 mm. and 16 mm. film.

Dimensions of the 16 mm. and 35 mm. film are also suitable for microfilm for photo recording.

SPECIFICATION

PART ONE : 35 mm. FILM

GENERAL

1. British Standard 35 mm. film shall conform in all respects to the arrangement, dimensions and requirements herein set out.

DIMENSIONS

2. British Standard 35 mm. film shall, subject to the tolerances herein specified, conform to the dimensions shown in Figs. 1 to 6 as follows :
 - Fig. 1. Cutting and perforating dimensions of positive raw stock.
 - Fig. 2. Cutting and perforating dimensions of negative raw stock.
 - Fig. 3. Projector aperture.
 - Fig. 4. Camera aperture.
 - Fig. 5. Position of sound track. (See Notes in Appendix.)

FRAME LINE

3. The centre of the frame line shall be midway between two successive perforations on each side of the film and shall be at right angles to the edge of the film.

FILM SPEED

4. The speed of 35 mm. film shall be 24 frames per second.

POSITION OF SOUND RECORD RELATIVE TO THE PICTURE APERTURE

5. The position of the sound record relative to the picture aperture shall be such that the centre of any picture shall be 20 frames further

from the beginning of the reel than the corresponding modulation of the sound track. The mark of the sound start on the leader shall be 20 frames nearer the beginning of the reel than the mark for the picture start.

CORES

6. Cores for negative and positive raw stock shall conform to the dimensions shown in Fig. 6 and shall be fitted with a key or keyway as desired.

PART TWO : 16 mm. FILM (SOUND AND SILENT)

GENERAL

7. British Standard 16 mm. film shall conform in all respects to the arrangement, dimensions and requirements herein set out.

DIMENSIONS

8. British Standard 16 mm. film shall, subject to the tolerances herein specified, conform to the dimensions shown in Figs. 7 to 14 as follows :

a. Sound Film.

- Fig. 7. Cutting and perforating dimensions of negative and positive raw stock.
- Fig. 8. Camera aperture.
- Fig. 9. Film core.
- Fig. 10. Projector aperture.
- Fig. 11. Sound records and scanned area.

b. Silent Film.

- Fig. 12. Cutting and perforating negative and positive raw stock.
- Fig. 13. Camera aperture.
- Fig. 14. Projector aperture.

FRAME LINE

9. The centre of the frame line shall pass through the centre of a perforation, and the frame line shall be at right angles to the edge of the film.

FILM SPEED

10. The speed of 16 mm. sound film shall be 24 frames per second.

POSITION OF SOUND RECORD RELATIVE TO THE PICTURE APERTURE

11. The position of the sound record relative to the picture aperture shall be such that the centre of any picture shall be 26 frames further from the beginning of the reel than the corresponding modulation of

the sound track. The mark of the (sound start) on the leader shall be 26 frames nearer the beginning of the reel than the mark for the (picture start).

POSITION OF EMULSION (EXCEPT FOR SPECIAL PROCESSES)

12. In the projector the emulsion side of the positive faces the objective, and the sound track is on the right when viewed from the objective.

In the camera the emulsion side of the film faces the objective. Viewed from the objective the sound track is on the right.

PROJECTION REELS

13. Projection reels for 16 mm. film taking lengths of 400, 800, 1200 and 1600 ft. of film shall conform to the dimensions shown in Fig. 15.

PART THREE : 8 mm. FILM

GENERAL

14. British Standard 8 mm. film shall conform in all respects to the arrangement, dimensions and requirements herein set out.

DIMENSIONS

15. British Standard 8 mm. film shall, subject to the tolerances herein specified, conform to the dimensions shown in Figs. 16 to 18, as follows :

Fig. 16. Cutting and perforating negative and positive raw stock.

Fig. 17. Camera aperture.

Fig. 18. Projector aperture.

FRAME LINE

16. The centre of the frame line shall pass through the centre of a perforation, and the frame line shall be at right angles to the edge of the film.

FILM SPEED

17. The recommended speed of 8 mm. film shall be 16 frames per second.

POSITION OF EMULSION (EXCEPT FOR SPECIAL PROCESSES)

18. In the projector the emulsion side of the positive faces the objective.

In the camera the emulsion side of the film faces the objective.

PROJECTION REELS

19. 200 ft. projection reels for 8 mm. film shall conform to the dimensions shown in Fig. 19.

APPENDIX

NOTES ON POSITION OF SOUND TRACK ON 35 mm. FILM

(See Fig. 5)

The dimensions are those which have recently been adopted by the S.M.P.E. and the following are notes of the explanatory memorandum accompanying the proposal.

The dimensions for the position of the sound track relate only to 'release prints.'

Standards have only been laid down for those dimensions which should be accurately controlled.

In the case of the variable density track the opaque area provided between the sprocket holes and the track edge minimises sprocket hole development effects. Optimum use of the full width of the scanning slit is secured.

In the case of the 76-mil track the effective track width is limited on the film by the establishment of opaque areas. On the variable area track these opaque areas ensure full use of the track width while on the matted variable density track the dimensions of the opaque areas are such as to maintain proportionality between the various squeeze track matte widths and the resulting output.

All dimensions are specified from the guided edge of the film, i.e., that edge of the film along which the sound track runs and by which it is guided through recording, printing and reproducing equipment by means of a fixed edge guide in such equipment to keep the centre line of the track correctly disposed with respect to recording and reproducing apertures.

Tolerances are specified for those dimensions that are established. When no tolerance is given the deviation from the dimension specified should be held to a minimum.

The sound track is so placed on the negative that the track centre line on the release print will be at the proper distance from the guided edge of the film at the time the print starts its release run.

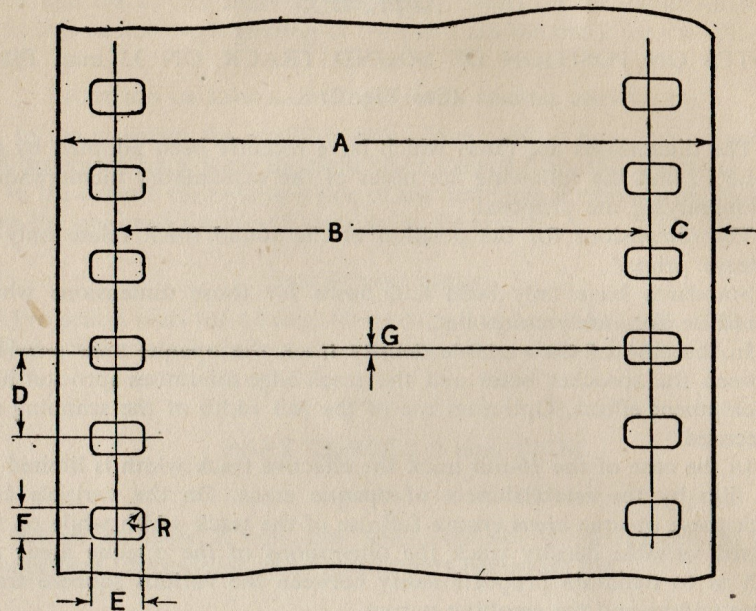


Fig. 1. Standard 35 mm. film
Cutting and perforating dimension of positive raw stock.

	Inches	Millimetres
A	1.378 { + 0.000 - 0.002	35.00 { + 0.00 - 0.05
B	1.109 ± 0.002	28.17 ± 0.05
C	0.134 ± 0.002	3.40 ± 0.05
D	0.187 0 ± 0.000 5	4.750 ± 0.013
E	0.110 0 ± 0.000 4	2.794 ± 0.01
F	0.078 0 ± 0.000 4	1.980 ± 0.01
G	Not > 0.001	Not > 0.025
R	0.02 approx.	0.5 approx.
L*	18.700 ± 0.015	475.0 ± 0.38

L* = the length of any 100 consecutive perforation intervals.
These dimensions and tolerances apply to the material immediately after cutting and perforating.

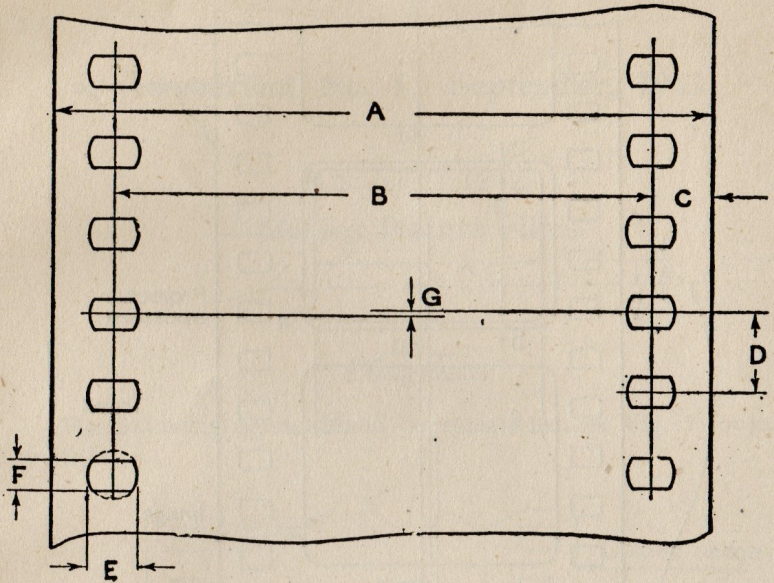


Fig. 2. 35 mm. negative film.
Cutting and perforating dimensions of negative raw stock.

	Inches	Millimetres
A	1.378 { + 0.000 - 0.002	35.00 { + 0.00 - 0.05
B	1.109 ± 0.002	28.17 ± 0.05
C	0.134 ± 0.002	3.40 ± 0.05
D	0.187 0 ± 0.000 5	4.75 ± 0.013
E	0.110 0 ± 0.000 4	2.794 ± 0.01
F	0.073 0 ± 0.000 4	1.854 ± 0.01
G	Not > 0.001	Not > 0.025
L*	18.70 ± 0.015	475.0 ± 0.381

L* = The length of any 100 consecutive perforation intervals.
These dimensions and tolerances apply to the material immediately after cutting and perforating.

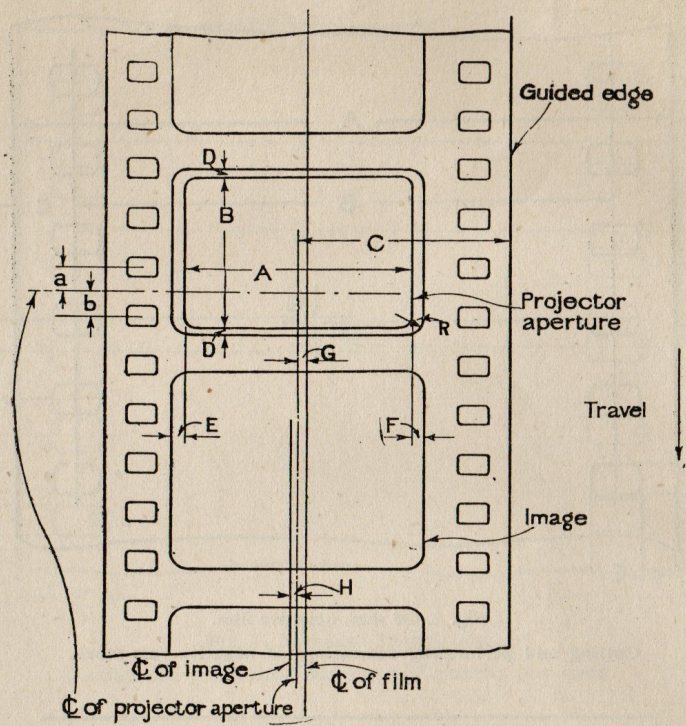


Fig. 3. Projector aperture.

	Inches	Millimetres
A	0.825 ± 0.002	20.95 ± 0.05
B	0.600 ± 0.002	15.25 ± 0.05
C	0.738 ± 0.002	18.74 ± 0.05
D	0.015	0.39
E	0.028	0.71
F	0.015	0.38
G	0.049	1.24
H	0.006	0.15
R	0.05 approx.	1.3 approx.

$a = b = \frac{1}{2}$ longitudinal perforation pitch.

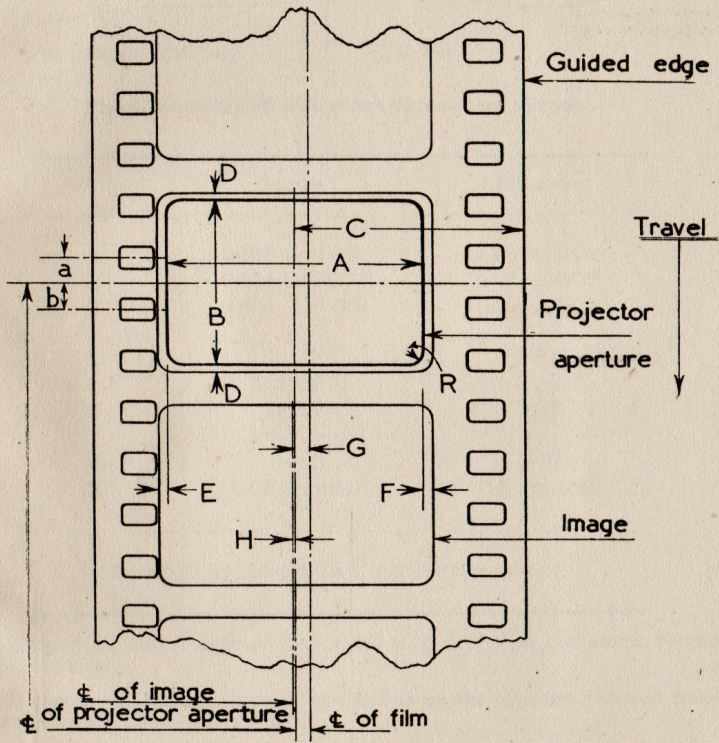
The aperture dimensions given result in a screen picture having a height-to-width ratio of 3 × 4 when the projection angle is 14 degrees.
These dimensions and locations are shown relative to unshrunk raw stock.

P.D. 156

Amendment No. 1. September, 1943
to
B.S. 677 : 1942
Motion Picture Films

Diagrams

The following figure should be substituted for Fig. 3 Projector aperture :



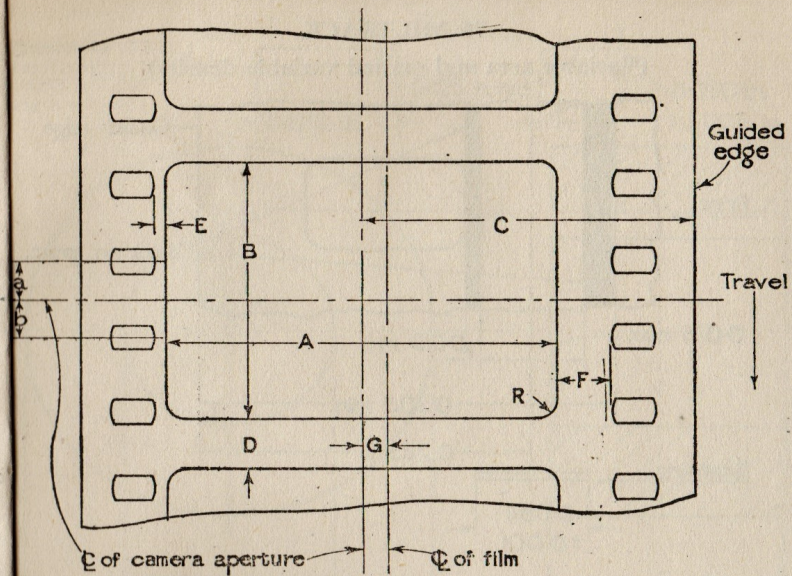


Fig. 4. Standard 35 mm. sound film camera aperture.

	Inches	Millimetres
A	0.868 ± 0.002	22.05 ± 0.05
B	0.631 ± 0.002	16.03 ± 0.05
C	0.744 ± 0.002	18.90 ± 0.05
D	0.117	2.97
E	0.010	0.25
F	0.121	3.07
G	0.055	1.40
R	0.03 approx.	0.8 approx.

$a = b = \frac{1}{2}$ longitudinal perforation pitch.

The dimensions and positions shown relate to unshrunk raw stock. Negative ;
Emulsion side down.

In the camera the emulsion side of the film faces the objective. Viewed from the
objective the sound track is on the left.

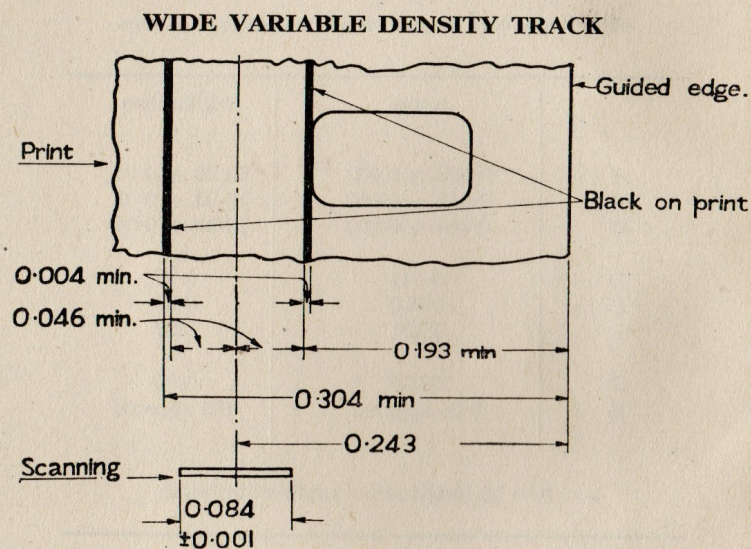
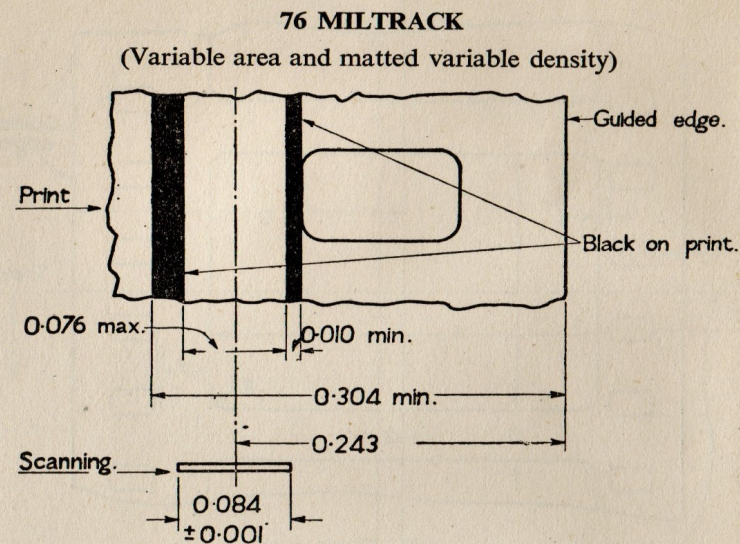


Fig. 5. Position of sound track on 35 mm. film.

All dimensions specified in inches.

All dimensions to apply on the print at start of release run.

Dimensions having no tolerance specification to be maintained to minimum practicable tolerances. A deviation greater than 0.002 in. is undesirable in any case.

Dimensions of Key :
Square section of side
= 0.090 ± 0.005
Length = 0.6875

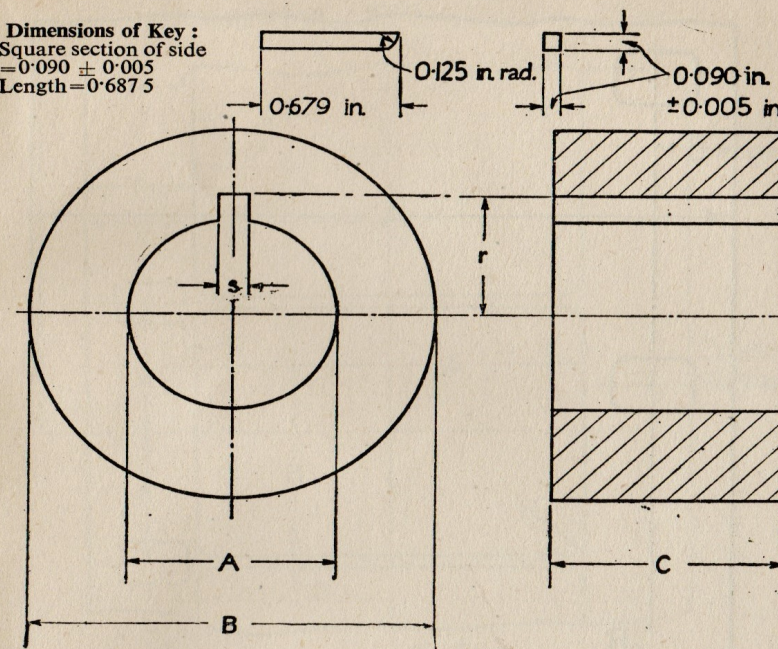


Fig. 6. Dimensions of cores for 35 mm. negative and positive stock.

	Millimetres	Inch equivalents
A	25.90 ± 0.20	1.020 ± 0.008
B	50.00 ± 0.25	1.968 ± 0.010
C	34.50 ± 0.50	1.358 ± 0.020
Recommended practice.		
r	16.70 ± 0.30	0.657 ± 0.012
s	4.00 ± 0.20	0.157 ± 0.008

Bore A to fit freely to hub 25.40 ± 0.1 mm. or 1.000 ± 0.004 in. diameter.

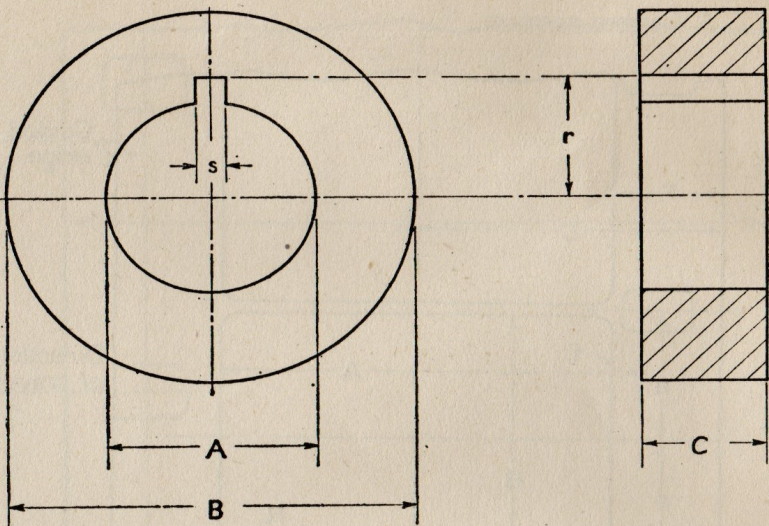


Fig. 9. 16 mm. film core.

	Millimetres	Inch equivalents
A	25.90 ± 0.20	1.020 ± 0.008
B	50.00 ± 0.25	1.968 ± 0.010
C	15.50 ± 0.50	0.610 ± 0.020
Recommended practice		
r	16.70 ± 0.30	0.657 ± 0.012
s	4.00 ± 0.20	0.157 ± 0.008

Bore A to fit freely to hub 25.40 ± 0.1 mm. or 1.000 ± 0.004 in. diameter.

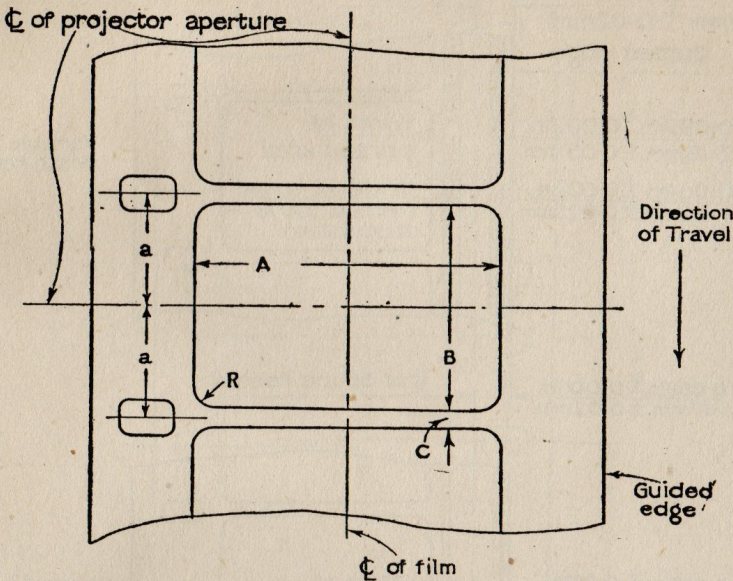


Fig. 10. 16 mm. sound film projector aperture.

	Inches	Millimetres
A	0.380 ± 0.002	9.65 ± 0.05
B	0.284 ± 0.002	7.21 ± 0.05
C	0.016	0.41
R	0.02	0.51

$a = \frac{1}{2}$ perforation pitch

These dimensions and positions relate to unshrunk raw stock.

In the projector the emulsion side of the positive faces the objective, except for special processes, and the sound track is on the right when viewed from the objective.

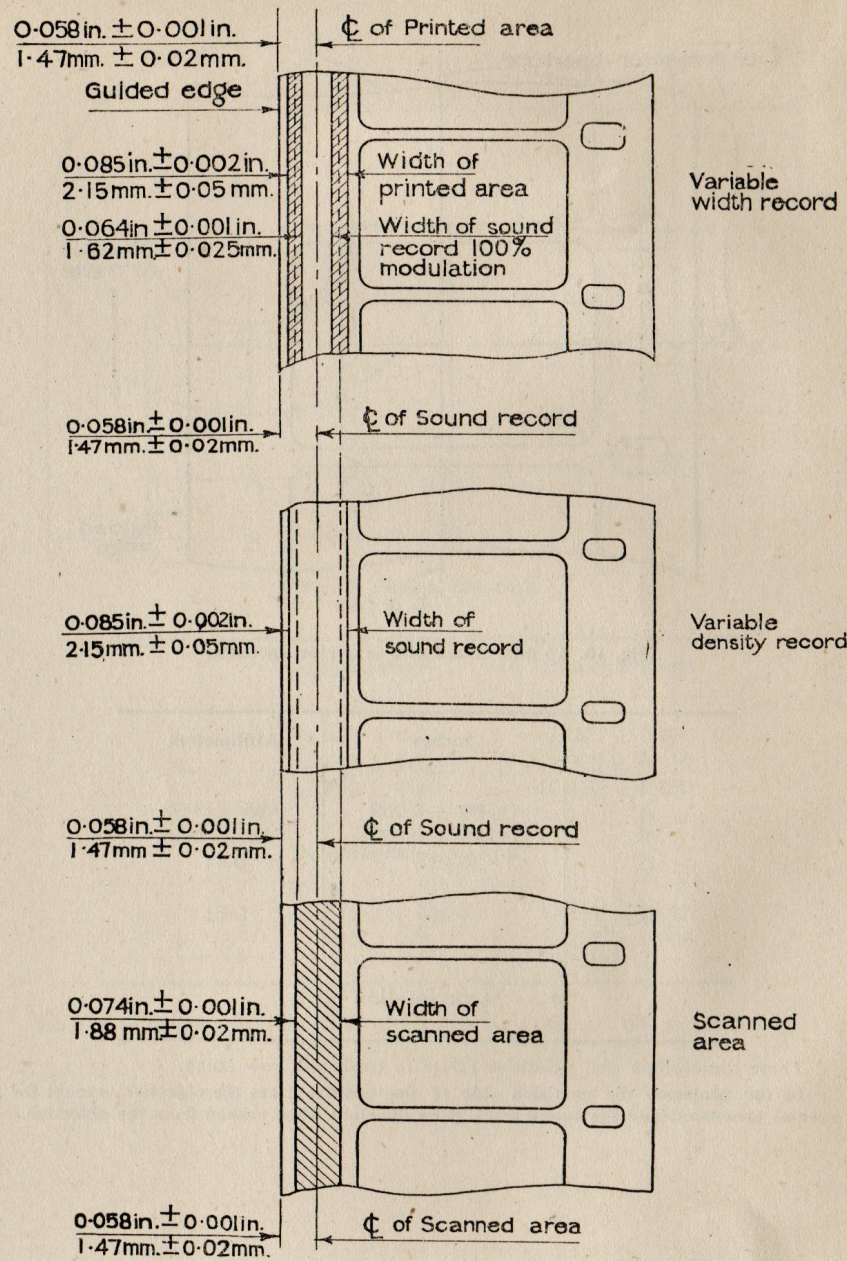


Fig. 11. 16 mm. sound film sound records and scanned area.

These dimensions and positions relate to unshrunk raw stock.

In the projector the base (not emulsion) side of the positive faces the light source and the sound track is on the left when viewed from the light source.

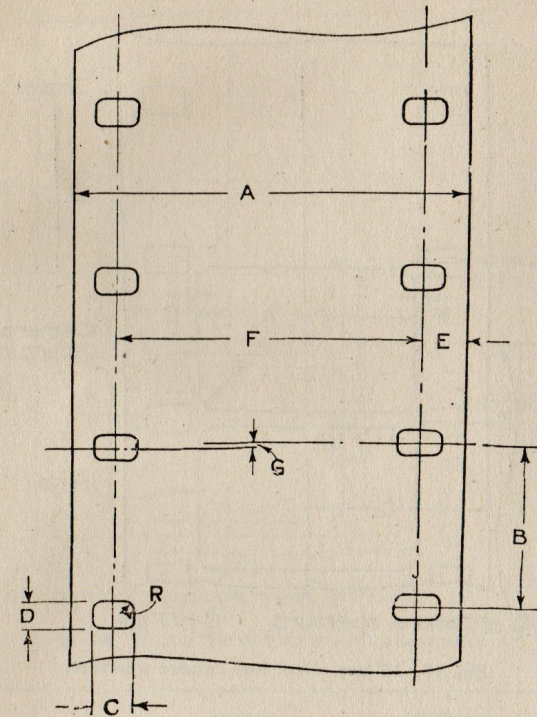


Fig. 12. 16 mm. silent film cutting and perforating negative and positive raw stock.

	Inches	Millimetres
A	0.630 { + 0.000 - 0.002	16.00 { + 0.00 - 0.05
B	0.300 0 ± 0.000 5	7.620 ± 0.013
C	0.072 0 ± 0.000 4	1.83 ± 0.01
D	0.050 0 ± 0.000 4	1.27 ± 0.01
E	0.072 ± 0.002	1.83 ± 0.05
F	0.485 ± 0.001	12.320 ± 0.025
G	Not > 0.001	Not > 0.025
L*	30.0 ± 0.03	762.00 ± 0.76
R	0.010	0.25

L* = The length of any 100 consecutive perforation intervals.

These dimensions and tolerances apply to the material immediately after cutting and perforating.

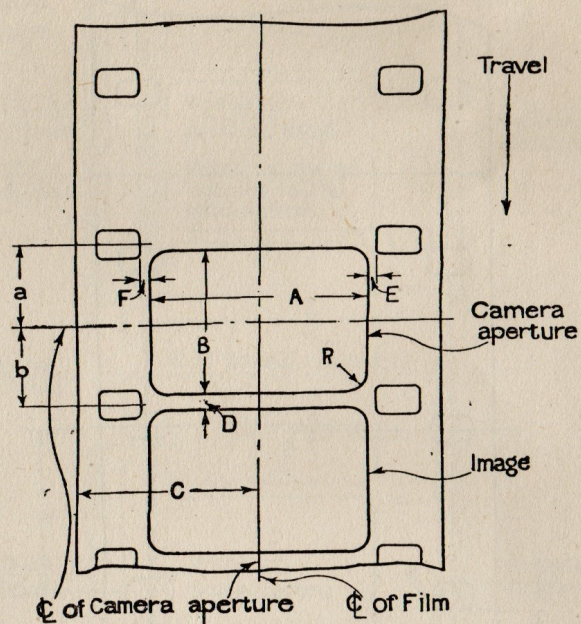


Fig. 13. 16 mm. silent film camera aperture.

	Inches	Millimetres
A	0.410 ± 0.002	10.41 ± 0.05
B	0.294 ± 0.002	7.47 ± 0.05
C	0.315 ± 0.002	8.00 ± 0.05
D	0.006	0.15
E	0.002	0.05
F	0.002	0.05
R	0.02 approx.	0.5 approx.

$a = b = \frac{1}{2}$ longitudinal perforation pitch

These dimensions and positions relate to unshrunk raw stock.
In the camera the emulsion side of the film faces the objective except for special process.

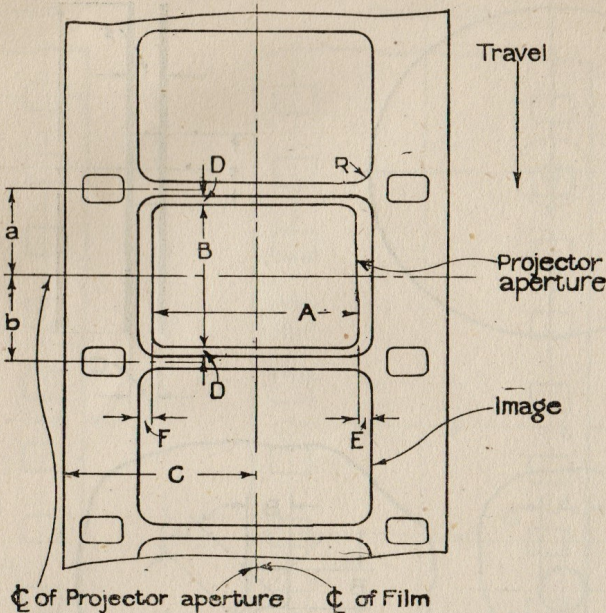


Fig. 14. 16 mm. silent film projector aperture.

	Inches	Millimetres
A	0.380 ± 0.002	9.65 ± 0.05
B	0.284 ± 0.002	7.21 ± 0.05
C	0.315 ± 0.002	8.00 ± 0.05
D	0.005	0.13
E	0.015	0.38
F	0.015	0.38
R	0.02 approx.	0.5 approx.

$a = b = \frac{1}{2}$ longitudinal perforation pitch

These dimensions and positions relate to unshrunk raw stock.

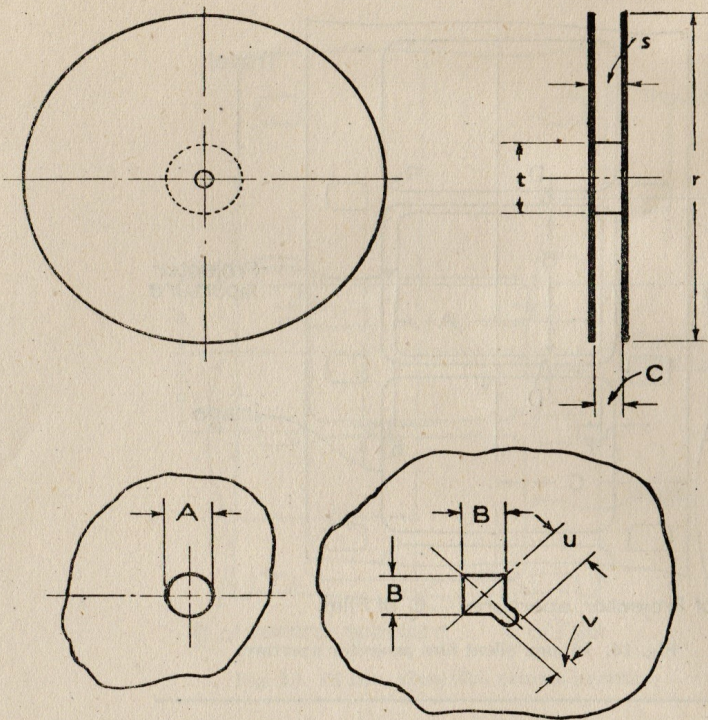


Fig. 15. 16 mm. film projector reels.

NOTE. Centre Spindle Holes. Either a combination of square and round holes or two square holes may be used, but attention is called to the fact that the former combination is claimed to be the subject of a registered design.

	400 feet	800 feet	1500 feet	120 metres	240 metres	480 metres
	Inches	Inches	Inches	Millimetres	Millimetres	Millimetres
A	0.319 $\left\{ \begin{array}{l} +0.000 \\ -0.003 \end{array} \right.$	0.319 $\left\{ \begin{array}{l} +0.000 \\ -0.003 \end{array} \right.$	0.319 $\left\{ \begin{array}{l} +0.000 \\ -0.003 \end{array} \right.$	8.10 $\left\{ \begin{array}{l} +0.00 \\ -0.08 \end{array} \right.$	8.10 $\left\{ \begin{array}{l} +0.00 \\ -0.08 \end{array} \right.$	8.10 $\left\{ \begin{array}{l} +0.00 \\ -0.08 \end{array} \right.$
B	0.319 $\left\{ \begin{array}{l} +0.000 \\ -0.003 \end{array} \right.$	0.319 $\left\{ \begin{array}{l} +0.000 \\ -0.003 \end{array} \right.$	0.319 $\left\{ \begin{array}{l} +0.000 \\ -0.003 \end{array} \right.$	8.10 $\left\{ \begin{array}{l} +0.00 \\ -0.08 \end{array} \right.$	8.10 $\left\{ \begin{array}{l} +0.00 \\ -0.08 \end{array} \right.$	8.10 $\left\{ \begin{array}{l} +0.00 \\ -0.08 \end{array} \right.$
C	0.677 min.	0.677 min.	0.677 min.	17.2 min.	17.2 min.	17.2 min.
Recommended practice				Recommended practice		
r	7.00	9.87	14.00	177.8	250.8	355.6
s	0.757	0.773	0.863	19.23	19.63	21.92
t	1.490	1.490	4.625	37.85	37.85	117.48
u	0.312	0.312	0.312	7.94	7.94	7.94
v	0.125	0.125	0.125	3.17	3.17	3.17

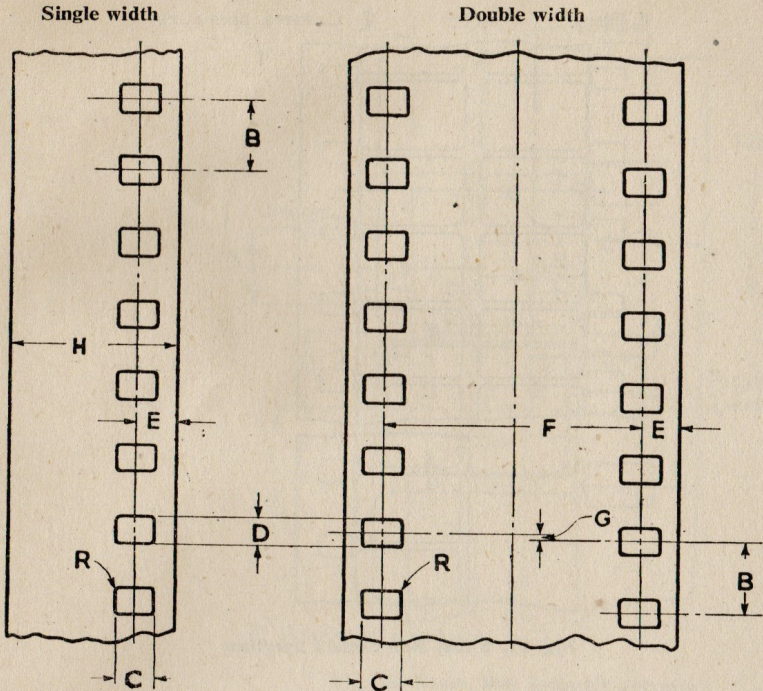


Fig. 16. 8 mm. film cutting and perforating negative and positive raw stock.

	Inches	Millimetres
A	0.630 $\left\{ \begin{array}{l} +0.000 \\ -0.002 \end{array} \right.$	16.00 $\left\{ \begin{array}{l} +0.00 \\ -0.05 \end{array} \right.$
B	0.150 ± 0.000 5	3.810 ± 0.013
C	0.072 ± 0.000 4	1.83 ± 0.01
D	0.050 0 ± 0.000 4	1.27 ± 0.01
E	0.072 ± 0.002	1.83 ± 0.05
F	0.485 ± 0.001	12.320 ± 0.025
G	Not > 0.001	Not > 0.025
H	0.315 $\left\{ \begin{array}{l} +0.000 \\ -0.003 \end{array} \right.$	8.00 $\left\{ \begin{array}{l} +0.00 \\ -0.08 \end{array} \right.$
L*	15.000 ± 0.015	381.00 ± 0.38
R	0.010	0.25

L* = The length of any 100 consecutive perforation intervals.
These dimensions and tolerances apply to the material immediately after cutting and perforating.
Film may be slit before or after processing.

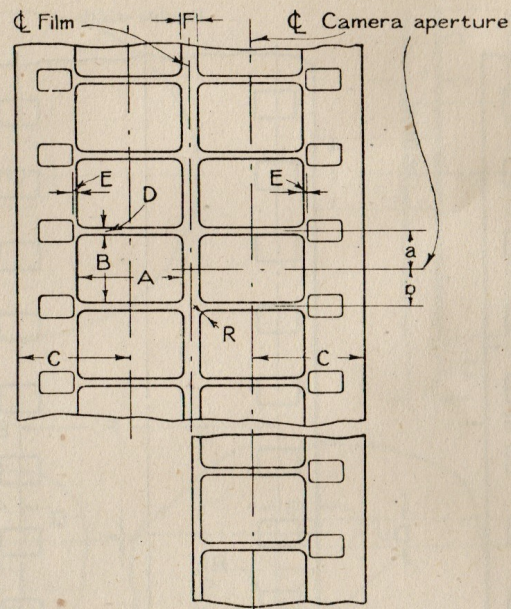


Fig. 17. 8 mm. film camera aperture.

	Inches	Millimetres
A	0.189 ± 0.001	4.80 ± 0.03
B	0.138 ± 0.001	3.51 ± 0.03
C	0.205 ± 0.002	5.22 ± 0.05
D	0.012	0.30
E	0.003	0.08
F	0.030	0.76
R	0.010	0.25

$a = b = \frac{1}{2}$ longitudinal perforation pitch.

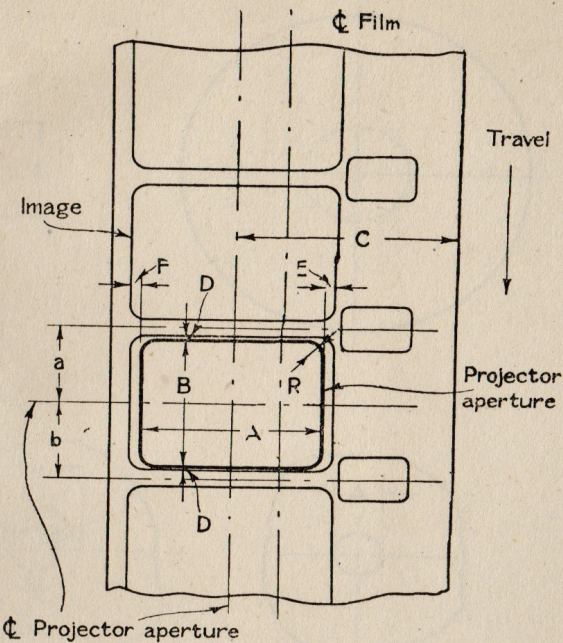


Fig. 18. 8 mm. film projector aperture.

	Inches	Millimetres
A	0.172 ± 0.001	4.37 ± 0.03
B	0.129 ± 0.001	3.28 ± 0.03
C	0.205 5 ± 0.002	5.22 ± 0.05
D	0.004	0.11
E	0.008	0.21
F	0.008	0.21
R	0.010	0.25

$a = b = \frac{1}{2}$ longitudinal perforation pitch.

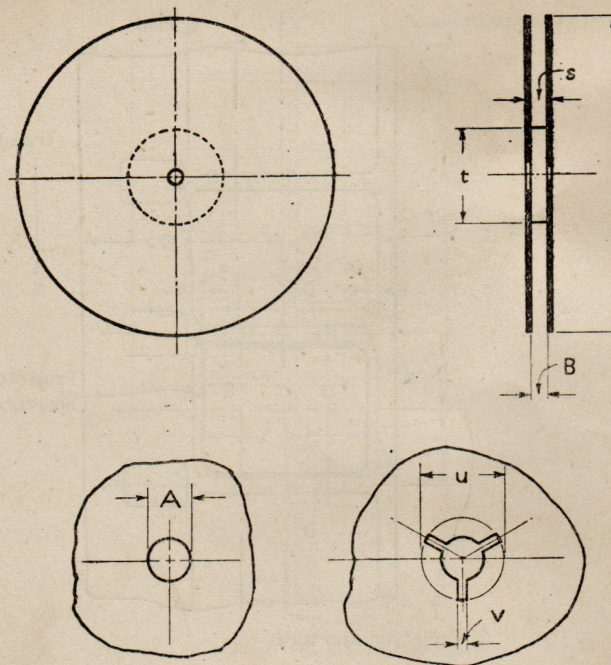


Fig. 19. 8 mm. reels.

Capacity, 200 ft. (60 metres)		
	Inches	Millimetres
A	$0.319 \begin{cases} + 0.000 \\ - 0.003 \end{cases}$	$8.10 \begin{cases} + 0.00 \\ - 0.08 \end{cases}$
B	0.35 min.	8.9 min.
Recommended practice		
<i>r</i>	5.00	127.0
<i>s</i>	0.41	10.5
<i>t</i>	1.49	37.8
<i>u</i>	0.63	16.0
<i>v</i>	0.06	1.6

Drive side of spool may have any desired odd number of driving slots, evenly spaced.

Waterlow & Sons Limited, 49, Parliament Street, Westminster, London, S.W.1.