Lens mounts of Kodak Ciné-Kodak movie cameras

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ABSTRACT AND INTRODUCTION

The "home movie" era began in the U.S. when Eastman Kodak, in 1923, introduced 16 mm safety film and a practical camera to use it. Over the ensuing decades, Kodak introduced a number of 16 mm movie cameras. In 1932, Kodak introduced 8 mm movie film, and a series of cameras using that medium emerged. With a few exceptions, these cameras all had the Ciné-Kodak "marque", and were the beginnings of what we might call the Ciné-Kodak dynasty. Many of these cameras (some in later versions) were arranged for interchangeable lenses, using a repertoire of different mounts. In this article we will see the various mounts and how they operate. Included is information on how features of the mounts may interact with the camera's eye level viewfinder for control of the viewfinder field of view as lenses of different focal length are used.

1. GENERAL

1.1 Companion article

The context within which these lens mounts emerged is described in this article by the same author: "The film and cameras that made 'home movies' possible".

1.2 The era

The scope of this article is primarily limited to lens mounts used on Ciné-Kodak movie camera models introduced up through 1956. Later models may involve different mount systems not discussed here.

1.3 Head count

Overall, there were nine different "interchangeable" lens mounts used on Kodak motion picture cameras. Six of these were used on 16 mm cameras, two on 8 mm cameras, and one on both.

1.4 Mount families and subfamilies

We will see that sometimes a basic mechanism concept will be adopted, in different configurations, in several types of mounts, to be used on different camera models. In one case, a consistent mount is used on several camera models, but the lenses that can be used with

it (and that were supplied for use with various models) differ, perhaps with respect to how the lens is locked in place.

1.5 Summary table

Appendix A gives a table summarizing the mounts described in this article.

2. THREADED MOUNTS

These mounts involve male threads on the lens and matching female threads on the "port" in the camera into which the lens is screwed. I have limited information on the details of several of these mounts, but the roster is listed here for information.

- Model A mount. Used on the Ciné-Kodak model A, the later version arranged for interchangeable lenses (1927-)
- Type A mount. Used on the Ciné-Kodak model E (1937-1946). Said to be technically indistinguishable from the Type C mount.
- Type C mount. Standard threaded mount (1"-32 TPI). Used on the Ciné-Kodak K-100 (1955-1959). This mount is widely used on video cameras and various optical instruments made by many manufacturers. I will actually discuss this mount in some detail (see section 6.).
- Type D mount. Basic threaded mount (5/8"-32 TPI). Used on the Ciné-Kodak Reliant and Ciné-Kodak Medallion 8 mm cameras.

3. THE MODEL A MOUNT

The first Kodak movie camera was the Ciné-Kodak (which, after the emergence of the Ciné-Kodak Model B, came to be known as the Ciné-Kodak Model A), introduced In 1923.

Figure 1. Ciné-Kodak Model A

Figure 1 shows a typical Model A.

It was initially equipped with a (non interchangeable) 25 mm f3.5 lens or (starting in 1924) a 25 mm f/1.9 lens. Later (1927) it became equipped for interchangeable lenses, using a threaded mount, unique to this camera (and called the "Model A mount"). The "standard" lens was a 25 mm f/1.9 lens. There was one alternative lens, a 78 mm f/4.5 telephoto.

We have no further information on this mount.

4. THE MODEL B MOUNT

4.1 Introduction

The Ciné-Kodak Model B was Kodak's first motor driven (spring motor, that is) movie camera, introduced in 1926. The first version was equipped with a 20 mm f/6.5 fixed focus lens. Shortly there became available another version with a 25 mm f.3.5 fixed focus lens. These lenses were not intended to be interchangeable. They were screwed into an internal "front plate" of the camera with a parochial thread.

Next there came a version with a 25 mm f/1.9 focusing lens. It was mounted with three screws that held a "foot plate" on the lens to the front of the camera. Although this is not an "interchangeable lens mount", it is the precursor of one. We see this arrangement in figure 2.

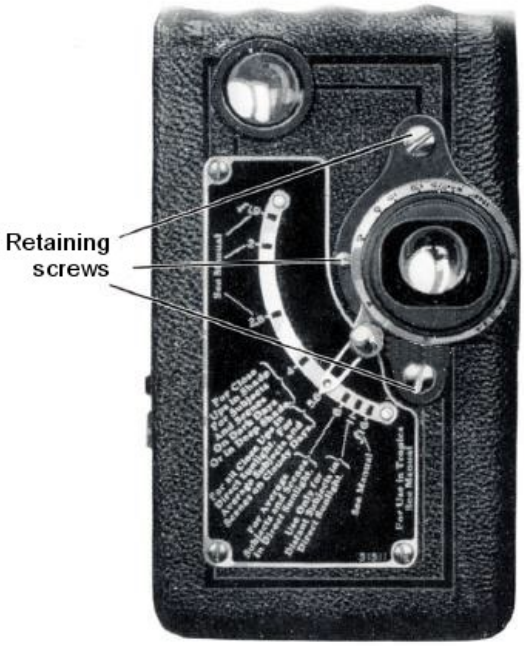

Figure 2. Ciné-Kodak Model B (f/1.9 lens) lens mounting

The manual tells the user that in the rare event that the rear of the lens need to be cleaned the lens could easily be removed for that

purpose by merely removing the three screws. We suspect that this was actually planned to be an "interchangeable lens" mount, but it never actually took on that role.

A rare intermediate form replaced two of the three slotted-head screws with screws with a long shank and a knurled head, allowing the user to more easily remove the lens and replace it with another. No third screw was used. We do not know what other lenses were available with this mount.[1]

We see this arrangement in figure 3.

Figure 3. Ciné-Kodak Model B f/1.9 lens special mount

Photo courtesy of Michael Cleveland

In the next iteration (1928), the f/1.9 lens version of the camera had a bona fide interchangeable lens mount. An alternative lens (using that mount) was available, a 78 mm f.4.5 telephoto lens. (We believe that there were never further lenses made with that mount.) This mount is usually described as the "Model B mount."

4.2 The Model B mount

Figure 4 shows this mount on a Ciné-Kodak Model B, the interchangeable lens version, with a 25 mm f/1.9 lens in place.

[1] Thanks to Michael Cleveland for bringing this rare mount to our attention.

Figure 4. Model B mount, 25 mm f/1.9 lens in place

The lens proper is threaded (permanently) into what I call a *foot plate* (black in the picture); it is part of what we overall call the "lens". The foot plate has two or three projecting posts (two in the case of the lens shown)

Each of the posts on the lens has, near its tip, a slot, cut from the left (as seen from the front of the camera). Figure 5 shows a typical lens with this mount.

Figure 5. 25 mm f/1.9 lens with Model B mount

In figure 6 we see the mount with no lens in place. We see the holes, H, through which the lens posts enter the camera side of the mount.

On the front of the camera are three bosses emerging through the front of the camera case from an interior front plate of the camera.

The three bosses are located at 12 o'clock, 6 o'clock, and 9 o'clock.[2] The two or three posts from the lens enter holes in these bosses (the 9 o'clock post does not always occur). We see these bosses in figure 6.

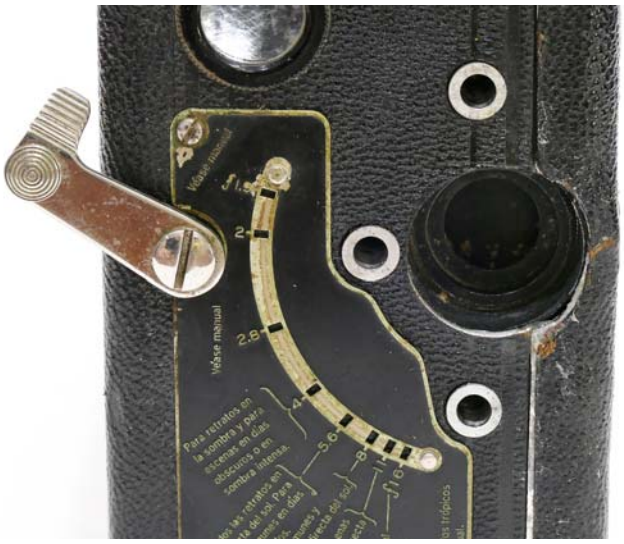

Figure 6. Model B mount, camera side, no lens in place

On the front of that front plate (but behind the camera housing) is a slide with three prongs. Each of these enters one of the three bosses through a slot in the side of the boss. With the lens locked in place, their tips enter the slots in the lens posts.

The slide is moved by the lever, L. An eccentric, behind the camera front, rotated by the lever, works in a slot in the slide to move it. In figure 4 we see the lever in the "lens locked" position, in which the slide prong tips are driven to our right, into the slots on the posts from the lens assembly. In figure 6, we see the lever in the "lens unlocked" position.

The faces of the slots away from the lens proper are beveled, and the tips of the locking slide are beveled to match. Thus, as the slide moves toward the posts, its tip can easily enter the slots and then, as the slide goes into place, this cams the lens assembly against the tips of the bosses, accurately locating it.

In fact, the locating slide is made of spring metal, and when it is fully "home", each tip has ridden up the bevel in the corresponding slot to the point where the prong carrying the tip is deflected. Thus, regardless of small dimensional variations, the lens is held against the locating surfaces of the three bosses by substantial spring force.

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[2] We believe that their locations are precisely that of the three screws in the earlier f/1.9 lens (noninterchangeable lens) version of the camera.

To unlock the lens so it can be removed, the lever is swung upward. The eccentric withdraws the locking slide tips from their engagement with the posts, and the lens is free to be removed.

We note that the posts on this particular lens are fastened to the foot plate with stylish acorn nuts. This arrangement is presumably intended to allow the exact relative positioning of the posts being attained during assembly (the holes in the foot plate through which the tips of the posts extend being slightly "oversize").

But on lenses having three posts, the 9 o'clock post is staked to the foot plate. The reason is that a nut here would block the motion of the aperture indicating pointer, which sweeps over that part of the foot plate. And of course with two of the three posts able to move in two dimensions during assembly, the necessary geometric relationships among all three posts can be attained during assembly.

In other lenses with this mount, the foot plate is cast, and the posts are screwed into it from the rear (no location adjustment during assembly being available).

The eye-level viewfinder located on the top of the camera has a field of view matching that of the camera with a 25 mm lens in place. Thus when the 78 mm lens is mounted, an alternative viewfinder is put into effect. We see it in figure 7.

Figure 7. Ciné-Kodak Model B with 78 mm lens in place

Its front element (F) is part of the lens, and is hinged so it can be laid flat against the lens body when it is not needed. The viewfinder's rear element (R) is mounted to the left side door of the camera (where there are three tapped holes to receive it) when the lens is first used

(it is provided with the lens). It can be folded flat when not needed. This is a “peep sight” finder, with no lens at either end.

5. THE KEYHOLE LOCK MOUNT FAMILY

5.1 Introduction

That name is mine. As we will see later, variations of this design were used on several camera models. In general, the mount of this genre on a particular model is spoken of in terms of the applicable camera model.

5.2 Versions

There are three versions of this mount family.

5.2.1 *Two studs, oblique*

We will first examine the variant used on the Ciné-Kodak Special camera (but not on the Ciné-Kodak Special II). We see this in figure 8. The picture is annotated to facilitate later reference.

Figure 8. Lens mount on Ciné-Kodak Special

This mount is often called the “CKS mount” (from an abbreviation for the camera model on which it is used), but is sometimes referred to as the “Type P” mount.

The Ciné-Kodak Special (introduced in 1933) has a two-lens turret. In the picture, we partially see the "inactive" lens, upside down, to the left.

The camera side of this mount has two studs (S), located at about 5 o'clock and 11 o'clock. The studs are threaded into the turret plate.

The lens is fastened ("permanently") into a hub on what I will call the *foot plate* (F) of the mount. It has a "flag" at the top, used to support the viewfinder lens (VL), about which more later. But much of the foot plate is hidden in this view.

In this mount family, there extend from the front of the camera body two or three studs (this differing between the various specific mounts in the family).

A short cylindrical sleeve on the hub (we can see it as C in figure 9, which shows the mount from behind), projecting through the foot plate, fits into a hole on the turret plate. A shoulder on the boss lies against the plate (assuming that the mount is pressed toward the camera; it is, as we will see shortly). Thus the lens is precisely located in both lateral position and azimuth.

The foot plate has a hole in it for each of the two studs, so the lens assembly can be put in place with its foot plate located by its engagement with the studs.

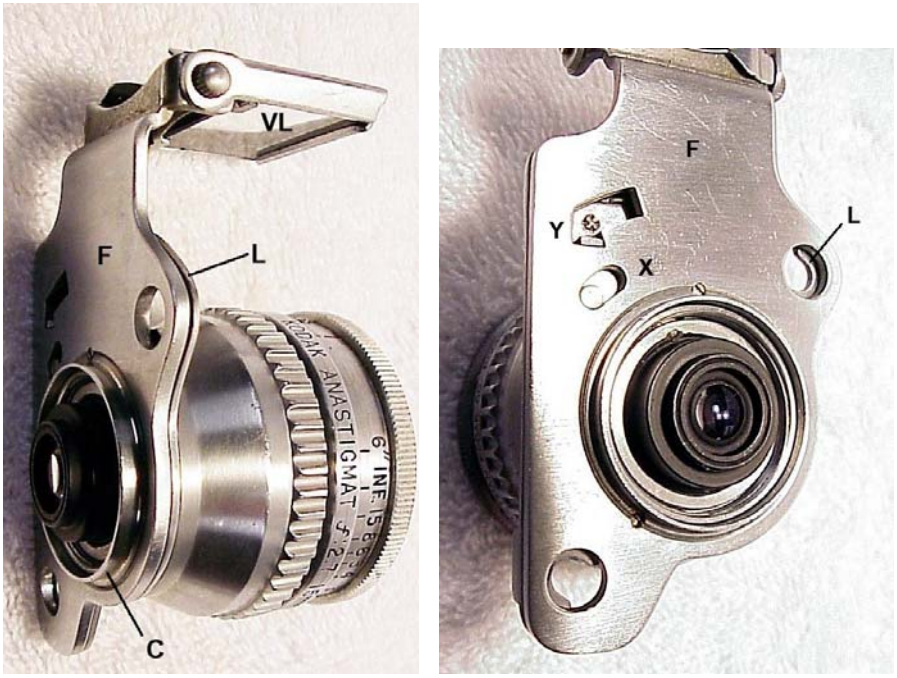

Figure 9. Ciné-Kodak Special mount from camera side

In front of the foot plate is another metal plate of generally similar overall shape. I will call this the lock plate (L). It is held in place against the foot plate by a shoulder on the hub, but not tightly. Thus it

can rotate on the mount barrel. However, its rotation is limited by a pin extending from the lock plate into a small circular arc in the foot plate. We see that arrangement at X in figure 9, which shows a typical mount of this type from the camera side.

The lock plate is also provided with a hole for each stud, but these are “keyholes”, with their narrow “tails” extending in a circumferential direction, counterclockwise (as seen looking at the lens in place).

With the lens and mount ready to be mounted, the lock plate is in a position where the round portions of the keyholes align with the round holes on the foot plate (this is a position slightly counterclockwise from where we see it in figure 8). Then the whole lens assembly can be put in place over the studs.

Next the lock plate is rotated slightly clockwise (probably by pushing on the button, B, in figure 8, and perhaps also by pressing on the tab, T). The result is that the narrow parts of the keyholes now fit into the grooves on the studs, locking the whole assembly in place. We see the assembly in this situation.

Then, a small latch on the back of the lock plate drops into a notch on the foot plate, locking the lock plate against inadvertent disengagement (we see this at Y in figure 9).

When it is time to remove the lens, the user moves upward button B, releasing the latch and allowing the lock plate to be rotated counterclockwise (using the button as a handle, and perhaps also pulling on tab T), releasing the lens assembly for removal from the camera.

Looking into a further subtlety, we can see from the left hand panel of figure 9 that the lock plate, which is thin and made of a springy metal, is slightly “dished” (concave away from the camera). The annular grooves in the studs have tapered faces. The locking features of the lock plate, in its relaxed state, are a little outboard of where they can gladly enter the grooves. But they cam themselves into place along the tapered faces of the grooves, the lock plate flexing toward the foot plate in the process. Thus the retention of the lens assembly to the camera is spring loaded, assuring that the proper lens position is attained in the face of small tolerance variations in the components.

Quite commonly, and as seem in these pictures, the lens assembly may carry, on the “flag” of the foot plate, a viewfinder lens (VL). This will be the front lens of the open eyelevel viewfinder on the top of the

camera. This lens gives the viewfinder a field of view matching that of the camera with this objective lens aboard.[3]

The viewfinder lens can be folded back against the top of the camera, just as we can do with the rear lens of the viewfinder, when the viewfinder is not in use.

5.2.2 *Two studs, vertical*

In this variant, there are also two studs, but they are located on a vertical axis (at 12 o'clock and 6 o'clock). This variant is used on the Ciné-Kodak Eight Model 60, an 8 mm spool loading camera. We see it in figure 10.

Here we should be able to recognize all the familiar players from the discussion of the previous version.

As with the Ciné-Kodak Special, the Model 60 is provided with a folding open eye level viewfinder, designed to give a field of view matching that of the camera with the "standard" lens in place. We see that in figure 11.

Figure 10. Lens mount on Ciné-Kodak Eight Model 60

The viewfinder is integrated with the handle, and is readied for use by raising the handle. We see in place the "standard" lens assembly whose field of view is matched by the viewfinder in its basic form. We

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[3] For certain lenses, notably those with greater focal lengths, the viewfinder "lens" is actually only a mask. When such a lens assembly is used, at the rear of the viewfinder, the lens that is normally there is slid out of the way, leaving only a "peep sight", which collaborates with the mask at the front to give a "life size" view of the proper extent.

note that the foot plate of this lens assembly is provided with a "fairing" to integrate it stylistically with the camera's aesthetic design.

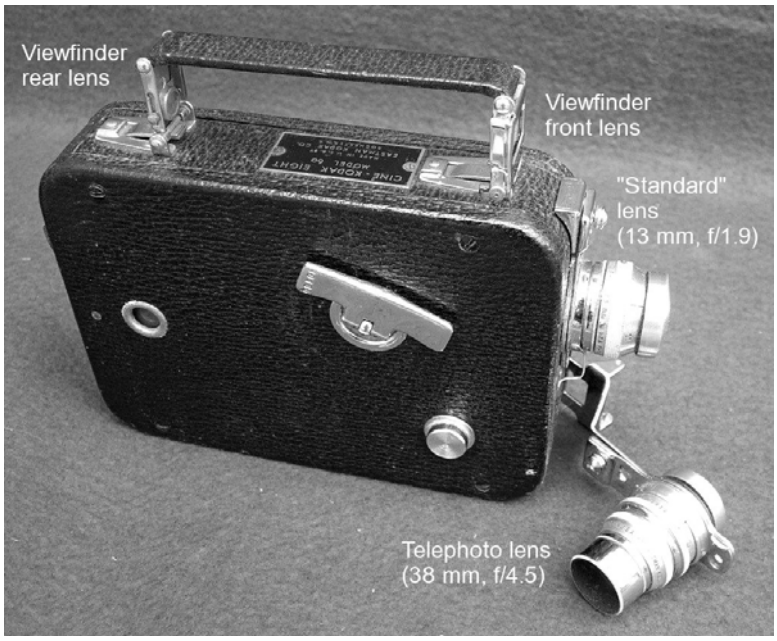

Figure 11. Ciné-Kodak Eight Model 60 viewfinder and lenses

We also see the optional telephoto lens (38 mm, f/4.5). For this focal length, the viewfinder is converted from the reverse Galilean type to a simple "peep sight" form (much like the "sports finders" sometimes used on still cameras). In this case, a flag on the lens carries the front mask; at the front standard of the viewfinder proper the lens is folded down out of the optical path; and at the rear standard of the viewfinder, the lens is slid down, leaving only the peep sight hole.

The participate in this scheme, the mount flag has a substantial "kink" in it to provide the proper placement of the mask.

5.2.3 *Three studs*

A variant of this mount concept using three studs is used on the Ciné-Kodak Model K, and on the Model BB, f/1.9 version, both 16 mm roll loading cameras. This mount is called the Model K mount. We see this mount in figure 12 on a Model K.

Two of the studs (S1, S2) are, as in the previously-described mount, located at 12 o'clock and 6 o'clock, but there is a third stud (S3) at 9 o'clock. It differs from the first two studs in that:

- Its diameter is slightly less
- It does not have an annular groove. Rather it has a straight-across slot cut from its bottom up.

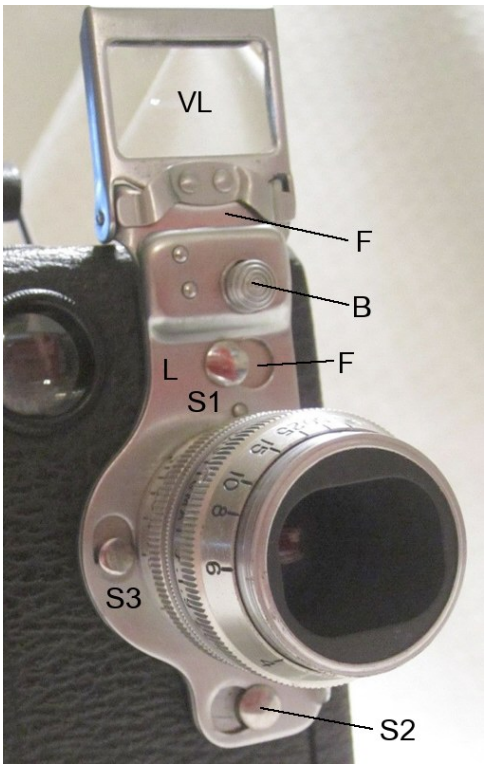

Figure 12. Model K lens mount on a Ciné-Kodak Model K

Locking plate L does not have, for this third stud, the familiar keyhole shaped hole. Rather, the hole is rather like an elongated "D", with the flat side at the bottom. When the locking plate is rotated (clockwise) into its locking position (as seen in the picture), the bottom edge of that hole rises into the slot of the stud, engaging the lens assembly to the camera at that point.

We assume that the purpose of the third stud is to provide greater stability for the lens, perhaps especially in the case of lenses that are physically long. We do not know the philosophy of the different locking arrangement for the third stud.

The Model K has an open eye level viewfinder. Only the rear lens is provided on the camera body. Each lens has, on a flag arising from its foot plate, the appropriate front lens (VL in the picture).

For certain focal lengths, the viewfinder is converted from the reverse Galilean type to a simple "peep sight" form In this case, the flag on the lens carries only a mask, and at the rear standard of the viewfinder, the lens is slid down, leaving only the peep sight hole.

On the Model BB, the rear viewfinder element is mounted on the camera body, as is a front element suited for use with a 25 mm lens (e.g., the "basic" lens, 25 mm f/1.9) Thus the 25 mm f/1.9 lens does not carry a viewfinder front element (unlike the 25 mm f/1.9 lens, with this same mount, provided for use with the Model K). So we see

a case in which two cameras using the same mount nevertheless require different forms of the same lens!

But for other lenses available for the model BB, the corresponding front viewfinder lens is part of the lens, and the indigenous viewfinder front element is folded down, out of the way, when such a lens is mounted.

5.3 The bayonet mount–Type M

5.3.1 *Introduction*

All Ciné-Kodak magazine cameras introduced through about 1950, both 16 mm and 8 mm, use what is called the Type M mount. The actual retention of the lens assembly uses a bayonet principle, and is consistent over all pertinent cameras and lenses. But there are various styles of locking the lens in place used by different lens series, and subtle differences in dealing with that matter over the cameras.

We will first note that all the cameras on which this mount is used (the magazine load cameras) have a viewfinder, sometimes internal and sometimes external, in either case with a zoom scheme for making the viewfinder field of view match that of the camera with a lens of certain focal length in place. Thus there is (generally) no need for a Type M mount lens to have a viewfinder lens nor the long flag that would require.

Figure 13 shows the camera side of a typical Type M mount lens.

Figure 13. Typical Type M mount

There are on the protruding lens barrel two short pins. We see only one in this picture; the other is identical and diametrically opposite.

Figure 14 shows, on a typical magazine camera, the port into which the lens barrel will go.

Figure 14. Port for Type M mount lens
(on Magazine Ciné-Kodak Eight Model 90 camera)

The lens is inserted so that its pins travel into the radial slots we see in the figure. The lens is then rotated counterclockwise to engage it with the camera.

At the end of rotation, the pins on the lens barrel come under two tabs, which are which are part of a stiff spring plate, which must deflect slightly as the pins come under the tabs. (That plate is the thick part, grayish in the picture owing to corrosion—the camera was 77 years old when this picture was taken!) Thus there is a (serious) spring force that holds the lens properly against its seat on the camera.

We also see in the figure, above the port, a spring loaded plunger. This will play a role in locking the lens in place. But there are three arrangements on the lens as to how this is done.

5.3.2 *Variant 1*

We see in figure 15 the first of these arrangements, which I identify as “variant 1” of the Type M mount lens (this is not recognized terminology).

Figure 15. Type M mount (variant 1)
(Magazine Ciné-Kodak)

A modest length flag extending upward from the lens assembly has a hole into which the spring plunger will extend when the lens reaches its fully engaged position (as seen in the picture). Wings on the flag can be used to help turn the lens into position.

To remove the lens, the operator depresses the spring plunger so it will no longer prevent rotation of the lens, and then, perhaps again pushing on one of the wings on the flag, rotates the lens clockwise until the pins can come out through the radial slots. The tip of the plunger is rounded, and the sides of the hole on the rear of the flag are beveled, so it will not be necessary for the operator to depress the plunger fully clear of the flag before the lens can be turned.

We note that with this mount the direction of rotation to engage and disengage the lens is the opposite of that we saw on the keyhole lock mounts—this one follows the “righty loosy” convention.

5.3.3 *Variant 2*

In figure 16 we see variant 2, a rather more sophisticated locking system.

Here the flag of the lens assembly has a little housing, H, which conceals the opening into which the plunger will shoot into the lens assembly flag to lock the lens in position. To remove the lens, the operator pushes to the right the button, B. A cam on the rear of the

button pushes in the plunger, disengaging it from the flag to allow rotation of the lens assembly. Perhaps by pushing on the button (or its housing), the lens is rotated clockwise until its pins can come free through the radial slots.

Figure 16. Type M mount (variant 2)
(Magazine Ciné-Kodak Eight Model 90)

The inventor of that version says in his patent, "And still another object is to provide a latch of small and pleasing contour so that when it is permanently fixed to a removable lens mount it will add a finished and neat appearance thereto."

5.3.4 *Variant 3*

In figure 17 we see variant 3, an even more tidy looking implementation of the Type M mount.

Here the lens has no flag. When it is inserted into the camera (there is, by the way, no mechanical scheme to assure that this is done "right side up"),[4] the user turns it counterclockwise, using a toothed ring on the lens (immediately adjacent to the camera when the lens is in place).

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[4] If when this mount was originally developed it had been visualized that a version with no flag would later emerge, the pins could have been made asymmetrical so that, even without a flag, the lens could only be inserted the right way up.

Figure 17. Type M mount (variant 3)
(Ciné-Kodak Royal Magazine)

In figure 18 we see the lens mounting port on a Ciné Kodak Royal Magazine.

When the lens reaches its fully engaged position, a small latch in the camera (we see it, black, just inside the upper bayonet slot) drops in behind the upper bayonet pin, locking the lens assembly against inadvertent disengagement. (Only cameras intended to use lenses of this variant–the Ciné-Kodak Royal Magazine–have that latch.)

Figure 18. Lens mount port—Ciné-Kodak Royal Magazine

Note that, although it is not directly part of the locking scheme for this lens, the camera still has the familiar spring-loaded plunger.

To remove the lens, the user pushes in the plunger (even though it has not engaged anything). Through an internal linkage this retracts the latch holding the bayonet pin. The lens is then free to be rotated (clockwise), using the toothed ring, until the pins line up with the slots and the lens is free to remove from the camera.

If this kind of Type M mount lens is mounted on a camera not intended to use this variant (that is, not having the little latch), the lens is "adequately" retained in the engaged position by the friction of the bayonet scheme. This is probably not a situation recommended by Kodak, but it will work if necessary.

And of course one can mount on this camera a lens with either a variant 1 or variant 2 locking arrangement. The plunger will lock either of them in the familiar way. When it is depressed to free the flag, that also clears the little latch in the bayonet engagement proper.

5.4 Interchangeability

While an M-mount lens intended for use on an 8 mm camera may well fit mechanically on a 16 mm camera, that does not mean that it will be properly functional. Most notably, it may well not produce the "image circle" needed to cover the entire 16 mm frame.

I would suspect that interchange on the opposite direction (a lens intended for use with a 16 mm camera put on an 8 mm camera) would be workable, but I have no authentic information on this.

5.5 The Type S mount

5.5.1 *Introduction*

As the various Ciné-Kodak cameras emerged, a large repertoire of "ciné" lens designs also emerged. Many of these lens designs were suitable, optically, for use on more than one camera model, but to exploit this, each of these lenses had to be made in multiple versions having different mounts. The result was surely an escalating logistic nightmare for Kodak.

To get this under control, Kodak, in 1933, introduced a Universal Lens Mount for ciné lenses, known as the Type S mount. It was intended to be eventually be used for all lenses to be used on 16 mm Ciné-Kodak cameras.

It would, however, be many years before Kodak introduced a camera that natively took lenses with this mount. The immediate plan was that new lenses would only be made with this mount, and there would be adapters that would adapt various cameras' mount systems to accept Type S mount lenses.

Of course the adapter situation became its own nightmare, especially given that many cameras relied on the lens assembly to provide the proper front lens for the camera's eye level viewfinder.

Figure 19. Typical S mount on lens

5.5.2 *The mount proper*

The principle of the Type S mount can be seen in figure 19, which shows a mount on typical lens assembly of that type.

The cylindrical barrel of the mount enters a matching opening in the camera. The single locating pin enters a slot in the camera[5] to assure proper rotational position of the lens.

Just above the flange on the mount is a set of fine pitch threads.[6] The lens is pulled into place and held there by a ring, permanently part of the camera but free to rotate, which has internal threads matching the external threads on the lens assembly.

5.5.3 *A camera of its own*

In 1948, a second generation version of the very popular "professional" Ciné-Kodak 16 mm camera, the Ciné-Kodak Special, was introduced (known as the Ciné-Kodak Special II).

A major difference from the first generation model was a change in the shape of the two-lens turret to prevent the two lenses from interfering with each other, physically or optically, for certain combinations of lenses.

While they were at that, Kodak changed the mount used by the camera from the keyhole lock version we discussed at length in section 5.2.1 to the Type S mount. That mount finally had a camera that used it directly. Ironically, this was also the last Kodak ciné camera to natively use the Type S mount.

Figure 20 shows a Ciné-Kodak II, on which we can see the camera side of the Type S mount.

Here, one locking ring is occupied with holding a (serious) lens in place but the other one is waiting to receive a lens. We can see in the latter ring two of the four locating slots and. less clearly, the internal threads of the ring. The ring is typically provided with a nice coarse toothed exterior to facilitate its manipulation.

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[5] Actually there are four slots, 90° apart. This allows the lens to be mounted in one of four rotational positions. This is often needed for various reasons in connection with professional cinematography.

[6] This is a "four start" thread, meaning that there are four helical ridges traveling side by side. This facilitates "starting" the ring onto the lens, as there are four rotational positions of the ring for which engagement can start.

Figure 20. Type S mount locking rings on Ciné-Kodak Special II

On this camera, the rings are provided with ball bearings where they bear against an internal thrust flange, an elegant implementation, in keeping with the spirit of this camera model.

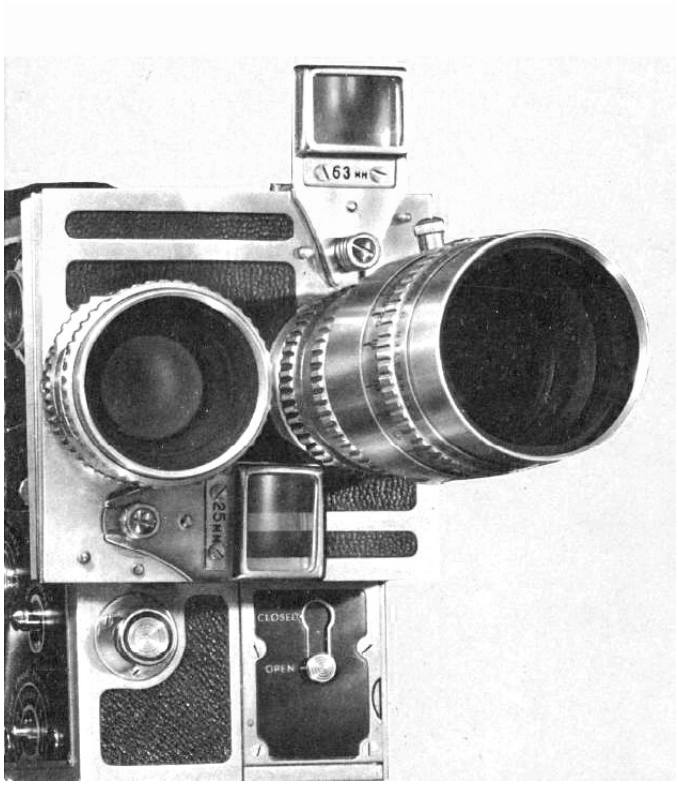

Figure 21. Viewfinder lenses on a Ciné-Kodak Special II

5.5.4 *The viewfinder front lens element*

But now there is a further wrinkle. The eye level viewfinder of the Ciné-Kodak Special was dependent on the lens assembly to provide it with an appropriate front element, and this viewfinder needs that or

something equivalent. The Type S mount does not lend itself to doing this with a lens or mask atop a vertical flag on the lens itself.

So for the Ciné-Kodak Special II, the various viewfinder front elements were separate items, mounted by sliding a fork on the element under a spring loaded cylinder on a stud on the camera turret. We can see this on figure 21.

The rear of the cylinder is convex, and drops into a recess around the fork slot (we can see that in figure 22) to keep the element in place on the stud as we manipulate it. (A stop stud to the right of the element's proper position helps us find that position.) When we get the element properly oriented, a hole in the element plate engages a small stud on the turret to keep the element in place, in the proper position.

Because this creature on the "inactive" lens position can get in the road of various controls (like the "run" button), and because we might in fact for some reason want to retire the viewfinder element on the "current" lens, we can, by leaning the element out to disengage it from the small pin, lay the viewfinder element to the side, where it can drop onto a different pin to hold it there. We see this for the viewfinder element on the "inactive" lens (on our left) in figure 21.

It is all sort of agricultural, but very practical.

Figure 22. Viewfinder elements for Ciné-Kodak Special II

In Figure 22, we see four of the available viewfinder elements. They cover lens focal lengths of 25 mm, 63 mm, 102 mm, and 152 mm.[7]

[7] These odd-seeming focal length choices for the lenses come about because the lens designs were originally based on handy focal lengths in inches: 1", 2.5", 4", and 6".

Note that for the two greater focal lengths, these elements are just masks. For those focal lengths, we operate the viewfinder in its “peep sight” mode, where there is only a mask at the front and where, at the rear standard, we retire the lens leaving only a “peep sight hole”.

Figure 23. Adapter–Type S to Ciné-Kodak Eight Model 60

5.5.5 *Adapters for Type S mount lenses*

A wide range of adapters were made to allow lenses with the Type S mount to be used on various Ciné-Kodak cameras, with various mounts.

Figure 23 shows an adapter for using a 15 mm Type S lens on a Ciné-Kodak Eight Model 60. We see the familiar locking organs of an Eight Type 60 mount, and the adapter flag carries the appropriate front viewfinder lens for a 15 mm lens. We see the locating notch for the single pin on a Type S lens (there is only one notch), and the ring with internal threads that will draw the lens into place and hold it there. (No ball bearings here, though!)

There is an adapter that is identical to this, except that it has the “three stud” version of the keyhole locking mount, to allow this same 15 mm lens to be used on a Ciné-Kodak Special.

In figure 24 we see an adapter for using various Type S lenses (notably those with focal lengths greater than the “kit lens”) on a Ciné-Kodak Special.

Figure 24. Adapter– Type S to Ciné Kodak Special

Here we see the familiar locking organs for a Ciné-Kodak Special lens. The flag here carries a viewfinder front lens that equips the viewfinder to work with a 50 mm lens, plus a "booklet" of three masks, with identifying tabs, used in connection with that lens to complete the viewfinder setup for lenses of three focal lengths.

The adapter is supplies with six of these masks, to suit all the then-current telephoto lenses in the repertoire. The user puts in place the three that accommodate his telephoto lenses (maybe one or two just being placeholders, since three must be in place for them to be properly aligned with certainty). Actually, there are only certain selections of three of the six that can be used, because of the way they are mounted.

There is a similar adapter intended to allow the use of a 25 mm Type S mount lens on a Ciné-Kodak Special. It also has masks to accommodate various lenses of greater focal length. These are of course different than the masks for those focal length lenses on the adapter shown in figure 24, as in this case they are working with a base viewfinder lens giving the proper field of view for a 25 mm lens rather than for a 50 mm lens.

5.5.6 *And so on and so forth*

There are many other fascinating creatures in the stable of adapters for Type S lenses, but they are beyond the scope of this article.

6. THE TYPE C MOUNT

6.1 History

The Type C mount was developed by Bell & Howell, reportedly introduced in 1926. Over the years it came into wide use for the ciné

cameras of many manufacturers, as well as on a range of optical instruments.

This is a straightforward threaded mount. The lenses have a male 1″-32 thread (not tapered), while the camera lens port has a corresponding female thread. Proper angular orientation of the mounted lens is attained by careful control of the phase of the threads on the lenses and the camera ports.

6.2 The Ciné-Kodak K-100

This was a rather elegant spool loaded 16 mm camera, introduced in a single lens version in 1955 and in a three lens turret version in 1956. This can be thought of as an "advanced amateur" or "semi professional" camera. It has some of the advanced features of the Ciné-Kodak Special. But it was nearly the "end of the line" for Kodak 16 mm ciné cameras (and was the end of the line for the "Ciné-Kodak" marque as well).

We might have expected that Kodak would have used the Type S mount on this camera, but in fact it used the Type C mount, perhaps a recognition of the wealth of ciné lenses, from various manufacturers, then available with that mount.

Figure 25. Kodak Ciné-Kodak K-100 Turret

In figure 25 we see the turret version. (This is not our personal one—I used this picture as it shows a roster of three serious lenses, rather than the two modest ones on ours.)

The camera has an internal viewfinder with adjustable vision correction. As we will see, for each taking lens there is a separate viewfinder front lens.

In figure 26 we see the turret with no lenses mounted, allowing us to see the mounting ports. (Note that in this picture, the turret is not in a “proper position”.)

Figure 26. Ciné-Kodak K-100, turret version, with no lenses

In figure 27 we see a typical Type C mount lens intended for use on this camera, the Ektar II 25 mm f/1.4, Lumenized (coated).

Figure 27. Kodak C mount Ektar II 25 mm f/1.4 (Lumenized)

There were many differing details among the compatible lenses, even those from Kodak. They had different designs of the ring by which the lens was turned to screw it into the camera. Some versions (especially

with long barrels) had no such ring, and one turned the lens by grasping its barrel.

In figure 25 we see that, for each taking lens, there is a separate viewfinder lens, smaller in diameter than the objective lenses. These are chosen to match the taking lens, the focal length giving the viewfinder a field of view corresponding to that of the camera with the "associated" taking lens in use.

The viewfinder lenses have a mount that uses a free collar, with an interior thread, on the lens. It is threaded onto external threads on the boss on the camera or turret into which the viewfinder lens is mounted, bearing on a flange on the lens to draw it into place.

We can see the camera side of this arrangement in figure 26.

Figure 28 shows a typical K-100 viewfinder lens.

Figure 28. "152 mm" viewfinder lens for Ciné-Kodak K100

We see that in this lens the "flange" on which the threaded collar bears is actually a C-clip.

A notch in the end of the lens (barely visible here) engages a pin in the "port" of the camera or turret to properly locate the lens rotationally. We can see that pin in figure 26 in the viewfinder lens port that is at about 2 o'clock. Why does that matter? Because the semitransparent yellow rectangular mask that shows the extent of the field of view is in the viewfinder lens, and must be properly oriented.

7. THE TYPE R MOUNT

This mount was used (only) on the Kodak Reflex Special camera, a very sophisticated professional 16 mm camera, made from 1961 through 1968. (It is the only camera referred to here that does not bear the "Ciné-Kodak marque.) It was intended for "studio" situations. It had an electric motor drive. It was evidently not a big commercial success; one authority had said that only a few hundred were ever made.

It had its own stable of lenses, the Kodak Ekton series. Some of these were made for Kodak by Angeniuex, the famous French ciné camera maker.

In figure 29 we can see the working of the Type R mount.

Figure 29. Type R mount

On the left we see the mount end of a typical lens with the Type R mount. On the right we see the camera side of the mount, on a Kodak Reflex Special, of course.

Cylindrical feature **a** on the lens fits snugly into bore **a'** on the camera, locating the lens radially. Shoulder **b** on the lens fits against surface **b'** on the camera, locating the lens axially and in azimuth ("pointing direction"). Spherical protuberance **c** on the lens (actually the head of a round head screw!) fits into notch **c'** on the camera to properly orient the lens. (There is of course no optical need for this, but it is needed to assure that such things as the reference line for setting the aperture, on the lens, is consistently oriented when the lens is mounted.)

With the lens in place, two levers, **L**, are moved away from the center of the turret (counterclockwise for the lower lever seen in the figure). This moves tabs **T** (we can only see one) to engage groove **G** on the

lens, which holds the lens in place. (The tab we see is in the position where it would have partway entered the groove.)

The tabs are made of spring steel, and must be deflected a bit when in groove **G**. This results in a large, fairly-consistent axial force on the lens, not greatly affected by small dimensional variations.

The “leading corners” of the tabs are shaped so that they can readily enter the groove and let the tab begin to ”climb into place” against its spring force.

To release the lens so it can be removed, the operator must turn both levers “toward the center of the turret” to swing the two tabs out of engagement with the groove on the lens.

It is often said of this mount that the retaining system “clamps” the lens in place, a term I do not find completely apt.

8. THE TYPE W MOUNT

This is not a lens mount but rather a system for attaching a filter or filter adapter to the front of the taking lens.

The typical “small” lens used on a Ciné-Kodak camera has at its front a bezel, which may be part of the integral lens hood and may carry a rectangular mask. This item is typically retained in the lens barrel with a friction ring, and is held in proper rotational position by way of a tab on this item fitting into a slot in the lens barrel. This item can just be pulled out of the barrel. We can say that it is connected to the lens with a “Type W” mount.

Then, a filter or filter adapter can be connected to the lens with that same arrangement.

9. CONCLUSION

We have seen that in the evolution of Kodak Ciné-Kodak movie cameras from 1923 through the 1956 there was much ingenious engineering applied to the matter of lens mounts, and to the related matter giving the viewfinder the appropriate field of view.

10. REISSUE

This article is reissued principally to add details of the Type R lens mount.

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Appendix A
Table of interchangeable lens mounts used on Ciné-Kodak cameras

Mount name	Type	Models used on	Notes
Model A	Threaded	Ciné-Kodak [Model A] (later)	
Not recognized as interchangeable	Screws	Ciné-Kodak Model B f/1.9 [Type 3[1]]	Not really "interchangeable" but getting close
No name	Thumbscrews	Ciné-Kodak Model B f/1.9 [3X[1]]	Factory retrofit only
Model B	Lever lock	Ciné-Kodak Model B f/1.9 [4[1]]	
Model K	Keyhole lock (3 studs)	Ciné-Kodak Model K Ciné-Kodak Model BB f/1.9	
Eight model 60	Keyhole lock (2 studs, vertical)	Ciné-Kodak Eight Model 60 (8 mm)	
Ciné-Kodak Special ("CKS")	Keyhole lock (2 studs, oblique)	Ciné-Kodak Special	Sometimes called "Type P"
Type A	Threaded	Ciné-Kodak Model E	Similar to C-mount
Type C ("C-mount")	Threaded 1"-32	Ciné-Kodak K-100	Widely used by many manufacturers on ciné cameras
K-100 finder lens	Orienting notch, threaded collar on lens	Ciné-Kodak K-100 (finder lenses)	
Type D	Threaded 5/8"-32	Ciné-Kodak Reliant (8 mm) Ciné-Kodak Medallion-8 (8mm)	
Type M	Bayonet with lock	Magazine Ciné-Kodak Ciné-Kodak Magazine 16 Ciné-Kodak Royal Magazine Magazine Ciné-Kodak Eight Model 90 (8 mm) Ciné-Kodak Magazine Eight (8 mm)	There were 3 styles of locking feature on the lenses. The third type, normally used with the Ciné-Kodak Royal Magazine, is not truly locked when on other camera models in the list.
Type R	Orienting pin, two lever-operated locking tabs into a groove on the lens.	Kodak Reflex Special	
Type S	Orienting pin, threaded collar on camera side	Ciné-Kodak Special II	Lenses with this mount used on many cameras via adapters
Type W	Push-in, orienting tab	Various	Not a true lens mount, this refers to a way of replacing the bezel on lenses with a filter adapter or the like.

Notes

1. Our notation, not generally recognized