M, X, and V on Camera Shutters

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ABSTRACT

Often in connection with older cameras we see or hear of the markings "M", "X", and "V" on a lever on the shutter, or may see or hear of the flash sync connector on a camera labeled as "X". In this article, we explain the history and significance of these markings. In the process, we will visit other parts of the alphabet, including "F", "S", and "PC".

Flash powder photography

The earliest generally-used technique for producing an intense artificial light for indoor and night photography involved flash powder, a pyrotechnic mixture revolving around powdered magnesium. The powder was placed in an open tray atop a handle. It was manually ignited with a mechanism similar to that used today in cigarette lighters. The photographer opened the camera shutter, ignited the flash powder, and closed the shutter. The process was effective, but also inconvenient, dangerous and offensive, and was hardly suitable for the "casual" photographer.

The electric flash lamp

A major improvement in flash photography came with the invention of the electric flash lamp. A specialized "light bulb"[1], it contained fine aluminum (or zirconium) wire or foil in an oxygen atmosphere, ignited by a primer lit by an electrically-operated filament.

At first, the lamps were fired manually by the photographer pressing a button on the "lampholder", again while the camera shutter was already open. An important next improvement was "synchronized" flash lamp operation, in which an electrical contact in specially-equipped shutters fired the lamp when the shutter was tripped.

However, the lamps did not reach full luminous output immediately, and thus arrangements had to be included for firing the lamp before

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[1] For which the proper term is "lamp"

the shutter actually opened. The objective was to have the peak of the lamp's luminous output occur in synchronism with the time the shutter was fully open. This was provided for by a simple mechanical timer in the "synchro" shutter. The release button immediately activated the flash lamp and started the timer, which shortly after tripped the shutter itself.

Different classes of flash lamps had different "rise times", which were eventually categorized into "F" (fast), "M" (medium), and "S" (slow) classes. The S-class lamps, usually quite potent, were not intended for synchronized operation. (They were the more modern equivalent of "flash powder".)

The M-class lamp, with about a 20-ms rise time, was the workhorse of the professional and advanced amateur flash photographer, and "synchro" shutters provided an appropriate shutter time delay to suit them.

The F-class lamps, typically small and very modest in their output, were intended for simpler cameras ("box cameras"). There, the synchronizing timer could be eliminated, since the short rise time of the S-class lamp was inconsequential in the face of the slow shutter speeds typically used in such cameras.

When using an F-class lamp with a faster shutter speed, however, as in a professional camera, it was necessary to introduce a shutter delay, although a small one (perhaps 5 ms). Some professional camera shutters in fact had a lever that selected "M" or "F" in order to cater for the delay of the two lamp classes. This feature, however, never become widespread.[2]

A special type of lamp, the FP class, was intended for use with focal-plane shutters. In these shutters, at higher speeds, a slit moves across the film plane. Although any given point in the film receives only the short exposure intended, the entire process took a while longer—perhaps up to 60 ms in the case of earlier focal-plane shutters. Thus the flash lamp had to have "staying power" to keep the scene illuminated until all parts of the frame have been exposed.

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[2] Anybody who had spent a lot of money for a "professional" camera wouldn't be caught dead using those feeble "F" lamps, which were intended for civilians and were sold in **drug stores**, for God's sake!

Electronic flash

The next big advance in flash photography came with the adaptation of the work of Harold Edgerton in developing high-speed, high intensity lamps based on high voltage electrical discharge in a gas-filled envelope. Electronic flash units fired almost instantly when the "sync" circuit was closed, so no shutter delay was needed. In fact, some early electronic photoflash units had a switch that would put a delay into the firing circuit of the flash unit itself to match the delay afforded (needlessly in this case) by the camera shutter, which had never heard of anything other than "M" lamps.

Soon, however, shutter manufacturers added a control lever to their shutters which would disable the flash synchronization time delay. The lever had two positions, marked "M" ("for medium delay") and "X" (for "no delay").

Other manufacturers, however, did not use such a lever, but rather equipped the shutter with two flash sync connectors, marked "M" and "X". When the shutter was tripped, the circuit to the "M" connector was closed at once and the timer started. At the end of the time delay the shutter was tripped and the circuit to the "X" connector was closed. A flash lamp holder ("flash gun") would be plugged into the "M" connector, an electronic flash unit into the "X" connector.

Didn't this impose an unneeded delay in tripping the shutter when using electronic flash? Yes, but it was only perhaps 20 ms, so it was really of no consequence to the average photographer.

Later, when the use of flash lamps had essentially disappeared in favor of electronic flash operation, the manufacturers of that style of shutter eliminated the "M" connector, leaving only the "X" connector, which was of course still marked "X". This is why even today we will sometimes read, "Connect one end of the sync cable to the Thunderbolt 5000 flash unit and the other to the 'X' connector on your camera." (It is almost certainly the only sync connector on the camera, and likely doesn't say "X" on it!)

Shoot yourself

From time to time, there was interest in equipping cameras with a *self timer*, which would allow the photographer to hustle into the scene before the shutter actually tripped. Some ingenious designer discovered that cost could be saved by "hijacking" the flash sync timer, already included in all serious shutters, for the purpose.

The common way to control this was to expand the range of the flash synchronization lever to embrace three positions, "M", "X", and "V". "V" had nothing to do with flash, but was the position that enacted the self-timer feature (which used the same timer, an escapement being engaged to increase its time from milliseconds to seconds). The "V" stood for *vorlauf*, a German word[3] meaning (approximately) "pre-run".

So, with the lever in "V", if you used flash, what kind of synchronization did you get? Well, the timer was otherly engaged, so you got "X" sync (no shutter delay). What about the flash lamp rise time? You used a slow shutter speed so that wouldn't be a problem. Or cussed at the designers.

What is a PC connector?

As flash units came into use, a variety of different connectors were used to connect the sync cable to the flash unit and to the shutter. Two German shutter manufacturers, Prontor and Compur, felt it would be advantageous to have a standard connector on the shutter end, so they jointly designed one of the most unreliable electrical connectors of all time to take that role. It became known as the "Prontor-Compur" (or "P-C", eventually "PC") connector. It is still the most common type of connector at the camera for the flash sync circuit.

Of course today, many cameras are equipped with an "accessory shoe", a postage-stamp sized metal track atop the camera into which a foot on the bottom of the flash unit can be slipped. In most cases today, this is a "hot shoe"—a metal contact in the center of its floor carries the sync circuit of the shutter, and the flash unit will have a spring-loaded bullet in its "foot" to make contact with it.

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[3] Remember, all this stuff was mostly designed in Germany then.