

The
Hasselblad
Lens Guide
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1. Preliminaries: Hasselblad notation

Despite the variety of bodies and lenses, the Hasselblad system is simple to understand. Best of all, there is a great deal of interchangeability among components spanning a period of over 40 years and, aside from the 50 year old 1600F/1000F system, no obsolescence.

The Hasselblad system can be divided into two major branches: 1) shutterless bodies which take leaf-shutter lenses, and 2) focal plane bodies which can take both shutterless lenses and leaf-shutter lenses. In the latter case, either shutter can be selected for use, depending on the application.

Starting with the 1600F, the numerical designation on the body indicated the top shutter speed and the type of shutter. Thus, a 1600F has a top shutter speed of 1/1600th of a second and a focal plane shutter. Likewise, the 500C has a top shutter speed of 1/500th of a second and uses a lens with a (Synchro)-Compur shutter. This notation continued with the introduction of the 2000FC in 1977, where the top speed of the electronically controlled focal plane shutter was 1/2000th second and the FC designation meant it could use either its own focal plane shutter and the new F lenses or it could use the existing leaf-shutter C lenses.

As new models were introduced over the past 40 years, strict interpretation of the numerical designation gave way to thinking in terms of a body series. Thus, the 501, 503, and 553 are all part of the 500C series of shutterless bodies and require leaf-shutter lenses such as C, CF, or CB. The 200F series of focal plane bodies can take either the shutterless F or FE lenses or the leaf-shutter lenses (Hasselblad broke with tradition on the naming of these bodies: the 200F series bodies can be thought of as numerically truncated descendants of the 2000FC series; their top shutter speed is either 1/1000th or 1/2000th, depending on model).

The new 202FA focal plane body only allows use of the focal plane shutter.

2. The most frequently asked questions

A lot of commonly asked questions have no definite answer. That is, the answer depends on either personal needs or preferences. I have repeated the most frequently asked ones below and have provided an answer gathered from the collective wisdom of people who have responded to these questions in the past. When an answer or part of an answer is my own opinion, I have indicated that; however, keep in mind that my opinion is not necessarily more authoritative than anyone else's.

Naturally, answers to many other common questions can be found in the sections that follow.

Q: Should I get a T* lens? How much better is a C T* lens than a C lens?

A: See the section on C T* lenses.

Q: Should I store the lens in a cocked or uncocked state?

A: Most people, including Ansel Adams, have said that it is best to leave lenses in an uncocked state. However, others point out that the motorized Hasselblads automatically recock the lens and this has not resulted in problems. My opinion is that it doesn't matter - it is more important that the lens be exercised regularly than what state it is left in. Also, from factory to customer, lenses will sit for quite some time (sometimes years) in a cocked state.

Q: How often should I exercise unused lenses?

A: The consensus is that lenses should be exercised at least once a month, especially at the slower shutter speeds.

Q: What is the story on lenses jamming?

A: Lenses should be mounted and dismounted only when both the lens and the body are cocked. A simple no-cost cure for this condition is explained and shown by Gary Gaugler at his web site:

http://photoweb.net/pw_tech/hassy_unjam.html

Q: When I look at my closed shutter, the tip of one of the blades seems to be bent. What should I do?

A: It's nothing to worry about; it's designed that way.

Q: Should I buy a SWC model or a 40mm lens?

A: This question has come up mostly in comparing the new 40mm CF FLE against the 903SWC or those SWC/M's with a CF lens. This is a tough decision and the tradeoffs are largely subjective. I believe the SWC models still hold an optical advantage over the 40mm lens, though with the FLE slightly less so. The strong points in favor of the 40mm lenses are that they are better suited to fast work (i.e. faster than landscape or architectural work), you have reflex viewing, and they cost a bit less than the SWC. However, the SWC's can use a groundglass and a magnifying viewfinder in

place of the film back if through-the-lens viewing is needed. My advice is to rent each one for a suitable period of time to determine which best suits your needs.

Q: Which is better for portraits, the 150mm CF or 180mm CF?

A: Many people have stated that the 180mm CF is one of the sharpest lenses Hasselblad has. Indeed, along with the 100mm CF Planar, the MTF curves for this lens are impressive. Even so, the 150mm CF is sharp enough that the real decision between the two will depend on things such as how close or far from your subject you need to be to get the proper framing. For example, the 180mm does have the advantage of making a tight head shot possible without using extension tubes. Again, my advice is to rent each one for a suitable period of time to determine which best suits your needs.

3. Quick Selection guide

The chart below can be used as a quick guide to help the first-time buyer decide on which series of lenses would be appropriate for which bodies.

Lenses for the ArcBody are not on this chart, but are discussed in a later section.

As an example of using this guide, the chart below shows that owners of 200F series bodies could choose FE series lenses to take full advantage of the features those bodies provide, but could also use CF series lenses without problems.

The following notation is used:

-- = this means that the lens and body combination cannot be used

OK = The lens and body can be used together.

E = This is also OK, with the added benefit that either the focal plane shutter or the lens shutter can be used. This procedure is described in Appendix A.

suffixes:

-b = the lens will not allow full use of body features

+l = lens has features that the body cannot make use of

A number in the lower right corner refers to a notation below which will explain the restriction or enhancement in more detail.

BODY series	LENS series						
	1600F, 1000F	C 501C	CT* CB	CF	F	FE (TCC)	CFE
1600F, 1000F	OK	--	--	--	--	--	--
500C	--	OK	OK	--	--	OK+l 1	OK+l 1
2000FC	--	E-b 2	E 2	OK	OK+l 1	OK+l 1	OK+l 1
200F	--	E-b 2,3	E-b 3	OK-b 3	OK	E	E

202FA	--	--	OK-b+I	OK-b	OK	OK+I
			3,4	3		4
SWC, 900	All Superwide cameras have a permanent 38mm f/4.5 Biogon lens					

Notes:

1. The 500C and 2000FC series bodies do not make use of the electronic databus connections on these lenses.
2. On C and CB series lenses, if the lens shutter is used in the B setting on focal plane camera bodies, this will leave the shutter closed after exposure until the body is recocked.
3. These lenses provide no electronic information to the body. In particular, they do not provide aperture information. See the section on FE lenses and also Appendix A.
4. The 202FA body differs from the rest of the 200F series in that it cannot make use of the lens shutter on CF or CFE lenses; the lens must be set to F and only the focal plane shutter can be used.

4. 1600F and 1000F lenses

The very first Hasselblad bodies and lenses are not really compatible with the rest of the Hasselblad system. They are included here for completeness.

These lenses were made for the 1600F and 1000F series of Hasselblad bodies with focal plane shutters. The 1600F was introduced in 1948 and became available in 1949; the 1000F bodies were made and sold in late 1953. These lenses can be used only on the 1600F and 1000F bodies; newer focal plane bodies such as the 2000FC and 200F series cannot use these lenses.

The normal lens was originally a Kodak 80mm/2.8 Ektar, followed later by a Carl Zeiss 80/2.8 Tessar. In addition to Carl Zeiss, other manufacturers offered lenses for these bodies.

These lenses can be identified by the lack of a shutter speed ring and, on some lenses, an aperture preset ring. These lenses have highly scalloped focusing and aperture rings. In particular, the 80mm/2.8 Tessars are chrome with a black filter ring.

1600F, 1000F lenses and data:

focal length	min - max aperture	closest focus	filter	type
60mm	f/5.6			Distagon
80mm	f/2.8			Ektar
80mm	f/2.8			Tessar
135mm	f/3.5			Ektar
135mm	f/3.5			Sonnar
250mm	f/4			Sonnar
250mm	f/5.6			Sonnar

These lenses were manufactured between 1948 and 1957.

Serial number information is still being collected. Detailed serial number information can be found in the Hasselblad Compendium.

5. C lenses

Starting with the introduction of the 500C in 1957, the C lenses were developed for the 500C series of bodies. These are Carl Zeiss lenses with Synchro-Compur shutters. They can be used not only on all 500C series bodies manufactured between 1957 and today, but, in the B setting, they can also be used on all 2000FC and 200F series focal plane bodies (except the 202FA).

A newer lens with a C designation was developed for the 501C; it is actually a CF lens, both internally and optically, with some minor CF controls omitted. This lens is discussed in another section below.

The following features are common to the C lenses:

Shutter speeds are from 1/500th second to 1 second, plus B. Beyond B are non-selectable green markings from 4 to 125 which indicate the number of full seconds the shutter should be held open for on the B setting, based on a given EV. An example of this is given in Appendix B. The shutter speed and aperture rings are normally interlocked, so that choosing different speeds or apertures will result in the same EV setting. A different speed/aperture combination can be selected by pulling back on the cross-coupling tab and turning the ring.

These lenses have moving depth-of-field indicators - red pointers that show the near and far range of depth on the distance scale. These pointers move and adjust themselves according to the aperture selected.

Flash synchronization is at speeds up to 1/500th second. A lever on the left side of the lens selects X, or M synchronization; X is for electronic flash, M is for flashbulbs. There is also a V setting for the 8-second self-timer; an additional locking lever must be pressed before V can be engaged or disengaged. The lens must be cocked before engaging V.

In normal operation, viewing through this lens is at maximum aperture. A lever on the right side of the lens can be used to stop down the lens. If the lens has been stopped down by the lever, then selecting the maximum aperture will cancel the effect of the lever so that viewing can again be done at maximum aperture regardless of shooting aperture. In any case, the aperture will reopen once the lens is recocked after the exposure. After the exposure, the shutter remains closed until the lens is recocked (a mounted lens will be recocked automatically by the body's winding crank). The very earliest C lenses did not have this depth of field preview lever; the Superwide models also do not have this lever.

As noted in the Selection Guide above, lenses in this series can be used on both 500C series (shutterless) bodies and also on bodies with a focal plane shutter. Appendix A describes how either the focal plane shutter or the lens shutter can be used with these lenses.

These lenses are satin chrome, with black lenses becoming available in the 1970s. These lenses have highly scalloped focusing and shutter speed rings, and have the words "Synchro-Compur" etched on the barrel. The focusing ring is at the rear of the lens and the shutter speed ring is at the front. The EV scale is marked in red.

Lens specifics:

On the early 80mm C Planars, viewing is not at full aperture unless the aperture is set at f/2.8 - otherwise it is at about f/3.5 (Rick Nordin).

Early 120mm S-Planar lenses had an f/32 minimum aperture (Rick Nordin).

The 30mm/3.5 and the 350mm/5.6 were introduced in 1973.

The 500mm Tele-Tessar, already impressive in size, had an unusual and enormous focusing ring until 1977. These lenses are predominantly black with early versions having chrome in the area around the shutter speed and aperture rings.

C lenses and data:

focal length	min - max aperture	closest focus	filter	type
30mm	f/22 - f/3.5	0.3m	26	Distagon
40mm	f/32 - f/4	0.5m	104	Distagon
50mm	f/22 - f/4	0.5m	63	Distagon
60mm	f/4		63	Distagon
60mm	f/5.6		63	Distagon
80mm	f/22 - f/2.8	0.9m	50	Planar
100mm	f/22 - f/3.5	0.9m	50	Planar
105mm	f/32 - f/4.3	1.8m		UV Sonnar
120mm	f/32 - f/5.6	0.95m	50	S-Planar
120mm	f/45 - f/5.6	0.95m	50	S-Planar
135mm	f/45 - f/5.6	0.53m w/bellows	50	S-Planar
150mm	f/32 - f/4	1.4m	50	Sonnar
250mm	f/45 - f/5.6	2.5m	50	Sonnar
250mm	f/45 - f/5.6	2.8m	50	Sonnar Superachromat
350mm	f/45 - f/5.6	5.0m	86	Tele-Tessar
500mm	f/64 - f/8	8.5m	86	Tele-Tessar
140-280mm	f/32 - f/5.6	2.5m+macro	93	Schneider Variogon

These lenses were manufactured between 1957 and the late 1970s, being gradually replaced with C T* versions. Some lenses, such as the 105mm UV Sonnar, were produced as C lenses only (i.e. there is no T* version).

Serial number information is still being collected. Detailed serial number information can be found in the Hasselblad Compendium.

6. C T* lenses

These lenses are essentially identical to the C lenses, except that they have six layers of coating to reduce flare and improve contrast. The term "T*" (pronounced "T-star") refers in general to all Carl Zeiss lenses with this multicoating, not just Hasselblad C T* lenses.

The question often arises about the differences in image quality between the C and C T* lenses. The consensus seems to be this: in situations where sources of flare are absent, a C lens with appropriate lens hood will produce images that are slightly less contrasty than its C T* counterpart. In some cases the images may be indistinguishable. In situations where there are sources of flare (especially flare with wide angle lenses), the C T* produces noticeably better quality.

C T* lenses are black, except for the very earliest T* lenses which are satin chrome. These lenses have highly scalloped focusing and shutter speed rings, and have the words "Synchro-Compur" etched on the side.

The T* designation is inscribed in red on the front of the lens barrel. During times of transition, such as going from the 500C to the 500C/M, it is not at all unusual in manufacturing environments for an upgrade to be implemented but not be so designated. This is the case with late model 500Cs that are really 500C/Ms. Similarly, it is possible that some lenses have the T* multicoating but are not marked as such. Conversely, it is possible, though not very likely or very common, for an older non-T* lens to have been repaired and fitted with a newer rim having the T* designation.

The first Hasselblad lenses to get the T* multicoating were the 30mm, 40mm, and the SWC's 38mm Biogon. The 80mm/2.8 C T* appeared in late 1974. By the end of 1976 most of the C series lenses were being produced in multicoated form.

The 140-280mm Variogon of this period is not designated a T* lens because it was made by Schneider rather than Zeiss; it was, however, multicoated.

C T* lenses and data:

focal length	min - max aperture	closest focus	filter	type
30mm	f/22 - f/3.5	0.3m	26	Distagon
40mm	f/32 - f/4	0.5m	104	Distagon
50mm	f/22 - f/4	0.5m	63	Distagon
60mm	f/22 - f/3.5	0.6m	63	Distagon
60mm	f/4		63	Distagon
80mm	f/22 - f/2.8	0.9m	50	Planar
100mm	f/22 - f/3.5	0.9m	50	Planar
120mm	f/5.6	0.95m	50	S-Planar
135mm	f/45 - f/5.6	0.53m w/bellows	50	S-Planar

150mm	f/4	1.5m		Sonnar
250mm	f/4.5 - f/5.6	2.5m	50	Sonnar
350mm	f/4.5 - f/5.6	5.0m	86	Tele-Tessar
500mm	f/6.4 - f/8	8.5m	86	Tele-Tessar

These lenses were manufactured from late 1974 to 1982.

Serial number information is still being collected. Detailed serial number information can be found in the Hasselblad Compendium.

7. CF lenses

The CF series is a redesign of the C series lenses, with improvements to the shutter, some changes to its handling, and an F setting for use with focal plane shutter bodies. The shutter in CF lenses is a Prontor shutter. This redesign occurred in 1982.

The following features are common to the CF lenses:

Flash synchronization is at speeds up to 1/500th second. Shutter speeds are from 1/500th second to 1 second, plus B. Unlike the C lenses, there are no green full-second markings beyond B. Beyond B is the F setting which is used with focal plane shutter bodies. The shutter speed and aperture rings are now normally independent; they can be moved together to retain the same EV setting by pressing down on a convenient cross-coupling button.

These lenses do not have the moving depth-of-field indicators; depth-of-field is now determined by a fixed scale engraved on the lens barrel.

These lenses do not have a self-timer.

As noted in the Selection Guide above, lenses in this series can be used on both 500C series (shutterless) bodies and also on bodies with a focal plane shutter. Appendix A describes how either the focal plane shutter or the lens shutter can be used with these lenses.

In normal operation, viewing through this lens is at maximum aperture. A lever on the left side of the lens can be used to stop down the aperture blades or reopen them. After the exposure, the shutter remains closed until the lens is recocked (a mounted lens will be recocked automatically by the body's winding crank).

These lenses are black and have ribbed rings for setting the shutter speed and aperture, and a checkered ring for focusing. The shutter speed ring is at the front of the lens, followed by the aperture ring, and the focusing ring is at the rear. The aperture ring is apparently designed for right-handed operation, as it is not easy to grasp from the left side of the lens.

The CF 40mm and 50mm FLE (floating lens element) lenses have a secondary focusing ring at the very front of the lens barrel. The secondary focusing ring moves the front elements for optimal image quality at close range. On the 40mm FLE lens, the secondary focusing ring selects one of three ranges; on the 50mm FLE, the secondary ring selects one of four ranges.

The 135mm Makro Planar has no focusing ring and is designed for use with a bellows extension. With the bellows, its focusing range is continuous from infinity to a 1:1 reproduction.

The 500mm Tele-Apotessar had a minimum focusing distance of 8.5m prior to 1989.

The 140-280mm Variogon has "Schneider Kreuznach" engraved at the front of the barrel, followed by a focusing ring (green markings for feet), and a zoom ring. The shutter speed ring, aperture ring, and cross-coupling button are the same as on the Zeiss lenses.

CF lenses have "CF" and the focal length engraved on the barrel. Numerical markings are white, except for the EV settings and distances in feet, which are orange. Early CF lenses have "Prontor" inscribed around the lens barrel; all CF lenses have always had Prontor shutters, however.

All CF lenses are T* multicoated lenses with these exceptions:

- the type of coating on the 105mm UV Sonnar is not specified in the literature, but is most likely uncoated; it is not multicoated.
- The Superachromat version of the 250mm Sonnar, which is designed for optimal quality throughout the entire visible spectrum plus part of the infrared (400nm - 1000 nm), has a single coating layer of coating which is said to be optimal for such a broad spectrum of wavelengths.
- The 140-280mm Variogon, being made by Schneider rather than Zeiss, is thus not designated T* but is multicoated.

CF lenses and data:

focal length	min - max aperture	closest focus	filter	type
30mm	f/22 - f/3.5	0.3m	26	Distagon
40mm	f/22 - f/4	0.5m		Distagon
40mm	f/22 - f/4	0.5m	93	Distagon FLE
50mm	f/22 - f/4	0.5m	60	Distagon
50mm	f/32 - f/4	0.5m	60	Distagon FLE
60mm	f/22 - f/3.5	0.6m	60	Distagon
80mm	f/22 - f/2.8	0.9m	60	Planar
100mm	f/22 - f/3.5	0.9m	60	Planar
105mm	f/32 - f/4.3	1.8m		UV Sonnar
120mm	f/32 - f/4	0.8m	60	Makro Planar
135mm	f/45 - f/5.6	1:1	60	Makro Planar
150mm	f/32 - f/4	1.4m	60	Sonnar
180mm	f/32 - f/4	1.55m	60	Sonnar
250mm	f/45 - f/5.6	2.5m	60	Sonnar
250mm	f/5.6	3m	60	Sonnar Superachromat
350mm	f/45 - f/5.6	4.5m	93	Tele-Tessar
500mm	f/64 - f/8	8.5m	93	Tele-Apotessar
500mm	f/64 - f/8	5.0m	93	Tele-Apotessar
140-280mm	f/45 - f/5.6	2.5m+macro	93	Schneider Variogon

These lenses were manufactured between 1982 to the present.

Serial number information is still being collected.

8. The 501C's C lens

The C lens supplied with the 501C by Hasselblad is a CF lens both internally and optically. It has the improved shutter of the CF lenses, the same optical design as the 80/2.8 CF Planar and is also a T* multicoated lens. It is a relatively recent lens (1994) and was also originally supplied with the early 501CM kits.

There are two differences between this lens and a CF lens:

One, this lens does not have the cross-coupling button which would allow the shutter speed and aperture rings to move in an interlocked fashion while retaining the same EV setting. Thus, the shutter speed and aperture rings on this lens are always independent.

Two, this lens does not have the F setting which, when used with a focal plane shutter body, allows disengagement of the lens shutter. Instead, the B setting must be used. Appendix A describes how either the focal plane shutter or the lens shutter can be used with these lenses.

This lens was introduced with the C designation most likely because of its C-like behaviour with the focal plane shutter bodies. Unfortunately, that designation has resulted in it being confused with the earlier C lenses.

This lens is black, with all the numerical markings being white (CF, F, and FE Hasselblad lenses have orange markings for feet and EV settings).

There is only one lens of this type.

focal length	min - max aperture	closest focus	filter	type
80mm	f/22 - f/2.8	0.9m	60	Planar

These lenses were manufactured between 1994 and 1997. Since this lens is essentially a CF lens with minor features omitted, it was offered with the lower cost 501C and early 501CM bodies as a way to attract new buyers to the Hasselblad system without affecting sales of the standard 80/2.8 CF. This niche has now been taken by the new CB series.

Serial number information is still being collected.

9. CB lenses

The CB lens series was announced in the fall of 1997, with the 80/2.8 CB being offered on 501CM kits by November 1997. They were introduced as lower cost alternatives to the CF lenses.

These lenses are similar in function and form to the CF lenses. There are several differences between the CB and CF lenses:

The 80/2.8 CB has one less element than its CF and 501C counterparts (six elements instead of seven) and the MTF charts by Hasselblad show that this lens is not optically identical to them. However, whether a difference between this lens and its counterparts is noticeable will depend on the nature of the subject and the degree of enlargement.

The gripping surface of the focusing and shutter speed rings has a synthetic rubberlike material with bandlike indentations. Focusing is very smooth and fast on these lenses. The aperture ring is no longer finely ribbed, but instead has a rather unusual series of "posts". As with the CF lenses, this aperture ring is designed to be adjusted most easily with the right hand. Although the CB lenses have the EV interlock, it is reduced in size and not as prominent when compared to that on the CF lenses.

The depth of field lever has been redesigned to act more as a sliding lever than the push-down lever on the CF lenses.

The PC socket now has a locking lever.

This lens does not have the F setting which, when used with a focal plane shutter body, allows disengagement of the lens shutter. Instead, the B setting must be used. Appendix A describes how either the focal plane shutter or the lens shutter can be used with these lenses.

The front of the lens, where the filter attaches, is now made of carbon fiber.

The rear of the lens mount is now machined from a single piece of stainless steel rather than the traditional four pieces.

This lens is black, with all the numerical markings being white.

CB lenses and data:

focal length	min - max aperture	closest focus	filter	type
60mm	f/22 - f/3.5	0.6m	60	Distagon
80mm	f/22 - f/2.8	0.9m	60	Planar
160mm	f/32 - f/4.8	1.5m	60	Tessar

These lenses were manufactured from 1997 to the present.
Serial number information is currently being collected.

10. F lenses

These lenses were developed for the 2000FC series of focal plane shutter bodies introduced in 1977; they are similar to CF series lenses except that they have no shutter and, consequently, no shutter speed ring.

The following features are common to the F series lenses:

The focusing ring is at the front of the lens; the aperture ring is at the rear. The aperture ring is independent of the shutter speed ring on the body, but a cross-coupling button on the lens allows the aperture ring to move in an interlocked fashion with the shutter speed ring to retain the same EV setting. Viewing is normally at maximum aperture. A lever can be used to stop down the aperture blades and reopen them.

These lenses are black with checkered focusing and ribbed aperture rings. F lenses have "F" and the focal length engraved on the barrel.

It is likely that all F lenses are T* multicoated lenses. For most focal lengths, the F lenses are faster and focus closer than their CF counterparts.

The 50mm Distagon FLE does not require a secondary focusing ring.

These lenses can also be used on 200F series bodies, but since they don't have a databus connection, they won't offer full use of the 200F series features.

F lenses and data:

focal length	min - max aperture	closest focus	filter	type
50mm	f/22 - f/2.8	0.32m	86	Distagon FLE
80mm	f/22 - f/2.8	0.6m	50	Planar
110mm	f/16 - f/2	0.8m	70	Planar
150mm	f/22 - f/2.8	1.4m	70	Sonnar
250mm	f/32 - f/4	2.5m	70	Tele-Tessar
350mm	f/4	1.9m		Tele-Tessar
140-280mm	f/32 - f/5.6	1.07m+macro	93	Schneider Variogon

These lenses were manufactured between 1977 and 1991.

Serial number information is still being collected. Detailed serial number information can be found in the Hasselblad Compendium.

11. FE (TCC) lenses

The FE lenses, formerly called TCC lenses, were developed for the 200F series bodies introduced in 1991. They are similar to the F lenses, but with an electronic databus connection to 200F series bodies via four contact pins.

The following features are common to the FE series lenses:

The focusing ring is at the front of the lens; the aperture ring is at the rear. The aperture ring is independent of the shutter speed ring on the body, but a cross-coupling button on the lens allows the aperture ring to move in an interlocked fashion with the shutter speed ring to retain the same EV setting. However, this cross-coupling is not performed if an aperture-priority mode is being used. Viewing is normally at maximum aperture. A lever can be used to stop down the aperture blades and reopen them.

These lenses are black with checkered focusing and ribbed aperture rings. FE lenses can be identified by two blue lines on the left side of the barrel and by the four contacts on the bayonet plate. Also, the FE lenses have "F" (not "FE") and the focal length engraved on the barrel. All FE lenses are T* multicoated lenses. As with the F lenses, the FE lenses for most focal lengths are faster and focus closer than their CF counterparts.

The 50mm Distagon FLE does not require a secondary focusing ring.

FE lenses tell the 200F series bodies which aperture has been selected while metering with the lens wide open. If a non-FE lens is used on a 200F series body with TTL exposure metering (e.g. the 203FE or 205FCC), then the exposure reading must be made either with the lens temporarily stopped down or with compensation for the lens being wide open.

FE lenses can be used on 2000FC series bodies, but those bodies do not make use of the electronic connections in the FE lens.

FE (TCC) lenses and data:

focal length	min - max aperture	closest focus	filter	type
50mm	f/22 - f/2.8	0.32m	93	Distagon FLE
80mm	f/22 - f/2.8	0.6m	60	Planar
110mm	f/16 - f/2	0.8m	70	Planar
150mm	f/22 - f/2.8	1.4m	70	Sonnar
250mm	f/32 - f/4	2.5m	70	Tele-Tessar
350mm	f/32 - f/4	1.9m	93	Tele-Tessar

These lenses were manufactured between 1991 and the present. Serial number information is still being collected.

12. CFE lenses

As the CFE designation suggests, a CFE lens is essentially a CF lens with the electronic databus contacts of the FE lenses. This latter feature allows the lens to meter at maximum aperture on the 200F series bodies.

The lens has a collar that allows it to be used with the quick-coupling adapter. The serial number and a T* designation appear on this collar.

This lens is visually distinctive by the appearance of the double blue lines (also common to FE lenses) and by focus limiter knobs on each side of the front of the lens barrel. These knobs are useful for certain applications, such as sports photography, as they allow focus to be restricted to a certain range and to stop at near and far points.

The PC connector lock, depth-of-field lever, and shutter speed ring indentations are the same as on the CB lenses. Also, the F setting and lock button is now reddish orange rather than green.

focal length	min - max aperture	closest focus	filter	type
350mm	f/45 - f/5.6	3.75m		Tele-Superachromat

In late fall of 1997, Hasselblad announced the 350mm/5.6 Tele-Superachromat CFE lens and as of this writing there is only one lens of this type.

Serial number and manufacturing information is not yet available.

13. ArcBody lenses

[from Hasselblad News]:

- The Hasselblad ArcBody is a new outstanding camera featuring an innovative concept that combines extremely generous shift and tilt capabilities with an exceptionally compact design and userfriendliness. It is perfectly suited for architectural and industrial photography, but can also be used successfully in a large number of other kinds of photographic work i.e. product, landscape and nature. In addition, the ArcBody is a very resourceful creative tool that provides new opportunities for producing effective and artistic images. The rear standard can be shifted as much as 28 mm which ensures the virtual elimination of diverging or converging lines in the image. The rear standard tilt of 15 degrees adds a good control over depth-of-field. Three interchangeable lenses are exclusively designed for the ArcBody by Rodenstock; the Apo-Grandagon 4.5/35 mm, the Apo-Grandagon 4.5/45 mm and the Grandagon-N 4.5/75 mm.

[from the Hasselblad web page]:

The lenses have virtually no colour fringing and the distortion is extremely low. All lens elements are multi-coated to provide superb image contrast and colour saturation. Used with the dedicated Centre filter the illumination is even at all shift positions. All ArcBody lenses have the same front bayonet diameter enabling use of the same Centre filter and Filter holder.

Features common to the Rodenstock lenses used with the ArcBody:

Copal 0 shutter, 1-1/500, B, T.

Rodenstock lenses for the ArcBody:

focal length	min - max aperture	closest focus	filter	type
35mm	f/22 - f/4.5	0.5m		Apo-Grandagon
45mm	f/32 - f/4.5	0.5m		Apo-Grandagon
75mm	f/45 - f/4.5	1.0m		Grandagon-N

Serial number and manufacturing information is not yet available.

14. Special lenses and equipment

1.4X PC-Mutar

The PC-Mutar is used for perspective control and can perform a vertical shift up or down by a maximum of from 8mm to 16mm, depending on the lens focal length. The PC-Mutar is designed to be optimal with the 40mm Distagon, but can be used with any lens from 40mm to 100mm (it does not appear to have the electronic contacts for FE lenses, however). It reduces the maximum aperture by one stop and increases the focal length by 1.4; it contains five elements and is T* multicoated.

1.4XE Teleconverter

This teleconverter increases the focal length by a factor of 1.4 and reduces the maximum aperture by one stop. It is designed to work with lenses with focal lengths between 100mm and 500mm. This teleconverter has the necessary electrical contacts so that it can also be used with FE lenses.

1.4XE APO Teleconverter

[from Hasselblad News]:

- Hasselblad Teleconverter APO 1.4XE. Dedicated to the Tele-Superachromat CFE 5.6/350 lens, the Teleconverter APO 1.4XE increases its focal length resulting in an excellent f8/490 mm lens. Designed to be used together, the lens with converter offers optical qualities that are equally superb as the original lens itself.

2X Teleconverter (also known as the 2X Mutar)

This teleconverter doubles the focal length and reduces the maximum aperture by two stops. It is T* multicoated and can be used on all lenses except the CF 135mm Makro Planar and with limitations on the CF 120mm Makro Planar. It does not have the electronic contacts for FE lenses and has been replaced by the 2XE.

2XE Teleconverter

Similar to the 2X, but with the electronic contacts for FE lenses. It is multicoated.

38mm f/4.5 Biogon

This is a permanently attached lens on the Superwide cameras. It is a true wide angle lens with excellent edge-to-edge sharpness. Depending on the

vintage of the camera, the lens will be either a C, C T*, or CF series lens differing only slightly from other lenses of the series. One difference is that since the short focal length of this lens precludes a reflex viewing system, an external viewfinder is used and therefore the shutters on these lenses remain closed when cocked. Another is that a stop-down lever is unnecessary.

The original Superwide of 1954 had a 38mm f/4.5 Biogon, but it predated the C series lenses. That lens had a Compur shutter which was cocked independently of film advance. Also, it had separate aperture and shutter speed rings and a self timer.

The SWC was manufactured between 1959 and 1981. The early SWCs had chrome C lenses, the later ones had black C lenses; later yet they had C T* lenses.

The SWC/M started with C T* lenses in 1980 and then went to having CF lenses in 1983.

The 903SWC, manufactured since 1988, has CF lenses.

Common specifications:

type:	Biogon (optically true wide angle)
focal length:	38mm
minimum aperture:	f/22
maximum aperture:	f/4.5
closest focus:	0.3 m (12 inches)
depth of field:	3m (10 feet) to infinity at f/4.5 0.65 m (26 inches) to infinity at f/22
shutter:	B, 1 second to 1/500 second; flash synchronization at all speeds
filter:	series 63 (Superwide, SWC, and SWC/M with C T*) or 60 bayonet (903SWC and SWC/M with CF).

60mm f/5.6 MK Biogon

This lens is for the MK70 photogrammetric camera only. It focuses to 0.9m

100mm f/3.5 MK Planar

This lens is for the MK70 photogrammetric camera only. Its focus is fixed at infinity.

Appendix A: Using leaf-shutter lenses on focal plane bodies

The 2000FC and 200F series of focal plane bodies can use both their own shutterless lenses (F, FE) and also the leaf-shutter lenses (C, C T*, CF, 501C, CB, CFE).

The following description applies to using a leaf-shutter lens on a focal plane body (the 202FA is an exception, see below).

To use the focal plane shutter, set the lens to B or F and then select a shutter speed on the body. To use the lens shutter, set the body to C and then select a shutter speed on the lens. An easy way to think of this is as follows: setting the lens to F makes the lens behave like an F lens; setting the body to C makes the body behave like a 500C series body.

Regardless of which shutter was used to make an exposure, if the lens was set to B, the lens shutter will close after the exposure until the body is recocked by the winding crank. If the lens shutter was set to the F setting, the lens shutter remains open and disengaged from the body.

A green button must be pressed to select or unselect the F setting.

Shutterless lenses (F, FE) are not intended for use on shutterless bodies (500C series).

When a leaf-shutter is used on a focal plane body, the focal plane shutter acts in much the same manner as the auxiliary shutter on 500C series bodies. Because of the precise synchronization that must occur in the releasing of these two shutters, both shutters should be maintained in good working order.

FE lenses tell the 200F series bodies which aperture has been selected while metering with the lens wide open. If a non-FE lens is used on a 200F series body with TTL exposure metering (e.g. the 203FE or 205FCC), then the exposure reading must be made either with the lens temporarily stopped down or with compensation for the lens being wide open.

The new 202FA focal plane body only allows use of the focal plane shutter, so it may use CF or CFE lenses on the F setting only. According to the Hasselblad web page, C, C T*, 501C and CB series lenses should not be used with the 202FA.

Appendix B: Using the green full-second scale on C lenses

The green scale is merely an aid in determining the number of full seconds to keep the shutter open for, and which aperture to use, while on B. If you work with exposure values, then it is a simple matter to adjust the EV scale on the lens for the exposure you want, then look at the shutter speed/aperture combinations that result - some of which may be on the green scale.

As an example, let's say that based on meter readings, or perhaps some other process, you've arrived at an exposure of 1 second at $f/2.8$, or EV 5, which is the same thing. When you adjust the shutter speed and aperture rings for this, you'll notice that the green scale shows the equivalent number of full seconds to keep the shutter open for various apertures. So, you could choose 1 second at $f/2.8$, but you could also move the shutter speed ring to B and then choose one of the following:

- 2 seconds at $f/4$
- 4 seconds at $f/5.6$
- 8 seconds at $f/8$
- 15 seconds at $f/11$

and so on.

Appendix C: Filters

The numerical designation of the filter series denotes the filter diameter, in millimeters. The following information is engraved on the side of the filter: filter diameter, filter factor, color, and exposure value compensation. For example, 50 4x O -2 is a 50mm orange filter with a filter factor of 4, or -2 stops (i.e. open up two stops).

series:

- 26 These are filters for the 30mm Distagons. Since the field of view on these lenses is so wide, it is not possible to attach filters to the front of the lens, therefore the front section of these lenses detach and the filter attaches to the rear of the front section. These lenses are designed to always incorporate a filter in the optical path, so one of the available filters is a clear glass filter.
- 50 These are double bayonet filters used primarily by the older C and C T* lenses and the 80mm F lens. They may be combined with other filters.
- 60 These are double bayonet filters and are the most common. They predominate in the CF lens series. They may be combined with other filters.
- 63 These filters were used primarily for the older wide angle lenses and they are held in place by a filter holder. With an adapter ring, they fit series 50 lenses.
- 70 These are double bayonet filters. They may be combined with other filters.
- 86 These are double screw-thread filters. They may be combined with other such filters..
- 93 These are filters that are held in place by a lens shade or adapter. They may not be combined.
- 104 These are bayonet filters. They may not be combined.

Appendix D: Recommended reading

The following books cover a number of items in great detail that are only touched on in this guide:

The Hasselblad Manual, 4th Edition Revised,
Ernst Wildi, 1996, ISBN 0-240-80251-9

Hasselblad Compendium, Rick Nordin, ISBN 1-897802-10-2,
available May 1998

How to Select and Use Medium Format Cameras,
Theodore DiSante, ISBN 0-89586-046-5

Valuable on-line references:

The Overview series by Danny Gonzalez, in particular "Overview: Choosing MF" and "Overview: Hasselblad". The Overview series is a comprehensive guide to all medium format systems; the latest posting of this series to the rec.photo.equipment.medium-format newsgroup can be found with a web search engine.

Another very valuable reference is Robert Monaghan's medium format megasite:

<http://www.smu.edu/~rmonagha/mf/index.html>

Appendix E: Buyer's checklist for inspecting used lenses.

Before buying, decide beforehand on the condition of the lens you will be comfortable with: do you want a mint lens or one that shows signs of normal use and wear but is optically and functionally sound? Look at ads in magazines such as Shutterbug or in the photo newsgroups to get an idea of the prices being asked for.

First, evaluate the general appearance of the lens body. Even if the lens appears to be in mint condition, it may indicate that the lens was hardly ever used and therefore checking the shutter is especially important. Also, lenses tucked away for years in a closet are more prone to fungus in humid areas. Slight scratches, worn numerals, or the black finish wearing off are signs of normal use rather than abuse, assuming the wear or scratches aren't excessive. Watch out for dents, especially at the rim of the lens and at the mount. Also, look out for a worn cocking or shutter actuator at the rear of the mount. Shake the lens a little bit - you should not hear anything like a loose element moving around. Inspect the PC contacts for damage.

Next, evaluate the glass. Bring a small penlight to shine through the lens or at least be able to hold it up to a bright diffuse light source. Look for signs of fungus, cloudy lenses, separation of elements, floating particles, or scratches. A spot or two on the coating isn't that serious. Why? Because an entirely uncoated lens transmits about 95% of the light and about 5% is dispersed as flare. A single layer of coating reduces the flare to roughly 1% and a multilayer coating (usually six layers) reduces the flare to less than 0.5% (less than half of one percent). So, a relatively small spot on a coated or multicoated lens would contribute only extremely small fraction of 1% towards flare or loss of contrast.

Next, evaluate the controls. This is best done by mounting the lens on a body and removing the film magazine so that shutter operation can be observed from the rear of the body.

- Turn the focusing ring - it should turn smoothly without "catching" or any stiff spots. Aside from CB lenses, turning the focusing ring is relatively heavy and slow compared with, for example, 35mm camera lenses.
- Focus at infinity, check the image through viewfinder and, if possible, a groundglass adapter attached to the rear of the body (this can be done on the B setting with the shutter held open). Check focus at the closest focusing point. If the lens is an FLE lens with a secondary focusing ring, make sure that it's set for the correct range.
- Check aperture blades. On C, C T* lenses, set the lens to something other than maximum aperture and press the depth-of-field lever. Pull back the coupling tab and close down to the minimum aperture. The blades should be clean. Open the aperture back up to maximum. The lens should be wide open. Close down the aperture again (don't press the depth-of-field lever), the lens should now remain either wide open or 1/2 stop down from wide open (see the section on C lenses for subtleties in this area). On all other lenses, stop down the lens with the depth-of-field lever, and check that the blades are clean. Open up the lens by pressing the depth-of-field lever again. Superwide cameras

and early C lenses don't have a depth-of-field lever.

- Check the shutter. It is best to select speeds before cocking the lens. Select an aperture of 5.6 or 4 and use that aperture with all shutter speeds. Starting with 1 second and going to each successive speed, the duration of light seen through the rear of the camera should be halved each time. The sound of the gear train at speeds from 1 second to 1/15 should be smooth and consistent. Check how close the 1 second speed is to a full second. If it is feasible, testing the lens by shooting slide film (not prints) is a good way of assessing if the shutter speeds are off by a stop or more.
- Check combined shutter and aperture. Select the minimum aperture and trip the shutter at various speeds from slowest to fastest while observing through the back of the camera (a bright light source is essential). As the shutter trips, you should be able to see the aperture closed down to the setting you've selected. Try this at several other apertures.
- Check the self-timer (C and C T* lenses). Select a shutter speed (1 second is a good test), cock the shutter, push in the tab for the MXV lever, then move the MXV lever to V. Trip the shutter. You should hear the self-timer mechanism wind down for about 8 seconds and then the shutter will trip for the selected interval. The self-timer should sound smooth and not hesitate when winding down.
- Check the interlock between shutter and aperture. On C and C T* lenses, both rings should move together. Pulling back on the cross-coupling tab should allow the aperture ring to turn independently and smoothly. On CF, F, FE, CB, and CFE lenses, the shutter speed and aperture rings are normally independent and pressing in on the cross-coupling button should allow them to move together.

Always try to get front and rear caps for each lens.

References

Collecting and Using Classic Cameras, Ivor Matanle, ISBN 0-500-27656-0

Collecting and Using Classic SLRs, Ivor Matanle, ISBN 0-500-01726-3

Hasselblad Compendium, Rick Nordin, ISBN 1-897802-10-2,
available May 1998

Hasselblad Lenses, product brochure, c1996-1997, code 93704

The Hasselblad Manual, 4th Edition Revised,
Ernst Wildi, 1996, ISBN 0-240-80251-9

Hasselblad Product Catalog, c1970-1971, code 1002 145 12 70

Hasselblad Product Catalog, 1994, code 93642

Hasselblad Product Catalog, 1996, code 93697

Hasselblad Web Pages, <http://www.hasselblad.com/>, <http://www.hasselblad.se/>,
<http://www.hasselbladusa.com/>

How to Select and Use Medium Format Cameras,
Theodore DiSante, ISBN 0-89586-046-5

McBroom's Camera Bluebook, 1995-1996 Edition, ISBN 0-936262-35-4

Modern Photography (magazine), September 1974, December 1975 issues

Popular Photography (magazine), November 1975 issue

Shutterbug (magazine), February 1989 issue

Single Lens Reflex Guide, Paul Wahl, Second printing Sept. 1960, Chilton,
Library of Congress Card Catalog No. 58-14332

SLR Yearbook 1971, Vol. 2, Editor: Peter Dean, Amphoto

Lens Guide revision history

- 1.0 97.03.30 Initial document.
- 1.1 97.04.22 Corrected some information on C and C T* lenses. Added information on the 1.4XE teleconverter and MK lenses. Also added information on the 38mm Biogon used on the superwide cameras.
- 1.2 97.07.17 Minor updates for 1000F, CF, and F lenses. Added information about the green full-second scale and about the self-timer on C lenses.
- 1.3 97.10.30 Corrected errors to the Quick Selection Guide (C vs. CF lens with 2000 and 200 series), added CB and CFE info. Added main sections for the CB, CFE, and ArcBody lenses. Rewrote behaviour of the B vs. F settings for C and CF lenses. Other minor textual cleanup.
- 1.4 97.11.07 Fixed email return address.
- 1.5 98.01.27 Corrected min. aperture for 50/4 CF. Corrected intro date of CF lenses on SWC/M. Corrected availability dates of 1600F and 1000F. Corrected some details of C lenses. Changed 60mm/3.5 as being C T* or CF only. Added more info on CB lenses. Added an appendix on using leaf-shutter lenses with focal plane bodies, thereby simplifying the text in the lens sections. Added a section on Hasselblad notation. Added a paragraph on C and C T* image quality.
- 1.6 98.05.07 Added filter size information to lens tables. Corrections to multicoating information. Added notes about using non-FE lenses on 200F bodies and about using lens shutters with focal plane bodies. Added info on Rodenstock lenses and also for the CFE 350 Sa lens. Cleaned up Quick Selection Guide. Suggested books for recommended reading. Added section on the most frequently asked questions. Added checklist for buying used lenses. Minor corrections to some lens data. Inserted caveats for the 202FA.
- 1.7 98.05.14 Added more details on 202FA restrictions and more information on early 500mm Tele-Tessars. Corrected filter info for the later SWC cameras and the 60mm C and C T* lenses. Made some corrections to 1600F and 1000F lens information.

One of the advantages of medium format photography is that the equipment is largely modular in design. Consequently, there is a great deal of component interchangeability within a system, often with bodies, viewfinders, backs, and lenses that were manufactured across a span of over 40 years.

This Lens Guide is written with several objectives in mind. First, to help the potential buyer of Hasselblad equipment understand the different series of Hasselblad lenses and, second, to provide an up-to-date historical reference.

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I welcome corrections and additional information. Please send email regarding this lens guide to: dmunroe@vcd.hp.com
-- end document --