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# International Standard



# 6903

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## **Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model I (capacity 60 m) — Cartridge-camera interface and sprocket drive — Dimensions and specifications**

*Cinématographie — Chargeur modèle I, de capacité 60 m, pour caméra 8 mm type S — Ajustement du chargeur dans la caméra et entraînement du débiteur — Dimensions et spécifications*

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**Descriptors :** cinematography, motion-picture film, motion-picture film 8 mm, motion-picture cameras, dimensions, specifications.

## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6903 was developed by Technical Committee ISO/TC 36, *Cinematography*, and was circulated to the member bodies in June 1983.

It has been approved by the member bodies of the following countries:

|                |        |      |
|----------------|--------|------|
| Canada         | Italy  | USA  |
| Czechoslovakia | Japan  | USSR |
| France         | Mexico |      |
| Germany, F.R.  | Sweden |      |

No member body expressed disapproval of the document.

# Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model I (capacity 60 m) — Cartridge-camera interface and sprocket drive — Dimensions and specifications

## 1 Scope and field of application

This International Standard lays down the dimensions of the 8 mm Type S Model I [capacity 60 m (200 ft)] motion-picture film camera cartridge and gives cartridge-camera interface specifications. This International Standard also lays down the dimensions of the sprocket drive opening and critical dimensions of the sprocket. In addition, the driving force, direction of drive and recommended drive ratio for 8 mm Type S [capacity 60 m (200 ft)] motion-picture film camera cartridge are specified.

An optional means of retaining the film supply until the cartridge is placed in the camera is described.

## 2 Dimensions

**2.1** The dimensions shall be as shown in the figures and given in the tables.

**2.2** The dimensions apply to an assembled cartridge with a film load at the time of manufacture.

**2.3** Datum planes B, C and A are referred to as first, second, and third respectively. These planes, which are used for dimensioning, are mutually perpendicular and are jointly called a datum reference frame.

**2.3.1** Datum plane A is coincident with the centre of a circle, located by basic dimension  $T$ . The circle is in contact with edges of the locating slot defined by dimensions  $A$ ,  $O$ ,  $P$  and  $Q$ . The diameter of the circle is such that it applies regardless of feature size (RFS) of the locating slot. (See the annex, clause A.3.)

**2.4** Datum features B, C and A are primary, secondary, and tertiary respectively.

**2.4.1** Datum feature B is the unnotched, unlabelled surface of the cartridge extending 50,8 mm (2.00 in) basic below and 41,53 mm (1.635 in) basic above the datum plane A. It is the primary datum feature and relates the cartridge to the datum reference plane by having a minimum of three points in contact with the first datum plane B.

**2.4.2** Datum feature C is the front seating surface of the cartridge, extending 50,8 mm (2.00 in) basic below and 41,53 mm (1.635 in) basic above datum plane A. It is the secondary datum feature and relates the cartridge to the datum reference frame having a minimum of two points in contact with the second datum plane C.

**2.5** Dimensions  $L$ ,  $N$ ,  $U$ ,  $A_m$ ,  $V$ ,  $M$ ,  $W$  and  $R_3$ , measured from datum planes A and C to the depth of dimension  $E$ , as shown in the view of the label side, describe the extent of both triangular recessed areas. The inboard wall of the recessed area, defined by dimensions  $L$  and  $N$ , shall be a smooth surface and may be tilted from the perpendicular to the datum plane B sufficiently to allow proper mould release when the cartridge is manufactured in a moulding process.

**2.6** The thickness of the wall of the cartridge used for notching, dimension  $W$ , shall be sufficient to withstand a force of at least 10 N (2.2 lbf), while deflecting no more than 1 mm (0.04 in).

NOTE — For the purpose of measurement, the force is applied by a solid round pin of nominal diameter 1,3 mm (0.05 in) centred 0,8 mm (0.03 in) nominally, above or below the film speed or filter notch coincident with basic dimension  $T$  on datum feature C.

**2.7** Dimension  $A$  specifies the normal overall thickness of the cartridge, extending from the bottom edge of the cartridge to the light lock rib (dimension  $U$ ), and within the light lock channel (dimension  $D_g$ ).

**2.8** Some cartridge manufacturers may desire to provide a means of retaining the film supply and take-up spools until the cartridge is placed in the camera. One method employs a spool locking device which is activated by a lock pin extending through datum feature B. Such a device should be designed to unlock the spools when the lock pin is depressed by seating the cartridge on the datum reference plane B (camera mechanism plate). The lock pin should be located within a zone from 12,7 mm (0.05 in) basic from datum plane A to 33 mm (1.3 in) basic from datum plane A within dimension  $B$ . The force required to hold the lock pin coincident with datum plane B shall not exceed 5,4 N (20 oz). The initial force to depress the lock pin may be significantly higher than the force required to hold the lock pin coincident with the datum plane B.

**2.9** Dimension  $M$  is measured from datum plane C.

**2.10** The sprocket axis shall be located within 0,25 mm (0.010 in) of the true centre formed by datum plane A and basic dimension  $A_f$ .

**2.11** Dimensions  $C_a$ ,  $C_b$ ,  $C_c$  and  $C_m$ , are diameters.

**2.12** Dimensions  $B_t$ ,  $B_u$  and  $B_v$ , define an optical guide provided to facilitate film loading at the time of cartridge manufacture.

### 3 Take-up drive

**3.1** The direction of rotation for the core shall be "clockwise" (right-hand drive) the same as the sprocket when viewed from the sprocket side of the cartridge.

**3.2** After disengagement of any film locking device, the cartridge shall operate with a nominal torque of  $9,2 \times 10^{-3}$  N·m (1.3 ozf·in) with a permissible range of  $7,1 \times 10^{-3}$  N·m (1.0 ozf·in) to  $10,6 \times 10^{-3}$  N·m (1.5 ozf·in). (See the annex, clause A.2.)

To enable cameras to automatically distinguish between the 8 mm Type S [capacity 60 m (200 ft)] cartridge and the 15 m (50 ft) capacity sound and silent cartridges, a spring-loaded drive plate is incorporated in the sprocket of the 60 m (200 ft) capacity cartridge. The spring-loaded drive plate will react

axially against the sprocket drive mechanism of the camera with a nominal force of 3,9 N (14 ozf) with a permissible range of 2,8 N (10 ozf) to 5,0 N (18 ozf), when the spring-loaded drive plate is depressed to within 0,5 mm (0.02 in) from datum plane B.

NOTE — Four driving lugs are shown in the sprocket, and it is recommended that the camera sprocket driver be designed in such a way as to present a plane surface for the four lugs to bear against.

**3.3** When operating the cartridge loaded with film without a magnetic sound stripe, proper film transport requires that all of the camera's film transport mechanisms, including those for recording sound, be activated. [This may not be required when using the 15 m (50 ft) capacity silent cartridge.]

### 4 Bibliography

ISO 1780, *Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model I — Aperture, camera aperture profile, film position, pressure pad and pressure pad flatness — Dimensions and specifications.*<sup>1)</sup>

ISO 3024, *Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model I — Camera run length, perforation cut-out and end-of-run notch in film — Specifications.*

ISO 3067, *Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model I — Notches for film speed, film identification and colour-balancing filter — Dimensions and positions.*

1) At present at the stage of draft. (Revision of ISO 1780-1975.)

Table 1 — Dimensions\*

| Dimensions             | mm             | Dimensions              | mm            |
|------------------------|----------------|-------------------------|---------------|
| <i>A</i>               | 24,23 ± 0,25   | <i>B<sub>h</sub></i>    | 8,81 min.     |
| <i>B</i>               | 75,9 ± 0,3     | <i>B<sub>j</sub></i>    | 12,75 min.    |
| <i>C</i>               | 35,31 ± 0,25   | <i>B<sub>k</sub></i>    | 21,34 min.    |
| <i>E</i>               | 19,81 max.     | <i>B<sub>l</sub></i>    | 6,60 max.     |
| <i>F</i>               | 2,3 ± 0,3      | <i>B<sub>m</sub></i>    | 2,36 ± 0,38   |
| <i>G</i>               | 1,5 ± 0,3      | <i>B<sub>n</sub></i>    | 39,37 max.    |
| <i>H</i>               | 22,4 ± 0,8     | <i>B<sub>p</sub></i>    | 32,51 max.    |
| <i>J</i>               | 15,5 ± 0,8     | <i>B<sub>q</sub></i>    | 47,96 min.    |
| <i>K</i>               | 0,38 ± 0,25    | <i>B<sub>s</sub></i>    | 16,71 min.    |
| <i>L</i>               | 11,94 min.     | <i>B<sub>t</sub></i>    | 19,99 max.    |
| <i>M</i>               | 0,18 ± 0,13    | <i>B<sub>u</sub></i>    | 5,08 min.     |
| <i>N</i>               | 4,50 min.      | <i>B<sub>v</sub></i>    | 45°           |
| <i>O</i>               | 3,91 ± 0,10    | <i>B<sub>w</sub></i>    | 3,84 ± 0,30   |
| <i>P</i>               | 3,61 ± 0,10    | <i>B<sub>y</sub></i>    | 15° ± 2°      |
| <i>Q</i>               | 19,56 ± 0,25   | <i>B<sub>z</sub></i>    | 15° ± 2°      |
| <i>R<sub>1</sub></i>   | 12,7 ± 2,5     | <i>C<sub>a</sub></i>    | 17,53 max.    |
| <i>R<sub>2</sub></i>   | 6,4 ± 1,3      | <i>C<sub>b</sub></i>    | 14,10 min.    |
| <i>R<sub>3</sub></i>   | 4,06 max.      | <i>C<sub>c</sub></i>    | 12,70 min.    |
| <i>R<sub>4</sub></i>   | 1,27 min.      | <i>C<sub>d</sub></i>    | 6,71 max.     |
| <i>R<sub>5</sub></i>   | 1,02 max.      | <i>C<sub>e</sub></i>    | 0,51 max.     |
| <i>R<sub>6</sub></i>   | 6,4 min.       | <i>C<sub>f</sub></i>    | 1,02 ± 0,38   |
| <i>S</i>               | 25,9 ± 0,3     | <i>C<sub>g</sub></i>    | 45° nom.      |
| <i>T**</i>             | 22,10          | <i>C<sub>h</sub></i>    | 2,29 ± 1,27   |
| <i>U</i>               | 31,12 min.     | <i>C<sub>j</sub></i>    | 2,03 ± 0,25   |
| <i>V</i>               | 3,18 max.      | <i>C<sub>k</sub></i>    | 1,65 ± 0,38   |
| <i>W</i>               | See 3.6        | <i>C<sub>l</sub></i>    | 27,28 max.    |
| <i>Y</i>               | 3,84 ± 0,30    | <i>C<sub>m</sub></i>    | 7,87 max.     |
| <i>A<sub>f</sub>**</i> | 40,84          | <i>C<sub>n</sub></i>    | 45°           |
| <i>A<sub>m</sub></i>   | 46,61 min.     | <i>C<sub>p</sub></i>    | 42,98 ± 0,38  |
| <i>A<sub>n</sub></i>   | 59,44 min.     | <i>C<sub>q</sub></i>    | 50,42 ± 0,76  |
| <i>A<sub>p</sub></i>   | 26,21 max.     | <i>C<sub>r</sub></i>    | 4,70 max.     |
| <i>A<sub>q</sub></i>   | 18,62 ± 0,20   | <i>C<sub>s</sub></i>    | 42,04 ± 0,51  |
| <i>A<sub>s</sub></i>   | 43,43 ± 0,30   | <i>C<sub>t</sub></i>    | 4,19 ± 0,51   |
| <i>A<sub>t</sub></i>   | 43,94 min.     | <i>C<sub>u</sub></i>    | 15° ± 5°      |
| <i>A<sub>u</sub></i>   | 48,01 min.     | <i>C<sub>v</sub></i>    | 13° ± 5°      |
| <i>A<sub>v</sub></i>   | 50,80 ± 0,25   | <i>C<sub>w</sub></i>    | 25° ± 5°      |
| <i>A<sub>w</sub></i>   | 30° ± 1°<br>5° | <i>C<sub>x</sub></i>    | 2,54 min.     |
| <i>A<sub>y</sub></i>   | 15,75 min.     | <i>C<sub>y</sub></i>    | 7,87 ± 0,51   |
| <i>A<sub>z</sub></i>   | 12,75 min.     | <i>C<sub>z</sub></i>    | 165,10 φ max. |
| <i>B<sub>a</sub></i>   | 1,02 ± 0,20    | <i>D<sub>a</sub></i>    | 83,19 max.    |
| <i>B<sub>b</sub></i>   | 8,10 ± 0,20    | <i>D<sub>b</sub></i>    | 2,39 ± 0,51   |
| <i>B<sub>c</sub></i>   | 29,26 min.     | <i>D<sub>c</sub>**</i>  | 31,65         |
| <i>B<sub>d</sub></i>   | 16,76 max.     | <i>D<sub>d</sub></i>    | 33,02 ± 0,38  |
| <i>B<sub>e</sub></i>   | 13,54 max.     | <i>D<sub>e</sub>**</i>  | 133,02        |
| <i>B<sub>f</sub></i>   | 45° nom.       | <i>D<sub>f</sub>***</i> | 15° ± 2°      |
| <i>B<sub>g</sub></i>   | 4,11 ± 0,38    | <i>D<sub>g</sub></i>    | 5,46 ± 0,20   |

\* All dimensions given in imperial units are shown in the annex.

\*\* Basic dimension — No tolerance intended.

\*\*\* In three places.

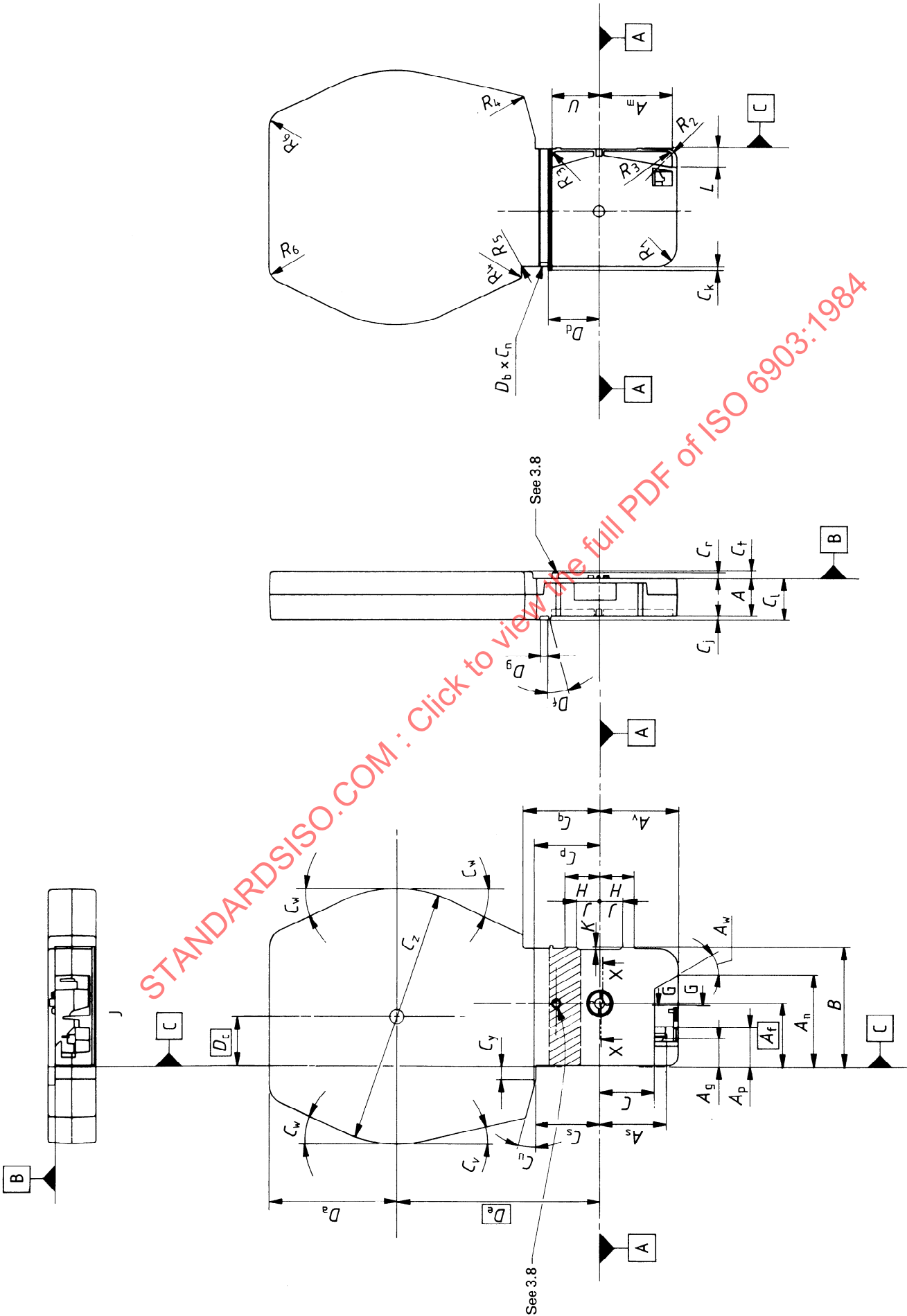
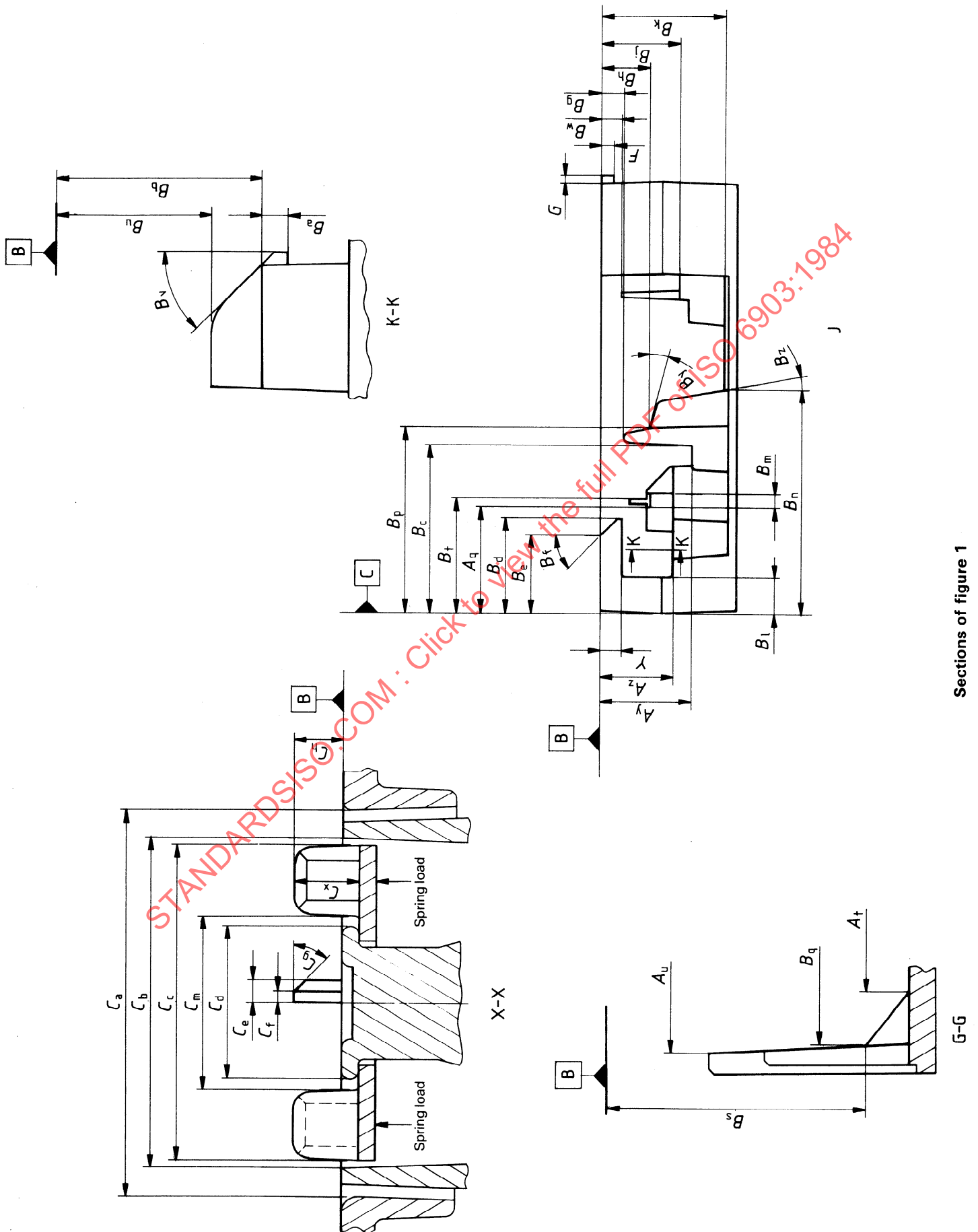


Figure 1 — Cartridge



Sections of figure 1

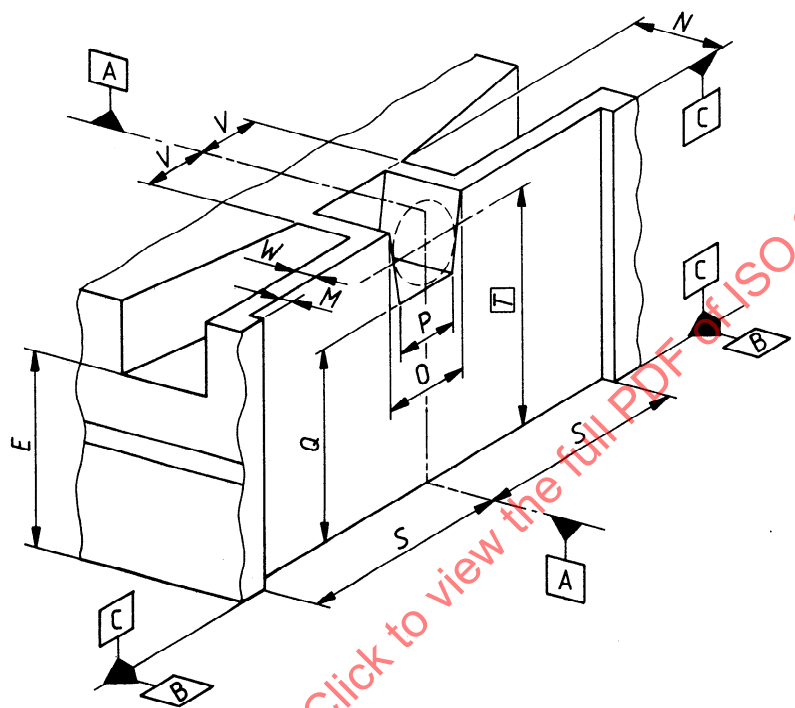


Figure 2 — Camera-locating slot

## Annex

(This annex forms part of the standard.)

**A.1** In designing the sprocket driver, consideration should be given to the fact that tooth-on-tooth engagement of the sprocket lug on the camera drive pin is a possibility.

**A.2** It is recommended that the sprocket be tendency driven (by some form of slip-drive mechanism) with a drive ratio of at least one turn of the sprocket driver for every fourteen strokes of the pull-down claw when no slippage occurs.

**A.3** To provide a consistent method of measurement, it is recommended that a cartridge gauging fixture be used which incorporates datum surfaces, a locating pin, and means of exerting locating forces on appropriate surfaces of the cartridge.

Table 2 — Inch dimensions

| Dimensions | in                                                                    | Dimensions | in                     |
|------------|-----------------------------------------------------------------------|------------|------------------------|
| $A$        | $0.954 \pm 0.010$                                                     | $B_h$      | 0.347 min.             |
| $B$        | $2.99 \pm 0.01$                                                       | $B_j$      | 0.502 min.             |
| $C$        | $1.390 \pm 0.010$                                                     | $B_k$      | 0.840 min.             |
| $E$        | 0.780 max.                                                            | $B_l$      | 0.260 max.             |
| $F$        | $0.09 \pm 0.01$                                                       | $B_m$      | $0.093 \pm 0.015$      |
| $G$        | $0.06 \pm 0.01$                                                       | $B_n$      | 1.550 max.             |
| $H$        | $0.88 \pm 0.03$                                                       | $B_p$      | 1.280 max.             |
| $J$        | $0.61 \pm 0.03$                                                       | $B_q$      | 1.888 min.             |
| $K$        | $0.015 \pm 0.010$                                                     | $B_s$      | 0.658 min.             |
| $L$        | 0.470 min.                                                            | $B_t$      | 0.787 max.             |
| $M$        | $0.007 \pm 0.005$                                                     | $B_u$      | 0.200 min.             |
| $N$        | 0.177 min.                                                            | $B_v$      | 45°                    |
| $O$        | $0.154 \pm 0.004$                                                     | $B_w$      | $0.151 \pm 0.012$      |
| $P$        | $0.142 \pm 0.004$                                                     | $B_y$      | $15^\circ \pm 2^\circ$ |
| $Q$        | $0.770 \pm 0.010$                                                     | $B_z$      | $15^\circ \pm 2^\circ$ |
| $R_1$      | $0.50 \pm 0.10$                                                       | $C_a$      | 0.690 max.             |
| $R_2$      | $0.25 \pm 0.05$                                                       | $C_b$      | 0.555 min.             |
| $R_3$      | 0.160 max.                                                            | $C_c$      | 0.500 min.             |
| $R_4$      | 0.050 min.                                                            | $C_d$      | 0.264 max.             |
| $R_5$      | 0.040 min.                                                            | $C_e$      | 0.020 max.             |
| $R_6$      | 0.25 min.                                                             | $C_f$      | $0.040 \pm 0.015$      |
| $S$        | $1.02 \pm 0.01$                                                       | $C_g$      | 45° nom.               |
| $T^*$      | 0.870                                                                 | $C_h$      | $0.090 \pm 0.050$      |
| $U$        | 1.225 min.                                                            | $C_j$      | $0.080 \pm 0.010$      |
| $V$        | 0.125 max.                                                            | $C_k$      | $0.065 \pm 0.015$      |
| $W$        | See 3.6                                                               | $C_l$      | 1.074 max.             |
| $Y$        | $0.151 \pm 0.012$                                                     | $C_m$      | 0.310 max.             |
| $A_t^*$    | 1.608                                                                 | $C_n$      | 45°                    |
| $A_m$      | 1.835 min.                                                            | $C_p$      | $1.692 \pm 0.015$      |
| $A_n$      | 2.340 min.                                                            | $C_q$      | $1.985 \pm 0.030$      |
| $A_p$      | 1.032 max.                                                            | $C_r$      | 0.185 max.             |
| $A_q$      | $0.733 \pm 0.008$                                                     | $C_s$      | $1.655 \pm 0.020$      |
| $A_s$      | $1.710 \pm 0.012$                                                     | $C_t$      | $0.165 \pm 0.020$      |
| $A_t$      | 1.730 min.                                                            | $C_u$      | $15^\circ \pm 5^\circ$ |
| $A_u$      | 1.890 min.                                                            | $C_v$      | $13^\circ \pm 5^\circ$ |
| $A_v$      | $2.000 \pm 0.010$                                                     | $C_w$      | $25^\circ \pm 5^\circ$ |
| $A_w$      | $30^\circ \begin{smallmatrix} +1^\circ \\ -5^\circ \end{smallmatrix}$ | $C_x$      | 0.100 min.             |
| $A_v$      | 0.620 min.                                                            | $C_y$      | $0.310 \pm 0.020$      |
| $A_z$      | 0.502 min.                                                            | $C_z$      | 6.500 $\phi$ max.      |
| $B_a$      | $0.040 \pm 0.008$                                                     | $D_a$      | 3.275 max.             |
| $B_b$      | $0.319 \pm 0.008$                                                     | $D_b$      | $0.094 \pm 0.020$      |
| $B_c$      | 1.152 min.                                                            | $D_c^*$    | 1.246                  |
| $B_d$      | 0.660 max.                                                            | $D_d$      | $1.300 \pm 0.015$      |
| $B_e$      | 0.533 max.                                                            | $D_e^*$    | 5.237                  |
| $B_f$      | 45° nom.                                                              | $D_f^{**}$ | $15^\circ \pm 2^\circ$ |
| $B_g$      | $0.162 \pm 0.015$                                                     | $D_g$      | $0.215 \pm 0.008$      |

\* Basic dimension — No tolerance intended.

\*\* In three places.