www.butkus.us

ASAHI PENTAX GUIDE

ASAHI PENTAX SPOTMATIC

ASAHI PENTAX NOCTA

ASAHI PENTAX

ASAHI PENTAX S

ASAHI PENTAX K

ASAHI PENTAX S1 (H1)

ASAHI PENTAX S2 (H2)

ASAHI PENTAX SUPER S2

ASAHI PENTAX S1a

ASAHI PENTAX S3 (H3)

ASAHI PENTAX SV

$250

This manual is for reference and historical purposes, all rights reserved.
This page is copyright© by M. Butkus, NJ.
This page may not be sold or distributed without the expressed permission of the producer
I have no connection with any camera company

On-line camera manual library
This is the full text and images from the manual. This may take 3 full minutes for the PDF file to download.

If you find this manual useful, how about a donation of $3 to: M. Butkus, 29 Lake Ave., High Bridge, NJ 08829-1701 and send your e-mail address so I can thank you. Most other places would charge you $7.50 for a electronic copy or $18.00 for a hard to read Xerox copy.

This will allow me to continue to buy new manuals and pay their shipping costs.
It'll make you feel better, won't it?
If you use Pay Pal or wish to use your credit card,
click on the secure site on my main page.

www.butkus.us

The Green Section between pages 16 *and* 17 *Page*

THE PENTAX: MODEL BY MODEL

The Pentax Spotmatic **2**
Loading ***4*** – Unloading ***4*** – Shooting ***4*** – Self Timer ***5*** – Flash ***5*** – Points to Note ***5***

The Pentax S3 (H3), SV and Super S2 .. .. **7**
Loading ***9*** – Unloading ***9*** – Shooting ***9*** – Self-timer ***10***

The Pentax S2 (H2), S1 (H1) and S1a **11**
Loading ***11*** – Unloading ***13*** – Shooting ***13***

The Pentax K **14**
Loading ***14*** – Unloading ***14*** – Shooting ***14***

The Pentax and Pentax S **17**
Loading ***17*** – Unloading ***17*** – Shooting ***17***

The Pentax Nocta **20**
Construction ***20*** – Operation ***20*** – Shooting Sequence ***21*** – Accessories ***22***

Pentax Lenses and Accessories **23**
Aperture Control Systems ***23*** – Standard Lenses ***23*** – Wide-Angle and Long Focus Lenses ***24*** – Supplementary Lenses for Close-Ups ***26*** – Extension Tubes ***26*** – Pentax Copying Equipment ***28*** – Extension Bellows ***28*** – The Microscope Attachment ***29*** – Right-Angle Finder Eyepiece ***29*** – Focusing Magnifier ***29*** – Accessory Shoe ***29***

The Pentax Exposure Meter **30**
Fixing the Meter to the Camera ***30*** – Taking the Meter off the Camera ***30*** – Using the Pentax Meter ***30*** – Testing and Replacing Battery ***32***

Some items of equipment or certain materials mentioned in this book may not be freely available in every country. Import and marketing conditions vary widely, and are outside the control of the photographic dealer.

1967 Edition © Focal Press Ltd., 1960
Printed and bound 1967 in Great Britain by Staples Printers Limited, Rochester, Kent.

THE PENTAX SYSTEM

The Pentax is a 35 mm. single lens eye-level reflex camera with a viewing system designed for accurate focusing and exact viewing.

The body is die-cast with hinged-on back, and is leather covered. The metal parts are black anodised or satin chrome finished. In place of the chromium trim, the camera is also available with black anodised finish throughout, which is popular among press photographers. The camera yields 36 negatives $1 \times 1\frac{1}{2}$ in. (24×36 mm.) on perforated 35 mm. film.

It has an eye-level reflex finder which shows the image in natural size. The built-in pentaprism produces an upright and right-way-round view. The centre of the reflex finder area contains a micro-prism zone permitting ultra fine focusing. The image is extremely brilliant and evenly illuminated right into the corners with the aid of a Fresnel field lens. The mirror is of the instant-return type, giving almost continuous vision through the viewfinder.

The taking lens itself is used to form the finder image; in consequence, the finder shows exactly the same field as will be obtained on the film without any parallax. The reflex image remains fully correct at any distance with any lens, including close-up supplementary lenses.

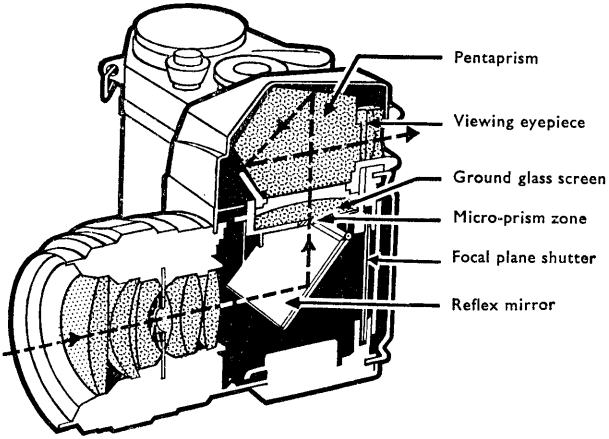
The screw-mounted lens is interchangeable and a wide range of lenses from 18 mm. to 1,000 mm. is available, the Takumar series, made by the manufacturer of the camera. In addition, lenses designed for other cameras (e.g. Edixa Reflex, Contax S, D, Hexacon, Pentacon and Praktica) will fit the Pentax.

An internal link between the shutter release and the lens mount on the current Pentax models couples with lenses which have automatic pre-selector diaphragm control. Some of the Takumar lenses have a manual pre-set diaphragm.

The lens mount carries a depth of field indicator and distances in both feet and metres. Focusing is effected by a rapid helical movement which is part of the lens mount.

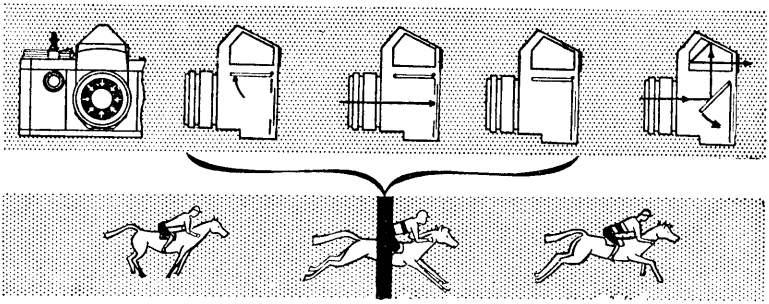
www.butkus.us

PENTAX OPTICAL SYSTEM



Above: A section through the camera shows the optical system of the lens, the mirror, the ground glass screen with its Fresnel lens and micro-prism zone, and the pentaprism and viewing eyepiece. The broken arrow indicates the path of the light while observing the image.

Below: On pressing the release button the iris diaphragm closes down to its pre-set aperture by an internal link, then the mirror flies up, the shutter opens and closes again, and the reflex mirror returns to make the image once more visible in the finder. The actual period of the blackout of the screen with this instant mirror return system is therefore confined to the exposure itself—as symbolised by the black strip in the bottom diagram. The image is visible at all other times before and after taking the picture.



The shutter of the Pentax is a self-capping focal plane type travelling across the film from right to left. "Self-capping" means that the shutter remains closed whilst being wound up ensuring full protection of the film; "focal plane" means that it moves right in front of the negative material. With this type of shutter, lenses can be changed while the camera is loaded.

The shutter is synchronised for flash bulbs and electronic flash with separate standard co-axial outlets on the body.

The Pentax Spotmatic features additionally a built-in light meter which measures the light through the taking lens.

The back of the Pentax is hinged on. It takes standard 35 mm. cassettes. The film runs from the cassette to the take up spool and is re-wound after exposure. The film transport is effected by a lever; one swing advances the film and the film counter arranged around the centre shaft of the transport lever. The same action also tensions the focal plane shutter. Unintentional double or blank exposures are automatically avoided. The rewind knob incorporates a folding crank for convenient and rapid rewinding of the exposed film.

A film speed indicator surrounds the rewind knob, three differently coloured scales of figures permit identification of film type as well.

A tripod bush is placed centrally below the lens in the camera base. The shutter release is on the camera top and carries in its centre a cable release socket. The dimensions of the camera are $5\frac{3}{4} \times 3\frac{1}{2} \times 3\frac{1}{4}$ in. with standard lens. The weight is 24 oz. (body only) and about 30 oz. complete with standard lens.

Pentax Evolution

THE FORERUNNER of the Pentax was the Asahiflex camera introduced in 1952, also known under the name *Tower* in the U.S.A., which was fitted with a waist level viewfinder and interchangeable lens of different screw thread from the Pentax. Model I was fitted with a 50 mm. Takumar *f* 3.5 lens with pre-set diaphragm and focal plane shutter from 1/25 to 1/500 sec. In 1953, the Asahiflex IA with a simpler

www.butkus.us

focal plane shutter (1/25 to 1/500 sec.) appeared, to be followed by Asahiflex IIB fitted with *f* 3.5 or *f* 2.4 Takumar lens as the world's first camera with instant return mirror (November, 1954). In February, 1955, the Asahiflex was fitted with a focal plane shutter from ½ to 1/500 sec., marketed as model IIA.

THE PENTAX, built on the experience gained with the Asahiflex, is fitted with an eye-level pentaprism and was first produced in 1957.

Slight changes in shutter speed calibration and speed range distinguish the different Pentax models. On the optical side, lenses with semi-automatic and fully automatic aperture setting appeared.

In 1965, the Spotmatic was introduced, with a built-in exposure meter that measures the brightness of the image on the focusing screen and is coupled directly to shutter and film speed settings.

Full details of the Pentax models which are being produced or have been made in the past are found on the green pages of this guide.

In the United States, the camera was originally marketed under the name of Heiland Pentax, now Honeywell Pentax; elsewhere it is known as the Asahi Pentax, the manufacturers being the Asahi Optical Company of Tokyo, Japan.

In Japan, and in Japanese-produced sales literature, operating manuals, etc., the later models are referred to as the Pentax S1, S2 and S3. In Great Britain and America these models were known, up to 1961, as the Pentax H1, H2 and H3 respectively. Throughout this book, therefore, instructions referring to the "S" models apply equally to the "H"-designated models.

HANDLING THE PENTAX

In order to simplify the description and handling of the Pentax camera without being confused by different features of individual models, this guide is divided into a general section which applies to all Pentax models, while the individual requirements and different handling of each model are found on the green pages.

For convenience, a symbolic reference system is also used in the general section. Wherever the sign ■ appears, further details will be found in the camera pages of the green section for each camera (Pentax K, S, H2, etc.). The sign ● refers to lens and accessories details in the green section. The appropriate pages are marked accordingly in the bottom left or right-hand corner.

Holding

It is obvious that the camera should be held as steady as possible as the slightest shake, even if not seen in the negative, will become visible in the enlargement.

FOR HORIZONTAL PHOTOGRAPHS hold the camera in the palm of both hands, the fingers gripping the front of the body, the thumbs against the back. Use the middle finger of the left hand to move the lens focusing mount, and the index finger of the right hand to operate the release button. Keep the elbows pressed against the body Either the right or the left eye may be used on the finder.

Always stand with your legs apart.

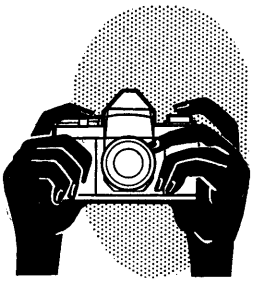
FOR VERTICAL PHOTOGRAPHS turn the camera through 90° so that the left hand presses the camera against your forehead from above. Use the thumb and the index finger to move the focusing mount. The right hand holds the camera from below with the thumb on the release button. It is of no consequence if the position of the hands is reversed; you can suit your own convenience.

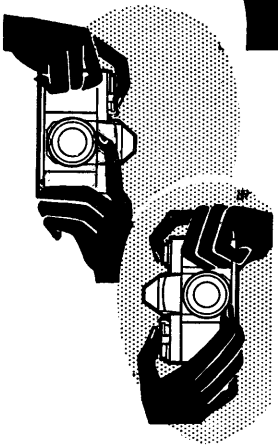
To release the shutter, press the release button with the ball of the finger (or thumb). Use finger pressure only, and keep the hand and its grip on the camera steady. The actual pressing down will have to be done slowly and smoothly.

www.butkus.us

HOLDING

For horizontal shots hold the camera in the palm of both hands, the fingers gripping the front of the body, and the thumbs against the back. Focus the lens with the middle finger of the left hand.

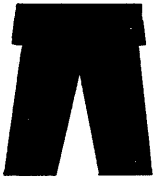




For upright shots turn the camera through 90° so that the left hand supports it from underneath. Alternatively, turn it round in the other direction, so that the left hand presses the camera against the forehead from above. In this case the thumb of the right hand presses on the release button, while the palm of the right hand supports the weight of the camera.

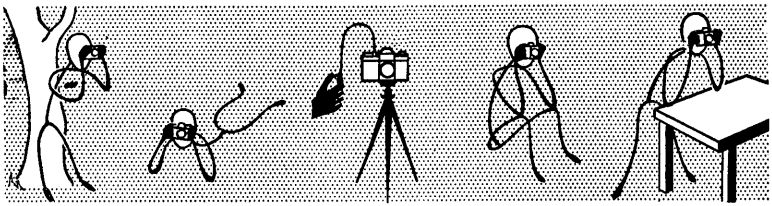
Press the elbows close to the body,

always stand with your legs well apart,



and hold quite still while you release.

Below: With the Pentax it is specially important to keep the camera really steady during the exposure, and for a fraction of a second after pressing the release button. Whenever possible support your body against something solid, such as a tree or wall or prop up your hands against your knees or a table; particularly with slow speeds. Use a cable release for time exposures from a tripod (p. 33).



The slower the exposure time, the smoother must be the release.

For slow exposures in the hand, it is advisable to rest the elbows or at least to lean the body against some support in order to avoid shake. In this way, 1/15, 1/8 and even 1/4 sec. can be risked without incurring camera shake.

Such a support is also desirable for faster exposures, as quite a lot of movements take place inside the camera after pressing the release button. A slightly unsteady hold may thus easily lead to blurred pictures.

The use of a tripod is necessary when taking time exposures and it is also recommended for speeds from 1/15 to 1 sec. For upright photographs from the tripod use a ball-and-socket head to allow changing from horizontal to vertical position.

Carrying

To be ready for quick action, it is best to carry the camera on a short strap round the neck so that it lies on your chest. Lifting it to the eye then takes a split second.

For convenience and protection, the Pentax should always be carried in its ever-ready case. This case is designed to hold the camera ready for use. The flap of the case is removable when the camera is in continuous use to enable quicker working.

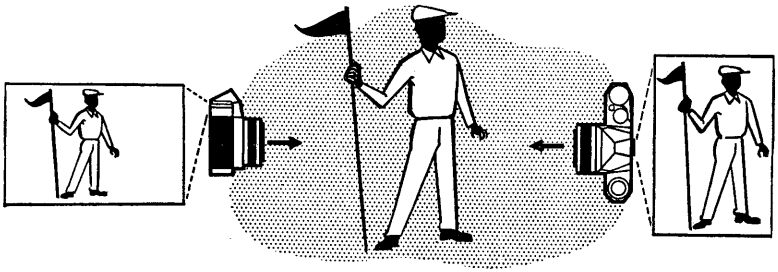
Viewing and Focusing

Focus only after cocking the rapid-wind lever, never before otherwise the reflex mirror is slightly out of position.

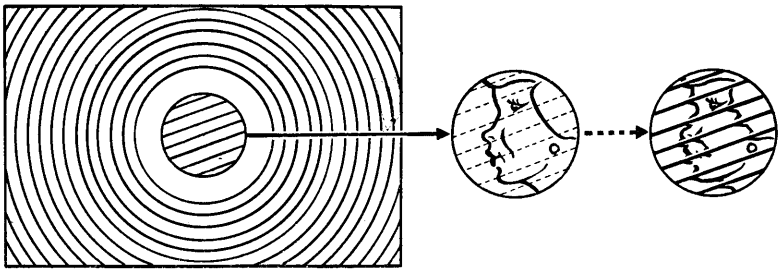
The image reflected by the lens on to the screen is always visible with the exception of the actual instant of release.

The brilliant image appears in natural size, free from parallax. A Fresnel field lens ensures even illumination into the very corners. A viewing pentaprism shows the image upright and right-way-round at eye-level.

www.butkus.us



Above: The viewfinder of the Pentax shows the image upright and the right way round. It remains upright and the right way round even when the camera is held for vertical shots (*right*). With the standard 2⅜ in. (55 mm.) lens the image also appears in approximately natural viewing size (in fact it is very slightly enlarged).



Above (left): The Pentax viewing screen consists of a ground glass screen and a central focusing area. Most of the screen is covered with a Fresnel-type field lens to ensure even image brilliance all over, right into the corners of the field. The central focusing area is actually two concentric circles. The outer circle is plain ground glass, without any Fresnel rings, to facilitate focusing of texture and fine detail on the ground glass.

The central area is the micro-prism zone which acts as a kind of multiple rangefinder. When the image is sharply focused, the pattern of lines or, on some models, dots virtually disappears (*centre*). When the image is out of focus it appears blurred; the pattern is then strongly visible. It remains visible even as the image approaches sharpness, breaking up the picture rather like the lines of a television screen (*right*) or an engraver's screen. The disappearance of the pattern at the point of maximum focus is quite abrupt, and thus provides a really accurate means of checking the exact image sharpness. While the ground glass screen is more suitable for fine texture detail, the micro-prism focusing zone is particularly effective with distinct outlines of the subject especially when they are borders between light and dark parts of the picture.

The best way to arrive at critical definition is to turn the focusing mount of the lens slowly to and fro while observing on the ground glass the subject to be focused. As you turn the mount, the image becomes more and more sharp up to a certain point, beyond which it will again lose definition. At this "beyond" stage, turn the mount back again, narrowing down the degree of movement until you arrive at the point of best definition. Earlier Pentax models have a magnifier built into the ground glass to determine the point of best definition. Later ones have a micro-split image centre showing distinctly fuzzy outlines while the lens is not accurately focused to become a clear one on setting the lens correctly.

This "becoming clear" is rather different in character from the normal ground glass image. *Just before* the image becomes sharp, it appears broken up by the superimposed diagonal line pattern of the micro-screen—somewhat in the nature of a television screen image. The moment the image is really sharp, this line pattern becomes invisible. Always have the lens at full aperture when focusing with the micro-screen.

The orthodox way of focusing with the ground glass may be adopted for taking photographs of subjects that are fairly stationary. A different method of focusing—using the micro-screen—is required when taking subjects in motion. Set the lens to a distance at which the subject will be in a given moment, or focus at some spot which it actually has to pass, and press the release button when the subject is reaching the pre-focused point.

With subjects liable to react self-consciously (e.g. children) set the lens to a suitable distance, and then approach the subject, exposing as soon as the micro-screen image appears sharp.

Alternatively, focus at some object which is at the same distance from the camera as the subject, but in a different direction. When you have found the range swing round to press the release button as soon as the victim slips into the field of view of the finder.

www.butkus.us

Shooting ■

Practise the following operations first with an empty camera until you can do them practically automatically.

1. **Work the film transport.** This advances the film and film counter and tensions the shutter ready for the next exposure.
2. **Set the exposure.** Adjust the shutter for the right amount of light for the subject conditions (p. 31).
3. **Select the aperture,** smaller aperture for greater depth of field (p. 37).
4. **Focus** and determine the picture area to obtain a sharp picture and the view you want.
5. **Release the shutter gently** (p. 9).

LOADING AND UNLOADING

The Pentax uses standard perforated cine film, 35 mm. wide, as used in the majority of other 35 mm. miniature cameras. It is available in various packings (see also p. 18), the most convenient being standard daylight cassettes. These are light-tight containers with a ready cut and trimmed length of film for 36 or 20 exposures and are loaded into the camera in daylight.

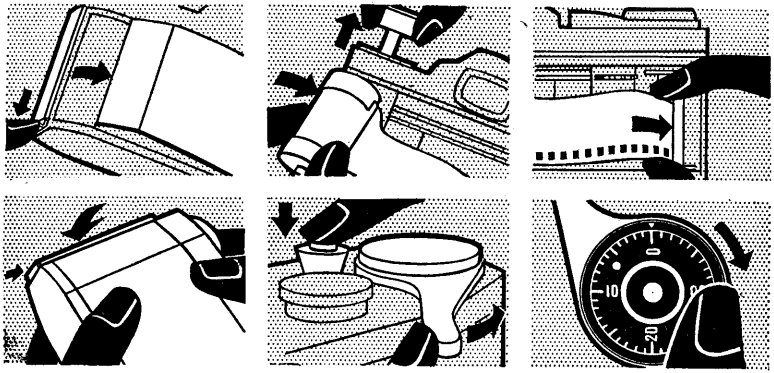
Avoid loading or unloading the camera in brilliant sunlight, though; choose a shady spot or do it in the shadow of your own body if nothing better is available.

Loading ■

1. **Open the camera back** by pulling out the sliding catch at the side of the camera body.
2. **Pull up the rewind knob** as far as it will go, then place a loaded film cassette into the empty film chamber (below the rewind knob) with its hollow part towards rewind key. The mouth of the cassette with the film end must point towards the take-up spool. Push the rewind knob back.
3. **Attach the film leader to the take-up spool.** Hold the cassette in position with the left thumb, while pulling with the right hand 4 to 4½ in. (10 to 11 cm.) of film from it. Push the free end of the film into one of the slots in the take-up spool of the camera. The take-up spool can be turned on its axis by its serrated lower flange to bring a slot into the most convenient position for inserting the film. Turn the flange of the take-up spool until the film slack is taken up. Before closing the camera back, make sure that the perforations of the film engage in the teeth of the film transport sprockets.
4. **Close the camera back** by pressing the hinged back on to the body and slide the locking latch back to secure it in this position.
5. **Wind on the film and release the shutter twice.** This advances the first two frames which have been exposed to

www.butkus.us

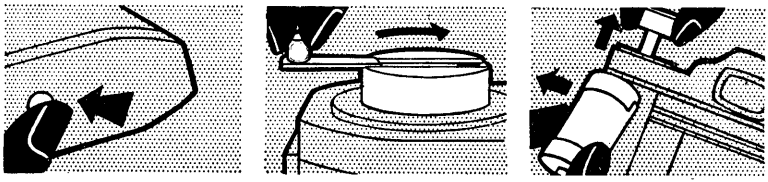
LOADING THE PENTAX



Top row: Open the camera back (*left*); pull up the rewind knob and insert the film cassette in the cassette chamber (*centre*); and fix the film leader to the take-up spool (*right*).

Lower row: Close the camera back and lock it (*left*); press the shutter release and advance the film twice over to bring a fresh portion of unexposed film into position behind the lens (*centre*); and set the film counter in the winding lever (*right*).

UNLOADING



Depress the reversing button in the camera base—and keep it depressed on some models (*left*); unfold the crank in the rewind knob and rewind the film into its cassette (*centre*); finally open the camera back, pull up the rewind knob and remove the cassette with the exposed film (*right*).

the light while inserting the film into the camera. These two wasted leader frames do not count as part of the number of exposures on the film.

6. **Set the film counter** on top of the film transport lever. Turn the disc in the direction of the arrow until the engraved arrow head on the rim points to "O" (not on the latest self-setting model SV). Now wind the lever once more and the first film frame is ready.

When inserting the film, check it is properly loaded by observing the rewind knob (at the opposite end of the camera to the transport lever). When you advance the film, the rewind knob should turn in the opposite direction to the arrow engraved on it. This proves that the film is being pulled out of the cassette on to the take-up spool. In the case of films shorter than 36 exposures, it is advisable to take up the possible film slack in the cassette by first turning the rewind knob in the direction of the arrow until a resistance is felt.

7. **Set the film indicator** on the base of the rewind knob by pulling up the knob and turning the disc by its serrated rim until the speed of the film inserted is opposite the index mark. In the case of colour daylight film use the green figures, for colour artificial light film use the red figures and for black-and-white film use the white figures. Push the rewind knob back.

Unloading ■

After all exposures have been made (the number of the exposures taken is automatically shown on the film counter disc), unload the camera.

1. **Set for rewinding.** Depress rewinding knob in base of camera, this disengages the transport sprocket in the camera.
2. **Rewind the film.** Rewind the film into its original cassette by unfolding the rewind crank and turning it clock-wise. Winding becomes distinctly easier the moment the film is fully wound back.

Main text continued on p. 17 *after the green section.*

www.butkus.us

THE PENTAX: MODEL BY MODEL

These green pages deal with the individual Pentaxes in detail.

Self-contained sections for each model cover points of loading, unloading, shooting and specific controls.

For a fuller explanation of aspects common to all Pentax cameras, compare these sections with the same headings in the main text.

The Pentax Spotmatic
- Loading 4
- Unloading 4
- Shooting 4
- Self-timer 5
- Flash 5
- Points to Note 5

The Pentax S3 (H3), SV and Super S2
- Loading 9
- Unloading 9
- Shooting 9

The Pentax S2 (H2), S1 (H1) and S1a
- Loading 11
- Unloading 13
- Shooting 13

The Pentax K
- Loading 14
- Unloading 14
- Shooting 14

The Pentax and Pentax S
- Loading 17
- Unloading 17
- Shooting 17

The Pentax Nocta
- Construction 20
- Operation 20
- Shooting sequence 21
- Accessories 22

Pentax Lenses and Accessories
- Aperture Control Systems 23
- Standard Lenses 23
- Wide-Angle and Long Focus Lenses 24
- Supplementary Lenses for Close-Ups 26
- Extension Tubes 26
- Pentax Copying Equipment 28
- Extension Bellows 28
- The Microscope Attachment 29
- Right-Angle Finder Eye-Piece 29
- Focusing Magnifier 29
- Accessory Shoe 29
- Cassette 29

The Pentax Exposure Meter
- Fixing the Meter to the Camera 30
- Taking the Meter off the Camera 30
- Using the Pentax Meter 30
- Testing and Replacing Battery 32

when depressed and pops up automatically on working the film transport lever.

THE FRAME OF THE MAGNIFYING EYE-PIECE behind the pentaprism has grooves to accept the right angle finder, focusing magnifier or accessory shoe.

FOR CLOSE-UP PHOTOGRAPHY, at distances below the normal close focusing range of 18 in. a set of extension tubes is available for lens-to-subject distances between 20 in. and 3½ in. and bellows units of a continuous range for close-up work down to 2½ in. with the standard lens. The Pentax No. 1 close-up lens permits focusing from 18 in. to 11 in.

OTHER ACCESSORIES include a microscope adaptor, copying stand, focusing magnifier, right angle finder and accessory shoe.

Loading

1. **Open camera back** by lifting up the rewind knob **past** the first click and the camera back will snap open.
2. **Insert the film cassette.**
3. **Fix the film to take up spool.**
4. **Close camera back** by simply pushing back the cover; it will automatically lock.
5. **Make two blind exposures.**
6. **Set film type indicator.**
7. **Set film speed** by lifting up the outer rim of the shutter speed dial and turning until the ASA speed of the film to be used appears in the cut out window opposite the small red index mark behind the figure 1.

Unloading

1. **Set for rewinding** by depressing the reversing button in the base of the camera. It will remain depressed automatically until the transport lever is moved on inserting the new film.
2. **Rewind the film.**
3. **Open the camera back** and remove the cassette.

Shooting

1. **Work the film transport** by moving the transport lever as far as it will go. When the shutter is tensioned a small window next to the shutter speed dial shows a red signal. When this signal disappears, you know you must advance the film and tension the shutter before the next shot.

www.butkus.us

2. **Set the exposure.** The shutter speeds may be set before or after cocking the shutter. Turn the speed dial either way to bring the required speed opposite the line in the centre of the dial. For time exposures, set the shutter speed to B; the shutter will remain open as long as the release is depressed.
3. **Focus and determine the picture area** by looking through the finder eyepiece. Turn the focusing ring on the lens mount until the micro-prism zone image in the centre of the viewfinder is clearly in focus.
4. **Switch on light meter.** Push up the switch button which is situated on your left on the side wall of the front of the camera body. The small cut out window above the switch will turn to red indicating that the meter is in the switched on position. Observe through the viewfinder the movement of the meter's needle which is on the right hand side of the ground glass; and
5. **Set diaphragm.** As you rotate the diaphragm ring the needle moves up and down. When it comes to rest at the centre you have set the correct exposure. If the needle does not reach the centre no matter how far you turn the diaphragm ring, that indicates that the shutter speed requires changing. With the needle off centre towards the "+" mark it means too much light and the shutter has to be set to a faster setting. If the needle is close to the "—" mark that indicates under exposure and a slower shutter speed setting has to be chosen.
6. **Release the shutter.** When the shutter is released the meter switch will automatically turn off and the needle remain fixed at the centre. The diaphragm will re-open to its full aperture and the image will look brighter.

Self-Timer

The self-timer setting lever is situated on the camera front panel. If the lever is pushed down fully it produces a delay of 13 seconds, pushing it down only partly a varying delay of 5 to the full 13 seconds is obtainable. The cocked self-timer is released by pressing the small button which is normally hidden behind the self-timer lever in the "out of action" position. If you have set the self-timer, but change your mind and do not want to use it, you only need to press the shutter release button on top of the camera and the shutter will be immediately released without delayed action.

Flash

The Pentax Spotmatic has a shutter slightly different to the other models which makes it possible to use electronic flash at 1/60th second.

Points to Note

The Super Takumar *f* 1.4 50 mm. is only suitable for the Spotmatic and the latest SV and SIA models which have an orange coloured

"R" marking on the film rewind knob. When removing this lens from the camera body the rear portion has to be protected by a rear mount cup to avoid scratching its rear element.

Tripod bush: The length of the tripod screw should not exceed the standard 3/16th in. (4½ mm.) otherwise the camera base might be damaged.

Pentax cassette: The reloadable metal cassette supplied for Pentax cameras cannot be used with the Spotmatic. A special cassette is in preparation.

Exposure meter: The meter should be kept switched off when not actually taking readings otherwise the battery will rapidly be exhausted. To replace the battery, open battery housing in the base plate of the camera marked "BATT" remove the old battery and replace by a new one with its "+" side down. Use Mallory PX400 or equivalent battery.

To check battery turn the shutter speed dial until its index turns to red and then turn on the meter switch. When the battery is still in good condition the needle rapidly drops to the minus side. If it does not drop rapidly the battery should be replaced by a new one.

www.butkus.us

THE PENTAX S3 (H3), SV AND SUPER S2

The Pentax S3 (H3) is also known in the U.S.A. as the Honeywell Pentax.

These models have an interchangeable lens with fully automatic diaphragm operation worked by the shutter release. A diaphragm release lever on the base of the mirror housing pushes a pin on the back of the automatic diaphragm lens which causes the diaphragm to close down to the pre-selected opening. The aperture of this fully automatic lens opens up immediately after the shutter has run down. A serrated lever on the rear of the lens mount can be set from "A" (automatic) to "M" for manual setting of the diaphragm.

The Pentax S3 (H3) is fitted with the 55 mm. Auto Takumar *f* 1.8.

The Pentax Super S2 is fitted with the 55 mm. automatic Super Takumar *f* 2, otherwise identical to S3. This model is produced for the Japanese home market only.

The Pentax SV is fitted with the 55 mm. automatic Super Takumar *f* 1.8 or the 55 mm. automatic Super Takumar *f* 2 and has in addition to the features of the S3 a built-in self-timer and a self-zeroing exposure counter.

THE FOCAL PLANE SHUTTER has speeds of 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500 and 1/1000 sec, B and T. All speeds are on one single shutter speed dial which does not revolve while the shutter is being released. It is synchronised for flash bulbs and electronic flash.

THE FRAME OF THE MAGNIFYING EYEPIECE behind the pentaprism has grooves to accept a right-angle finder, focusing magnifier, accessory shoe and Pentax exposure meter.

THE MICRO-PRISM ZONE in the centre of the Fresnel screen of the viewfinder permits ultra fine focusing. It consists of minute triangular prisms forming a pattern of dots when the subject is out of focus.

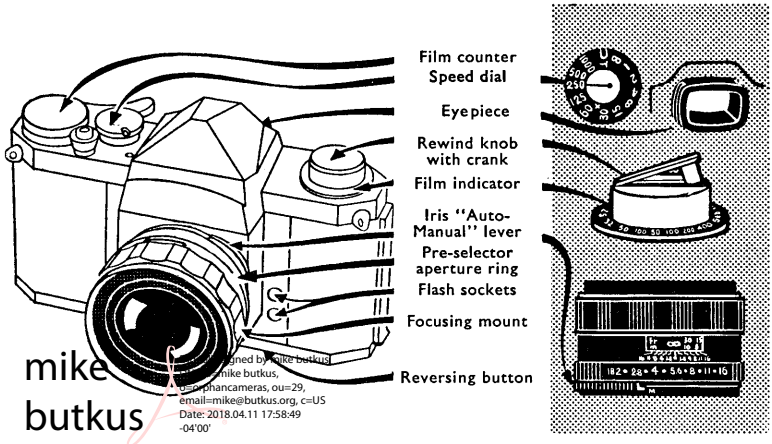
A WINDOW in the camera top shows a red dot when the film and shutter have been wound, ready for the next exposure. This disappears when the shutter has run down.

THE REVERSING BUTTON in the base plate of the camera disengages the transport sprocket for rewinding. It will stay down when depressed, and pops up automatically on working the film transport lever.

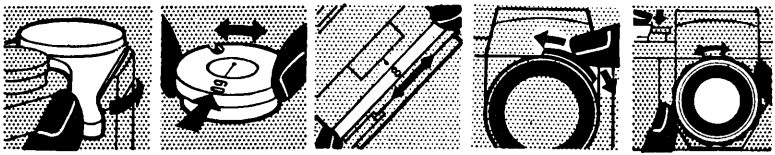
THE STANDARD LENS accepts 49 mm. screw-on filters and lens hood.

FOR CLOSE-UP PHOTOGRAPHY at distances below the normal focusing range of 17 in. a set of extension tubes is available for lens-to-subject distances between 20 and 3.5 in., and a bellows unit for a

THE PENTAX S3 (H3), SV, SUPER S2



The film counter, fitted in the rapid winding lever, counts exposures forward and shows the number of pictures taken. *The speed dial* on top of the body sets the shutter speeds from 1-1/1000 second. *The viewfinder eye-piece* has a special mount to take accessories (see page 18). *The re-wind knob* incorporates a *folding crank* for fast rewinding. *The film indicator* is a dial below the rewind knob and can be set independently. *The iris "Auto-Manual" lever* on the lens opens the diaphragm fully for viewing, closes it down automatically while taking, then opens the diaphragm up again. Alternatively, on "M" setting, the lens is always at the aperture selected. *The pre-selector aperture ring* sets the lens stop to be used for the exposure. *The flash sockets* serve for focal plane bulbs and electronic flash respectively. *The focusing mount* moves the whole lens forward and back and carries a distance scale marked in feet and meters. *The rewinding button* in the camera base disengages the transport mechanism when rewinding the film.



Shooting with the Pentax S3, SV and Super S2. *From left to right:* Advance film and tension shutter with rapid winding lever; set the exposure time on the shutter speed dial; pre-select the lens aperture on the lens mount; set the iris "Auto-Manual" lever to "A"; finally focus the lens with the front ring on the mount and press the release button to take the picture.

www.butkus.us

continuous range of close-up work down to 2½ in. with the standard lens. The Pentax No. 1 close-up lens permits focusing from 18½ to 11 in.

OTHER ACCESSORIES include a microscope adapter, copying stand, focusing magnifier, right-angle finder, reloadable cassette and accessory shoe.

Loading

1. **Open the camera** back by pulling down the sliding latch in the side.
2. **Insert the film cassette.**
3. **Fix the film to the take-up spool.**
4. **Close the camera back.**
5. **Make two blind exposures.**
6. **Set the film counter to "0"** (not on SV model, where the counter is self-setting).
7. **Set the film indicator.**

Unloading

1. Set **for rewinding** by depressing the reversing button marked **R** in the base of the camera. It will remain depressed automatically until the transport lever is moved on inserting the new film.
2. **Rewind the film.**
3. **Open the camera back** and remove the cassette.

Shooting

1. **Work the film transport** by moving the transport lever as far as it will go. When the shutter is tensioned a small window next to the shutter speed dial shows a red signal. When this signal disappears, you know you must advance the film and tension the shutter before the next shot.
2. **Set the exposure.** The shutter speeds may be set before or after cocking the shutter by turning the speed dial either way to bring the required speed opposite the line in the centre of the dial.

   For short time exposures, set the shutter speed to **B**; the shutter will remain open as long as the release is depressed.

   For long time exposures set the shutter speed to **T** and release. The shutter will remain open until you turn the dial away from the T setting.
3. **Set the aperture** by turning the rear ring of the lens mount until the required aperture clicks into position opposite the red dot in front of this ring. Half stops are indicated by white dots between two apertures. To utilize the fully automatic aperture setting of lenses so fitted push the black lever behind and to the left of the aperture scale upwards so that the letter A, engraved in white, is visible. This keeps the aperture open for focusing and viewing at full bright-

ness and also re-opens the aperture automatically immediately the shutter has run down.

To observe the depth of field on the reflex screen with the lens stopped down, the aperture can be set manually by pushing down the black lever behind the aperture scale so that the letter "M" engraved in red is visible.

4. **Focus** and determine the picture area by looking through the finder eyepiece. Turn the focusing ring on the lens mount until the micro-prism zone image in the centre of the viewfinder is clearly in focus and completely free from distortion.
5. **Release** the shutter gently. On releasing, the diaphragm will automatically close down to the pre-selected aperture before the shutter runs down, and will open again immediately afterwards to full aperture.

Self-Timer

The Pentax SV has a self-timer built-in with a delay adjustable between 5 and 10 seconds.

1. **Set the self-timer cocking wheel** on the top plate of the camera below the rewind knob by turning it in a clockwise direction as far as it will go.
2. **Release the self-timer** by pressing the self-timer button which is situated in the top plate between the rewind knob and the penta-prism housing.

The self-timer cocking wheel can be set before or after the rapid winding lever of the camera has been cocked. When the shutter is in the released position the V mark on the rim of the self-timer wheel comes to the front, indicating that it requires winding to be able to take a picture.

To produce a shorter than 10-second delay time, press the self-timer release button after the self-timer wheel has been wound about 50°. This will give about 5 seconds delay.

www.butkus.us

THE PENTAX S2 (H2), S1 (H1) and S1a

The Pentax S2 is fitted with an interchangeable Auto-Takumar *f* 2 lens, while the S1 has the same lens but of *f* 2.2 aperture. Both have automatic diaphragms, worked by the shutter release through an internal link in the camera. A diaphragm release lever on the base of the mirror housing pushes in a pin on the back of the semi-automatic diaphragm lens. The Pentax S1a is fitted with the 55 mm. *f* 2 Super-Takumar, fully automatic iris and self-zeroing exposure counter.

THE FOCAL PLANE SHUTTER has speeds of 1, ½, ¼, ⅛, 1/15, 1/30, 1/60, 1/125, 1/250 and 1/500 sec., B and T. All speeds are on one single shutter speed dial which does not revolve while the shutter is being released. On later models the dial has a cut-out to take the coupling pin of the clip-on Pentax exposure meter (page 21). The shutter is synchronised for flash bulbs and electronic flash.

THE FRAME OF THE MAGNIFYING EYEPIECE behind the pentaprism has grooves to accept a right-angle finder, focusing magnifier, accessory shoe and, for later models, the Pentax exposure meter.

A MICRO-PRISM ZONE in the centre of the Fresnel screen of the viewfinder serves for ultra-fine focusing. An area immediately surrounding the micro-prism zone is free from the Fresnel screen lines for easier focusing on the ground glass screen.

A WINDOW in the camera top shows a red dot when the film and shutter have been wound, ready for the next exposure. This disappears when the shutter has run down.

THE REVERSING BUTTON in the base plate of the camera disengages the transport sprocket for rewinding. It stays down when depressed, and pops up automatically on working the winding lever.

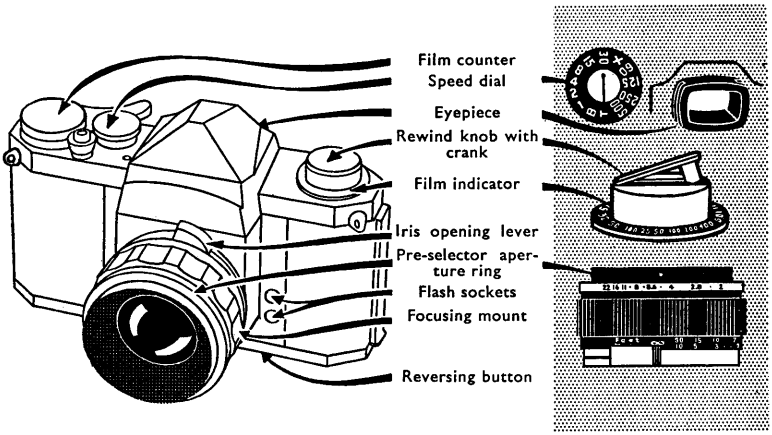
THE STANDARD LENS accepts 46 mm. screw-on filters and lens hood. The Super Takumar 55 mm *f* 2 takes 49 mm attachments.

FOR CLOSE-UP photography at distances below the normal focusing range of 22 in. (S1, 20 in; Sla, 18 in.) a set of extension tubes is available for lens-to-subject distances between 20 and 3.5 in., and a bellows unit for a continuous range of close-up work down to 2½ in. with the standard lens.

OTHER ACCESSORIES include a microscope adapter, copying stand, right-angle finder, focusing magnifier, reloadable cassette and accessory shoe.

Loading

1. **Open the camera** back by pulling down the sliding latch in the side.
2. **Insert the film cassette.**
3. **Fix the film to the take-up spool.**
4. **Close the camera back.**



The *film counter*, fitted in the rapid winding lever, counts exposures forward and shows the number of pictures actually taken. The *speed dial* on top of the body sets the shutter speeds from 1 to 1/500 second. The *viewfinder eyepiece* carries a special mount to take a right-angle finder or an accessory shoe. The *rewind knob* incorporates a *folding crank* for more comfortable rewinding. The *film indicator* is a disc below the rewind knob and can be set independently at any time. The *iris opening lever* on the lens opens the aperture to its full extent, irrespective of the pre-selected stop, for focusing. The *pre-selector aperture ring* sets the lens stop to be used for the exposure. The *flash sockets* serve for focal plane bulbs and electronic flash respectively. The *focusing mount* moves the whole lens forward and back, and carries a distance scale marked in feet and metres. The *reversing button* in the camera base disengages the transport mechanism when rewinding the film.

Shooting with the Pentax S2 and S1. *From left to right:* Advance the film and tension the shutter with the rapid winding lever; set the exposure time on the shutter speed dial; pre-select the lens aperture with the front ring on the lens; pull down the iris opening lever; finally focus the lens with the focusing mount and press the release button to take the picture.

www.butkus.us

5. **Make two blind exposures.**
6. **Set the film counter to "0".**
7. **Set the film indicator.**

Unloading

1. **Set for rewinding** by depressing the reversing button marked R in the base of the camera. It will remain depressed automatically until the transport lever is moved on inserting the new film.
2. **Rewind the film.**
3. **Open the camera back** and remove the cassette.

Shooting

1. **Work the film transport** by moving the transport lever as far as it will go. When the shutter is tensioned a small window next to the shutter speed dial shows a red signal. When this signal disappears, you know you must advance the film and tension the shutter before the next shot.
2. **Set the exposure.** The shutter speeds may be set before or after cocking the shutter by turning the speed dial in either direction to bring the required speed opposite the index line in the centre of the dial.

   For short time exposures, set the shutter speed to B; the shutter will remain open as long as the release is depressed.

   For long time exposures, set the shutter speed to T and release. The shutter will remain open until you turn the dial away from the T setting.
3. **Set the aperture** by turning the front ring of the lens mount until the required aperture clicks into position opposite the red dot on the front rim. Half stops are indicated by black dots between two apertures. To utilise the automatic aperture setting on lenses so fitted, press down the lever on the rear of the lens mount as far down as it will go. This opens up the aperture for focusing and viewing at full brightness.
4. **Focus** and determine the picture area by looking through the finder eyepiece. Turn the focusing ring on the lens mount until the micro-prism screen image in the centre of the viewfinder is clearly in focus and completely free from distortion.
5. **Release the shutter gently.** On releasing, the aperture will automatically close down to the pre-selected opening immediately before the shutter runs down.

THE PENTAX K

This model is also known as the Tower 29 in the U.S.A. It is fitted with an interchangeable 55 mm. Auto-Takumar *f* 1.8 lens with automatic diaphragm operation, worked by the shutter release through an internal link in the camera. A diaphragm release lever on the base of the mirror housing pushes a pin on the back of the automatic diaphragm lens.

THE FOCAL PLANE SHUTTER has speeds of 1, ½, ¼, ⅛, 1/15, 1/30, 1/60, 1/125, 1/500 and 1/1000 sec. and B and T. The instantaneous speeds from 1/30 to 1/1000 sec. are set on the shutter speed dial on top of the camera, while the slow speeds from 1 to 1/15 sec. are set on the slow speed dial on the front. It is synchronised for flash bulbs and electronic flash.

A MICRO-PRISM ZONE in the centre of the Fresnel screen of the viewfinder serves for ultra fine focusing. An area surrounding the micro-prism zone is free from Fresnel pattern, for easier focusing on the ground glass screen.

THE STANDARD LENS accepts 46 mm. screw-in filters and lens hood.

FOR CLOSE-UP PHOTOGRAPHY at distances below the normal focusing range of 20 in. a set of three extension tubes is available for lens to subject distances between 30 and 3½ ins. and a bellows unit for a continuous range of close-up work down to 2½ in. with the standard lens.

OTHER ACCESSORIES include a copying stand and microscope adapter.

Loading

1. **Open the camera back** by pulling the sliding catch in the side of the camera.
2. **Insert film cassette.**
3. **Fix the film end to the take-up spool.**
4. **Close the camera back.**
5. **Make two blind exposures.**
6. **Set the film counter to "0".**
7. **Set the film indicator.**

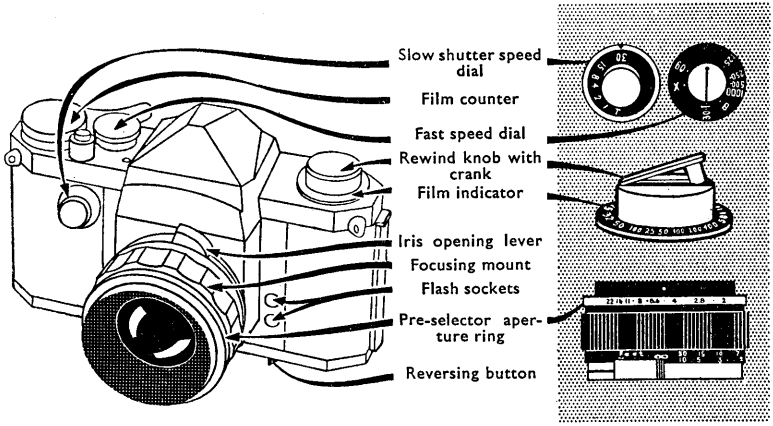
Unloading

1. **Set for rewinding** by depressing the reversing button in the base of camera, and keep it depressed during rewinding.
2. **Rewind the film.**
3. **Open the camera back** and remove the cassette.

Shooting

1. **Work the film transport** by moving transport lever as far as it will go.

www.butkus.us



The *slow shutter speed dial* sets exposure times from 1 to 1/30 second. The *film counter*, incorporated in the rapid winding lever, counts exposures forward and shows the number of pictures actually taken. The *fast shutter speed dial* sets exposure times from 1/30 to 1/1000 second; this dial must be set to 30-1 when the slow speeds are to be used on the slow speed dial. The *rewind knob* incorporates a folding crank for more comfortable rewinding. The *film indicator* is the disc below the rewinding knob, and can be set independently to show the speed of the film loaded into the camera. The *iris opening lever* opens the lens aperture to its full extent for focusing and viewing. The *focusing mount* moves the whole lens forward and back and is calibrated in feet and metres. The *flash sockets* serve for focal plane bulbs and electronic flash respectively. The *pre-selector aperture ring* pre-sets the lens aperture to be used for the actual exposure. The *reversing button* in the camera base disengages the transport mechanism for rewinding the film.

Shooting with the Pentax K. *From left to right:* Advance the film and tension the shutter by working the rapid winding lever; set the shutter speed on the fast speed dial (*top*) or the slow speed dial (*bottom*); pre-set the lens aperture to be used; pull down the iris opening lever; focus the lens, and press the release button to take the picture.

2. **Set the exposure.** The shutter speeds from 1/30 sec. to 1/1000 sec. are set on the top dial. Lift the dial and turn it to bring the speed required opposite the index line in the centre of the dial. The slow speed dial on the camera front must remain set to the figure 30. The shutter speed may be set either before or after the shutter has been cocked. *Note:* when setting to 1/1000 sec. the speed dial does not drop down fully.

   The slow shutter speeds are set on the front dial by turning it to the desired slow speed. For slow speeds first set the fast speed dial on top of the camera to 30-1.

   At the B setting, the shutter will remain open as long as the release is depressed. At the T setting, the shutter opens on releasing; to close the shutter, turn the slow speed dial to the left.
3. **Set the aperture** by turning the front ring of the lens mount until the required aperture clicks into position opposite the red dot on the front rim. Half stops are indicated by black dots between two apertures. To utilise the automatic aperture setting, on lenses so fitted press the lever on the rear of the lens mount as far down as it will go. This opens up the aperture permitting focusing and viewing at full brightness.
4. **Focus and determine** the picture area by looking through the finder eyepiece. Turn the focusing ring on the lens mount until the micro-screen image in the centre of the viewfinder is clearly in focus and completely free from distortion.
5. **Release the shutter gently.** On releasing, the aperture will automatically close down to the pre-selected opening immediately before the shutter runs down.

www.butkus.us

THE PENTAX AND PENTAX S

The Pentax S is also known as the Tower 26 in the U.S.A.

These models are fitted with the 58 mm. Takumar *f* 2, the 55 mm. Takumar *f* 2.2 or the 55 mm. Takumar *f* 2.4 as standard lens. The lenses have a pre-set diaphragm, but no internal link control from the camera and long focal length lenses may be used. The only difference between the Pentax and the Pentax S is the range of shutter speeds.

THE FOCAL PLANE SHUTTER has speeds from 1 sec. to 1/500 sec. and B and T. The instantaneous speeds are set on the shutter speed dial on top of the camera, while the slow speeds are set on the slow speed dial on the front. It is synchronised for flash bulbs and electronic flash.

The actual speeds of the Pentax are 1, ½, 1/5, 1/10, 1/25, 1/50, 1/100, 1/200 and 1/500 sec. also B and T.

The actual speeds of the Pentax S are 1, ½, ¼, ⅛, 1/15, 1/30, 1/60, 1/125, 1/250 and 1/500 sec. also B and T.

THE GROUND GLASS SCREEN carries a Fresnel lens.

THE STANDARD LENSES accept 46 mm. screw-in filters and hood.

FOR CLOSE UP photography at distances below the normal focusing range of 20 in. a set of three extension tubes is available for lens-to-subject distances between 20 and 3½ in., and a bellows unit for a continuous range of close-ups down to 2½ in. with the standard lens.

OTHER ACCESSORIES include a copying stand and microscope adaptor.

Loading

1. **Open the camera back** by pulling up the sliding catch in the side of the camera.
2. **Insert the film cassette.**
3. **Fix the film end to the take-up spool.**
4. **Close the camera back.**
5. **Make two blind exposures.**
6. **Set the film counter to "0".**
7. **Set the film indicator.**

Unloading

1. **Set for rewinding** by depressing the reversing button n the base of the camera and keep it depressed during rewinding.
2. **Rewind the film.**
3. **Open the camera back** and remove the cassette.

Shooting

1. **Work the film transport** by moving transport lever as far as it will go.
2. **Set the exposure.** The shutter speeds from 1/25 (1/30 on model S)

THE PENTAX NOCTA

This is an Asahi Pentax model designed for infra-red telephotography in total darkness. It has an electro-optical system and permits viewing in total darkness by the conversion of an infra-red scene to a bright representation in the viewfinder of the camera. It is designed for military, criminal, psychological and other specialized work.

It is fitted with an infra-red flash gun and a searchlight covered by an infra-red filter. The latter is used to illuminate the scene and the infra-red light reflected is converted electro-optically into a visible image on to the camera finder. The light of the flash bulb is used for the exposure. The infra-red beam from the searchlight is almost invisible while the beam from the infra-red flash at the instant of exposure may be seen as an extremely weak red light by the subject if he is looking directly at the camera.

With the special Toshiba Super R5 flash bulb and Kodak High-Speed infra-red film with maximum development boosting, a maximum shooting distance of 328 ft. is possible.

Construction

The unit consists of the basic elements of a Pentax body but with one fixed shutter speed of 1/20 sec. and bulb, flash synchronization and with detachable sports finder. The lens is 300 mm. *f* 3.3, specially designed for infra-red, stopping down to *f* 22 with an angle of view of 8°, and is supplied complete with a 256× N.D. filter, 42 mm. diameter. A 25 mm. focal length eye piece is fitted producing a total viewfinder image magnification of 10× with an effective angle of view of about 5°.

With a 50 watt bulb in the searchlight, objects 328 ft. away are visible. The wavelength range used is 0.85/1.2 microns. Parabolical mirrors of 170 mm. diameter, 20 mm. focal length, are fitted to the infra-red searchlight and infra-red flash.

The image converter tube with 16 kV. output uses a 9 v. dry cell battery contained in the camera body. The infra-red searchlight uses a 12 v. 50 w. bulb with a D.C. 12 v. 8 A/h. battery or 12 v. 70 w. A.C. power pack. The power source of the infra-red flash gun is a 9 v. dry cell.

As flash bulb, the Toshiba Super R.5 is intended, which has a peak lumen of 1,500,000 with 25,000 lumen/sec. output and an effective duration of 14 milli-secs.

Operation

It is beyond the scope of this Guide to go into full details of the operation of the Nocta. The following details explain the basic principles involved.

The unit should be used from a solid professional tripod, on account

www.butkus.us

of its bulk and the open-flash exposure method. The camera assembly weighs about 16 lb. without power pack.

The image converter tube used for focusing has pin-cushion distortion and only the centre circle in the frame of 5 mm. diameter should be used for focusing. The image area of the image converter tube is a circle of 25 mm. diameter on the standard 24×36 mm. film.

The Noctovision viewfinder must not be switched on while available daylight goes through the lens, particularly at wide apertures, as the tube may be damaged. The neutral density filter supplied with the instrument may, however, be placed over the lens to permit short observation provided no direct sunlight strikes the lens.

In fact, there is danger to the tube even while operating the Noctovision finder with the aid of the infra-red searchlight with the lens at full aperture if an object stands fairly close to the lens. Such an object might reflect infra-red rays strongly into the viewfinder system.

To obtain correct exposure, distance-aperture-developer combination tables are given to act as a rough guide. However, varying atmospheric conditions, also fog and smog, considerably affect exposure. The film to be used is the Kodak high-speed infra-red film, generally available in 100 ft. bulk lengths only. It must be loaded into the magazine in total darkness and even the loaded magazines should not be exposed to daylight. The film itself has to be stored under refrigeration below 0°C. and brought into room temperature at least four hours before use.

Shooting Sequence

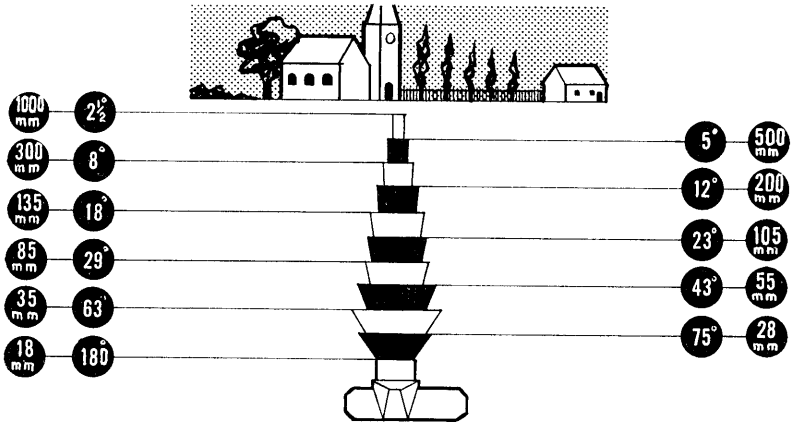
1. **Searchlight.** Connect the power source cord to the connecter of the searchlight, and turn on the switch.
2. **Lens.** Remove the lens cap and N.D. filter. Open up the diaphragm to *f* 3.3.
3. **Finder.** Turn on the switch of the Noctovision viewfinder.
4. **Flash bulb.** Depress the lock button, pull out the socket, insert a flash bulb, and push back the socket. The socket is pushed back with a "click" and with this click the flash gun circuit is closed completely. Be sure that the socket is pushed with a "click". Test the bulb with the white BULB TEST button.
5. **Focusing.** Look through the eyepiece, rotate the focusing ring of the lens by holding the focusing lever and bring the object into focus. Always focus by observing the image at the centre circle of the fluorescent screen of the image converter tube. When focusing, rotate the milled ring of the eyepiece to suit your eyesight. Note the setting of this ring for future use.
6. **Exposure.** After composing and focusing, set aperture (according to distance, atmospheric conditions and developing method) and gently release the shutter. The reflex mirror rises, and the shutter releases, firing the synchronized flash bulb. When your finger leaves the shutter release button (or cable release), the mirror returns to its original viewing position, and the image of the object returns on to

WIDE ANGLE AND LONG FOCUS LENSES FOR THE PENTAX*

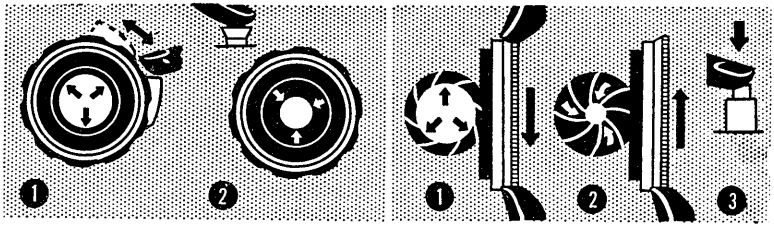
Lens	Focal length (mm.)	Aperture Max.	Aperture Min.	Angle of view	Closest focusing distance (ft.)	No. of elements	Aperture mechanism	Weight	‡ Filter size mm.
Fish-eye Takumar	18	f11	f32	180°	—	4	Manual	3.5 oz.	—
Super Takumar	28	f3.5	f22	75°	1.3	7	Fully Automatic	9.2 oz.	58
● Takumar	35	f4	f22	63°	1.5	5	Normal	4.8 oz.	46
Super Takumar	35	f2	f16	63°	1.5	8	Fully Automatic	14.5 oz.	70
Super Takumar	35	f3.5	f22	63°	1.5	5	Fully Automatic	5.4 oz.	49
● Auto- Takumar	35	f3.5	f22	63°	1.5	5	Semi- Automatic	5.2 oz.	46
● Auto- Takumar	35	f2.3	f22	63°	1.5	6	Semi- Automatic	11 oz.	65
Macro- Takumar	50	f4	f22	46°	4 in.	8	Pre-set	9.4 oz.	49
● Takumar	83	f1.9	f22	29°	3.5	7	Pre-set	11 oz.	49
● Auto- Takumar	85	f1.8	f22	29°	3	5	Semi- Automatic	12 oz.	55
Super Takumar	85	f1.9	f16	29°	3	5	Fully Automatic	12.3 oz.	58
Quartz- Takumar	85	f3.5	f22	28°	—	4	Pre-set	4.5 oz.	Special
Super Takumar	70-			16.5 to			Fully		
Zoom	150	f4.5	f22	35°	12§	42.8	Automatic	45 oz.	67
● Takumar	100	f3.5	f22	24°	4	3	Pre-set	8 oz.	46
Super Takumar	105	f2.8	f22	23°	4	5	Fully Automatic	10.2 oz.	49
● Auto- Takumar	105	f2.8	f22	23°	4	4	Semi- Automatic	9.9 oz.	49
● Takumar	105	f2.8	f22	23°	4	4	Pre-set	9.9 oz.	46
Super Takumar	135	f3.5	f22	18°	6	5	Fully Automatic	12.1 oz.	49
● Takumar	135	f3.5	f22	18°	6	5	Pre-set	10.6 oz.	49†
Super Takumar	150	f4	f22	16.5°	6	5	Fully Automatic	11.3 oz.	49
Tele- Takumar	200	f5.6	f22	12°	9	5	Pre-set	13 oz.	49
Takumar	200	f3.5	f22	12°	9	4	Pre-set	26.5 oz.	67
Takumar	300	f4	f22	8°	25	3	Manual	48 oz.	82
Tele- Takumar	300	f6.3	f22	8°	18	5	Pre-set	25.7 oz.	58
Tele- Takumar	400	f5.6	f22	6°	27	5	Manual	45 oz.	77
Takumar	500	f5	f22	5°	35	2	Manual	6 lb 5 oz.	46
Tele- Takumar	1000	f8	f22	2.5°	98	3	Manual	16 lb. 9 oz.	46

*Lenses with automatic aperture mechanism are only suitable for Pentax cameras with automatic diaphragm control. All other lenses are suitable for all Pentax models.
†Earlier models of this lens take 46 mm. screw-on filters. ● Discontinued
‡All filters are screw-on type except those for the Auto-Takumar 35 mm. f 2·3, and S-Takumar 35 mm. f 2, which clip on, and for the Takumar 500 and 1000 mm. which are placed behind the lens.
§With close-up attachment supplied with lens, 6 ft. 3 in.

www.butkus.us



A total of eleven focal lengths is available for the Pentax, ranging from ¾ in. (18 mm.) to nearly 40 in. (1000 mm.), with angles of view from 180° to 2½°. The longer the focal length, the larger the image scale, but the smaller the view covered. The shorter the focal length the wider the view, but the smaller the scale of the image.



The lenses of the current Pentax cameras have a fully automatic diaphragm that re-opens immediately after the shutter runs down.

Left: The standard lens, as well as some of the wide-angle and long focus lenses of the Pentax H2, H1 and K have a semi-automatic pre-set diaphragm. **1.** On pulling down the iris opening lever, the latter opens up the lens to its full aperture for focusing and viewing. **2.** On pressing the release button an internal link in the camera stops down the lens to its pre-selected aperture before releasing the shutter.

Right: Most other lenses of the Pentax and also the standard lens of the original Pentax and S have a manual pre-set aperture system. **1.** After pre-selecting the lens aperture to be used with the front aperture ring, the rear aperture setting ring opens up the lens to its full extent for viewing and focusing. **2.** Immediately before the exposure close down the aperture to its pre-set top by turning the rear ring in the opposite direction. **3.** Then press the shutter release to take the picture.

THE AUTOMATIC APERTURE SYSTEM is simpler still. You pre-set the lens aperture in the same way as with the pre-set lens systems. This stops down the lens to the required aperture. To open it up to full aperture, pull down the lever on top of the lens mount. For the exposure, the lens is stopped down automatically to the pre-set aperture by an internal link through the camera, connected to the release button. After the exposure you have to pull down the aperture lever once more to get back to full aperture.

The aperture can be pre-set and changed at any time, irrespective of whether the aperture lever is tensioned or not.

Lenses with normal or pre-set aperture systems can be used on all Pentax models; those with automatic aperture systems only on Pentax models with the internal release linkage.

THE FULLY AUTOMATIC SYSTEM of the recent Pentax models is similar to the above but with the additional facility that the diaphragm re-opens automatically to full aperture as soon as the shutter has run down. It is described under the Pentax S3. The fully automatic lenses are only suitable for these newer models with the internal iris link.

Supplementary Lenses for Close-ups

The unaided Pentax focuses down to about 2 ft., according to the model, where it covers a field of approximately 9 × 14 in. It can work at still closer distances with the aid of the Pentax Close-up Lens No. 1. This is suitable for all lenses accepting 49 mm. filters. It offers a focusing range from 18½ in. to 11 in. with the 55 mm. Pentax lens.

Alternatively, you can use close-up meniscus lenses: these are available from photo-dealers. They make the camera suitable for photography of small objects, such as plants, small creatures, for copying documents, books, stamps, for table-top work, etc.

These close-up lenses are suitable for all models of the Pentax camera, and are best used in a filter mount to screw into the lens mount. They are available in a variety of focal lengths.

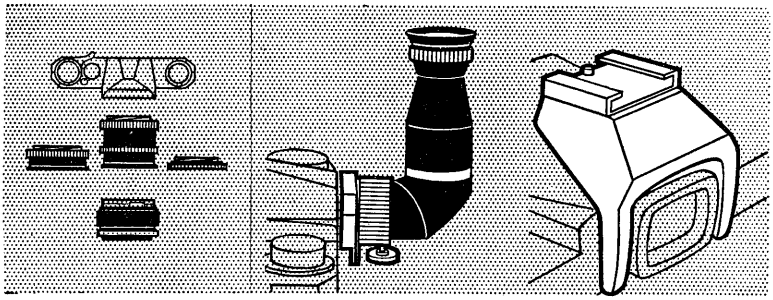
When placing the close-up lens over the taking lens, the reflex finder of the Pentax shows the exact image covered free from parallax and the picture can be focused in the same way as without the close-up lens. Suitable tables near the end of this Guide give more detailed data.

At full aperture, the definition falls off slightly, especially towards the corners, and the camera lens should be stopped down to *f* 5.6, or better still *f* 8, when using the close-up lenses. No change of exposure time is required.

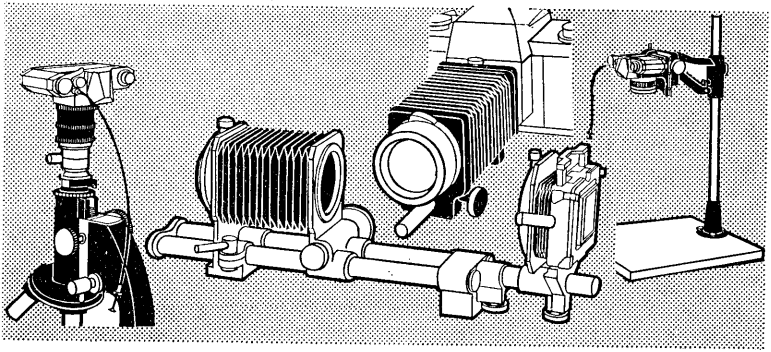
Extension Tubes

Instead of supplementary lenses for close-up focusing, extension tubes can be fitted between the lens and camera body. Their purpose is similar to that of the supplementary lenses, but their combined

www.butkus.us



Left: Extension tube of various sizes permit large-scale close-up and macro-photography with the Pentax.
Centre: The right-angle finder attachment fits on to the viewfinder eyepiece mount of the Pentax models with grooved eyepiece and is particularly useful for awkward shots where you cannot conveniently get your eye behind the viewfinder (for instance low-angle photography, copying, etc.).
Right: The accessory shoe attaches to the viewfinder eyepiece mount of the Pentax models with grooved eyepiece and fits on top of the pentaprism housing, to take a flash gun and similar accessories.



Left: The micro-attachment adapts the Pentax camera for taking pictures through a microscope. The adapter connects the camera directly to the microscope eyepiece.
Centre: The bellows extension units serve the same purpose for close-up photography as the extension tubes, but are more versatile owing to their variable extension.
Right: For routine copying jobs the copying stand holds the Pentax rigidly above the original, and points it accurately and vertically downwards. A micro-setting of a slide moves the whole camera up and down for precision focusing without adjustment of the lens. For greater copying distances the length of the column can be increased by means of extension columns.

focusing range is greater. They allow photographs up to natural size and even larger than life size, to be taken.

Three extension tubes are provided by the manufacturer of the Pentax. The individual tubes are numbered No. 1 (7.5 mm.), No. 2 (15 mm.), No. 3 (30 mm.). These tubes may be used individually or in any combination. Additional combinations can be produced by use of further tubes. The tube or combination of tubes screws between the camera body and lens.

On model S3 (H3), SV and Super S2 use tubes marked S3; on model S1 (H1) use tubes marked S1. When using the semi-automatic Takumar lenses (page 15) with S3 tubes depress the diaphragm coupling pin on the back of the lens before mounting it on the tube.

The extension tube table near the end of this Guide shows the distance in front of the film at which the object is sharp, the size of the subject area covered on the film, the scale of reproduction on the film, and the exposure factor (by which the exposure time has to be increased on account of the increased lens-to-focal plane distance).

DEPTH OF FIELD when working at close range is very small. For example, at 12 in. and *f* 5.6 overall depth just over 1 in., so that it is generally advisable to use small apertures. The close-up depth of field table near the end of this Guide gives sharp zones at various apertures for distances between 3 ft. and 11 in.

Pentax Copying Equipment

THE COPYING STAND consists of a baseboard with column. A sliding camera holding arm is fixed to the column. The front of the sliding arm is fitted with a pantographic base plate with micro adjustment knob. This outfit is designed for accurate copying with the Pentax. It maintains precise, parallel camera position for close-up work, in particular with extension tubes and close-up lenses.

THE PENTAX COPIPOD is a portable copying stand supplied in a pouch case. It consists of four extensible legs, lensboard and 49/46 mm. adaptor ring. For use with No. 1 extension tubes and with lenses of minimum focusing distance of 1.8 ft (55 cm.) and can also be used without tubes.

Extension Bellows

THE PENTAX EXTENSION BELLOWS are useful for extreme close-up work. The bellows are mounted between two arms, and are extended and retracted with a rack and pinion drive on an optical bench-type of rod which is calibrated. The front of the bellows attachment accepts the camera lens while its back screws into the camera body. The maximum extension is approximately 100 mm. so that with the standard lens pictures may be taken as close as 2½ in.

When using the automatic Takumar lenses (p. 15), depress the diaphragm coupling pin on the back of the lens before mounting it on the bellows unit.

The unit is made collapsible; it may be stored in a small case.

www.butkus.us

EXTENSION BELLOWS II is a rather more elaborate version of above bellows. It is fitted with double runners, for extreme rigidity, and a slide copying attachment can be fitted to it to make duplicates of colour slides and for copying other flat transparent objects.

The Microscope Attachment

The microscope attachment for the Pentax consists of a main adapter tube which is threaded at one end to screw to the camera body. The other end has a bayonet mount which accepts the bayonet end of the coupling ring. The other end of the coupling ring has a screw thread to screw to a tube which clamps to the microscope focusing tube.

An anti-reflection tube is supplied to prevent interior reflections in the microscope focusing tube when no eyepiece is employed.

Finally, a stopping clamp can be fitted to the microscope focusing tube above the barrel of the microscope. This stops the microscope from sliding down under the weight of the camera and adapter.

Right-angle Finder Eyepiece

This accessory viewfinder unit attaches to rear frame of the camera viewfinder eyepiece of the Pentax models with guide grooves on the eyepiece. It permits a convenient viewing at low level for photographing children, general low angle shots, close-ups and photomicrography.

Focusing Magnifier

This accessory unit attaches to the rear frame of the camera viewfinder eyepiece on those Pentax models with guide grooves on either side of the eyepiece mount. It gives a magnified view of the central micro-prism zone only and does not cover the whole focusing screen. It greatly enhances the accuracy of focusing in this central area of the screen. The magnifier has its own focusing eyepiece to compensate for individual eyesight of the user.

Accessory Shoe

This accessory shoe fitting will slide into the two side slots on the camera viewfinder eyepiece of Pentax models with guide grooves on the eyepiece. The accessory shoe then sits on top of the pentaprism housing in the centre of the camera, and accepts a miniature exposure meter, flash gun and similar camera attachments.

Cassette

A reloadable metal cassette is available. It is intended primarily to be reloaded with black-and-white film from bulk lengths. It will not fit the Spotmatic for which a special version is in preparation.

THE PENTAX EXPOSURE METER

The Pentax photo-electric exposure meter clips on to the guide grooves on the rear frame of the camera eyepiece and locates over the pentaprism housing. It is suitable for use with Pentax models which have a cutout in the top of the shutter speed dial to take the coupling pin of the meter (H1 and H3 models made after April 1961).

This meter uses a Cadmium Sulphide cell, with an acceptance angle of 30° which approximately matches the field of the standard lenses. It is powered by a mercury "button" battery, making it appreciably more sensitive than conventional selenium cell photo-electric exposure meters. It has a "high-low" switch, for use in high or low light levels, with an intermediate "off" position to which it should be set when not in use, to conserve the battery.

The mercury battery, which lasts for 12 to 24 months, can be replaced by lifting the spring and removing the cap on the underside of the meter.

Fixing the Meter to the Camera

1. **Locate the meter on the pentaprism housing.** On 1964 model, raise the eyepiece frame on the rear of the meter; slide the legs into the grooves of the viewfinder eyepiece frame on the camera. Fold down the frame on the meter which then acts as a catch to stop the meter falling off. On 1965 model, slide eyepiece frame into grooves while depressing the serrated levers on either side of the frame.
2. **Couple the meter** with the shutter speed dial by turning the meter dial, marked with shutter speeds, in either direction until you hear its spring-loaded coupling pin click audibly into the cutout in the camera shutter speed dial.

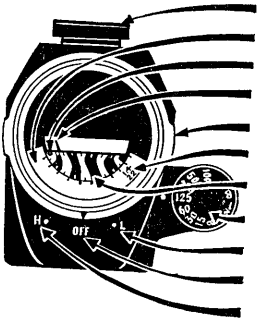
Taking the Meter off the Camera

Raise the rear eyepiece frame of the meter or, on 1965 model, depress the levers on either side of the frame, and lift it straight off the camera, disengaging the legs from the grooves as you do so.

Using the Pentax Meter

1. **Set the Film Speed.** The meter shutter speed dial is on top of a bracket protruding from the side of the meter. Below the bracket is a milled film speed setting ring with a white index dot, and below this again, a drum, engraved with ASA film speeds, which couples with the camera's shutter speed dial. Hold the meter shutter speed dial still and turn the film speed setting ring until the dot is against the required film speed on the drum.

www.butkus.us



Meter cell window

Black aperture scale for high setting

Zero point

Meter needle

Meter switch ring with finger grips

Red aperture scale for low setting

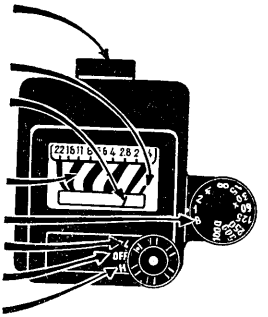
Guide lines

Meter shutter speed dial

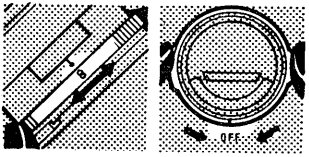
"L" setting for dim light

"Off" setting to conserve battery

"H" setting for bright light



Attaching the meter to the camera. *From left to right:* Place meter over pentaprism housing. With back cover raised, engage the legs in eye-piece grooves; lower the back cover to secure meter; twist shutter speed dial either way to engage spring-loaded coupling pin in the cut-out on the camera speed dial.



Setting the meter. *Top, left to right:* set indicator mark on lower disc to film speed on the drum; pre-select shutter speed; switch on meter to "H" or "L" according to light level; point camera at the subject; read off correct aperture against the meter needle. *Bottom, left to right:* Transfer aperture number to lens aperture scale; switch off the meter after use.

2. **Pre-set the shutter speed** by setting the required speed on the meter shutter speed dial against its white index mark.
3. **Set the high-low switch.** Turn the ring on top of the meter by its serrated projections, until the black arrow, normally at "off", is at H (High) when photographing outdoors or in bright light. With this setting, use the *black* aperture scale on the meter dial. Turn the switch to L (Low) when indoors, at night or in very dull light, and use the *red* aperture scale.

   With the 1964 meter on setting H, if the meter needle does not point to the black (high) scale, you have to set a faster shutter speed. If the needle does not move far enough, turn the chromed ring so that the black arrow points to L.

   On setting L, if the meter needle does not point to the red (low) scale, you must select a slower shutter speed. If the needle moves to the extreme right end of the scale, select the H setting.
4. **Point the camera at the subject.** See "Using an Exposure Meter", p. 33.
5. **Read the aperture and transfer to the lens.** Trace down the black or white block against which the needle registers, to the corresponding aperture number on the meter scale. This is the correct aperture for the shutter speed selected and should now be set on the lens. You are then ready to expose.
6. **Switch off the meter** after use by turning it to the "off" position.

This measuring sequence can of course be reversed, if it is required to work at a given aperture. Set the diaphragm ring on the lens to the required aperture after making adjustments **1** and **3** above. Point the camera at the subject and turn the shutter speed dial which will cause the aperture scale on the meter to rotate. When the selected aperture (set on the lens) comes opposite the meter needle, the correct shutter speed has been set and is indicated against the white index mark beside the shutter speed dial.

Testing and Replacing Battery

The later versions of the 1964 meter have a "B" in green on the H-OFF-L scale. With the indicator set to "B", the needle should move to the green mark in the window to indicate that the battery is still working. Similarly, on the 1965 model, depressing the green centre of the wheel of the meter should cause the needle to move to the green index.

If the battery is exhausted remove it from the clip on the under side of the meter and replace it with a new one.

www.butkus.us

3. **Open the camera back** (see Loading, No. 1), remove the cassette, then close the camera back (Loading, No. 4) or reload with a new film.

The Double and Blank Exposure Lock

The Pentax camera is fitted with a double and blank exposure lock. This means that the same piece of film cannot be exposed twice and, further, that the film cannot be wound on by mistake before an exposure has been made.

If, therefore, you cannot press the release button, you must transport the film by means of the rapid winding lever. If the rapid winding lever cannot be moved, the camera is ready for use or you have come to the end of the film, and you have to unload.

For deliberate double exposures make the first exposure in the normal way. Then tighten the film with the rewind knob, and keep hold of the rewind knob. Depress the reversing button (p. 16) and work the rapid winding lever. This tensions the shutter without advancing the film. Finally make the second exposure, and carry on in the normal way.

Cutting off Exposed Lengths

If a film which is only partly exposed has to be processed, set the shutter for the next exposure and in the darkroom or in complete darkness cut off with a pair of scissors the frame which lies in the film aperture. Retrim the remainder of the film (see p. 19), fix it again on the take-up spool, and close the camera.

It is ready for the next exposure once the film counter has been set four numbers forward (the amount of film lost through cutting and re-loading).

The re-inserting can be done in daylight. In this case a total of about 6 to 7 frames are lost, for, after inserting and closing, two blind exposures have to be made to wind on the film length which was exposed to the daylight.

Changing Partly-exposed Films

To replace a partly-exposed film by another one, for instance if you want to take a few colour photographs in between some black-and-white shots, proceed as follows:

1. **Check the number of exposed frames** on the film counter.
2. **Rewind the film** but stop immediately you feel a slight resistance. This resistance comes from pulling the film end from the take-up spool. If the film is to be reloaded again, you must not pull the whole film into the cassette, otherwise the film end would have to be extracted by opening the cassette in the darkroom.
3. **Unload the re-wound film** and note the number of exposures taken on the beginning of the film. Now you can load the camera with any other type of film.

   When reloading, load the partly exposed film in the usual way (p. 14), cover the lens with a lens cap (or hold some opaque material against the lens) and as additional precaution stop fully down.

   Wind and release until the film counter has advanced by the number of frames already exposed. To be on the safe side it is advisable to allow one more frame to pass.

   The rest of the film can now be exposed in the usual way.

Other Film Packings

In addition to standard cassettes, 35 mm. film is also available in various loose packings for loading into cassettes (see p. 26●). This is a much cheaper way of using film as you do not have to buy a new cassette every time with the film. The following packings are available.

DARKROOM REFILLS are lengths cut and trimmed for 36 exposures and have to be loaded into a cassette in total darkness (e.g. in a darkroom, or a light-tight changing bag).

DAYLIGHT REFILLS are cut and trimmed lengths for 20 or 36 exposures, which are wound on to a centre spool (as used in the cassette) and covered with a black paper leader strip to allow loading of a cassette in daylight.

BULK FILM is supplied in lengths of 18 to 200 ft., and is the most economical way of using film. A suitable length is cut off to be loaded into a cassette in total darkness. (Working in total darkness, for loading darkroom refills or bulk film is not difficult. It is, however, advisable to practise filling with a dummy film first in daylight before starting the darkroom work.)

Handling, Winding and Trimming the Film

When handling the actual film, particular care must be taken not to touch its emulsion (matt) side. Always handle it and wind on to the

www.butkus.us

centre spool of the cassette, by holding the film by either side of its edge, preferably between thumb and index finger. At the same time, it is of no less importance that the spot on which the loading is done should be perfectly dry, clean and dust free.

When using bulk film in loading cassettes, the edge of the work-bench can be marked with notches or drawing-pins to indicate various distances, let us say for 12, 24, 36 exposures of film. This considerably simplifies the measuring of film lengths in the darkroom.

The film ends need trimming. At the beginning of the roll of film make either a straight or wedge-shaped cut for the centre spool of the cassette and measure off the required length of film (see table, below). At the end of this make the curved cut for the take-up spool. The curved cut should start between the fifth and sixth bottom perforation—when emulsion is towards you—and must not go through a perforation hole.

LENGTH OF FILM REQUIRED FOR ANY NUMBER OF EXPOSURES

Number of exposures	*Length of film required*		*Number of exposures*	*Length of film required*		*Number of exposures*	*Length of film required*	
	in.	cm.		in.	cm.		in.	cm.
1	1 3/4	30	14	31 3/4	80	27	51	130
2	3 1/8	34	15	33	84	28	52 1/2	133
3	15	38	16	34 1/2	88	29	54	137
4	6 1/4	41	17	36 1/4	92	30	55 1/2	141
5	7 3/4	45	18	37 3/4	96	31	57	145
6	9 1/4	49	19	39 1/4	100	32	58 1/2	148
7	20 3/4	53	20	40 1/2	103	33	60	152
8	22	56	21	42	107	34	61 1/2	156
9	23 3/4	60	22	43 3/4	111	35	63	160
10	25 1/4	64	23	45	114	36	64 1/2	164
11	26 3/4	68	24	46 1/2	118	37	66	167
12	28 1/2	72	25	48	122	38	67 1/2	171
13	30	76	26	49 1/2	126	Including trimming		

The ready-cut film is now spooled on the centre spool of the cassette. While winding in, hold the film only by its edges.

Also, take care not to press too hard on the film, and don't squeeze the film-ends when drawing through the hand. Failure to take the first precaution may result in fogging, while neglect of the latter precaution may give rise to peculiar kinds of exposure effects known as "lightning flashes". These are due to electrical discharges, and appear as dark, zigzag lines running from the edge of the film towards the centre of the picture.

Loading Standard Cassettes

The majority of cassettes consist of a centre spool which is in a shell with top and bottom cover. The film leaves the shell by a light-trapped slot. The centre spool can be removed from the shell by removing either top or bottom of the cassette, according to the construction of the particular container.

Most cassettes are actually intended by their makers to be used once only, and with the film originally supplied in it. However, provided they are reasonably robustly made, and the light-trapping velvet slot is in good condition, these cassettes *can* be reloaded many times, and will give perfectly satisfactory resu'ts—*if handled carefully.*

Loading with Bulk Film or Darkroom Refills

Work in total darkness and prepare the film as described (p. 18).

1. **Open the cassette.**
2. **Fix the film to the centre spool.** If the centre spool is fitted with a film catch, thread the tapered end of the film into it. In cases where the centre spool is fitted with a spring, thread the end under it and fold it sharply back. If the centre spool is without any suitable fitting to hold the film, it has been proved best to wind a 1½ in. (4 cm.) piece of cellulose tape round the centre spool, so that on either side about ½ in. tape is used to secure the film.
3. **Wind the film on the centre spool.**
4. **Insert the centre spool into shell,** leaving the first 2 in. of film protruding through the light-trap.
5. **Close the cassette.** Where top and bottom are originally fastened by the outside label, fix the top and bottom cover to the shell preferably with a length of cellulose tape.

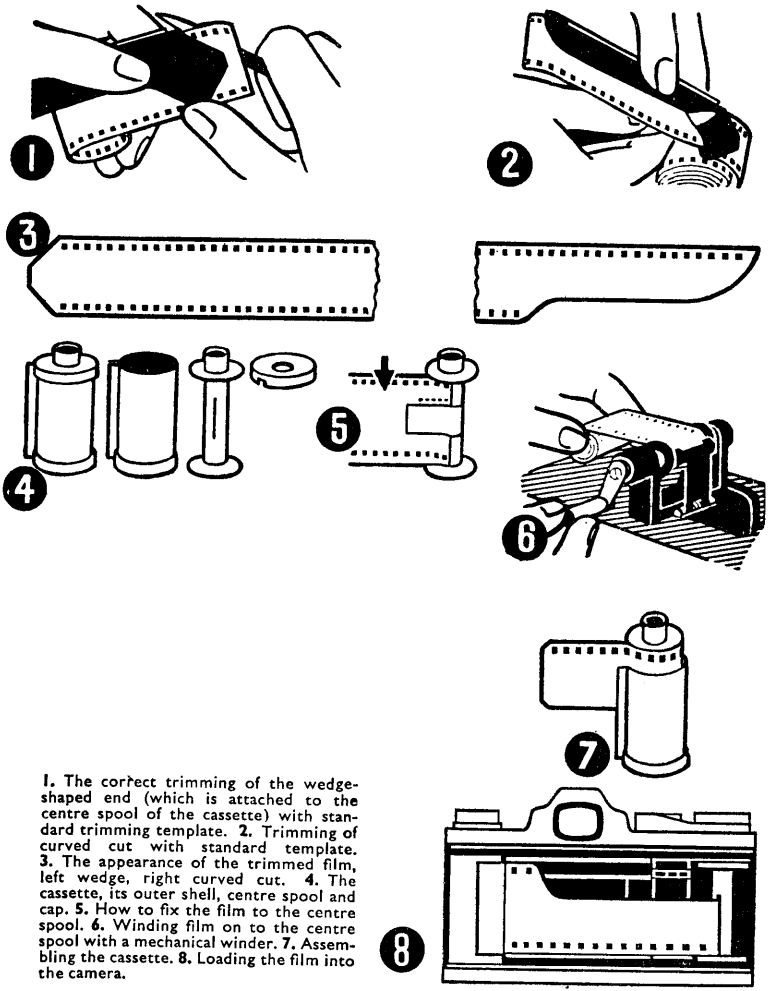
Loading with Daylight Refills

No darkroom is necessary, but work in subdued daylight or artificial light.

1. **Remove the film wrappings and label of refill.**
2. **Open the cassette.**
3. **Introduce the refill into shell of the cassette;** leaving the first 2 in. of paper-leader protruding through light trap. The actual centre spool of the cassette is not needed.
4. **Close the cassette.**
5. **Pull out the paper-leader and 2 in. of film.**
6. **Cut off the paper-leader.** Where top and bottom are originally fastened by the outside label, fix the top or bottom cover to the shell preferably with a length of cellulose tape.

www.butkus.us

TRIMMING FILMS AND LOADING A CASSETTE



1. The correct trimming of the wedge-shaped end (which is attached to the centre spool of the cassette) with standard trimming template. **2.** Trimming of curved cut with standard template. **3.** The appearance of the trimmed film, left wedge, right curved cut. **4.** The cassette, its outer shell, centre spool and cap. **5.** How to fix the film to the centre spool. **6.** Winding film on to the centre spool with a mechanical winder. **7.** Assembling the cassette. **8.** Loading the film into the camera.

Shutter Speeds and Movement

The actual shutter speed you need within a series of available aperture-speed combinations is governed by considerations of camera steadiness as well as of subject movement.

An unsteady camera hold results in camera shake, to which a small and light instrument such as the Pentax is particularly liable. Even the slightest shake will result in inferior definition of the negative. Practical experience goes to show that 1/125 sec. is safe, while you have to hold the camera particularly steady when using 1/60 or 1/30 sec. Where lighting conditions make even longer exposure times essential and there is no subject movement, either support the camera on a tripod, or look round for extra support for your elbows and hands—e.g. a wall, railing, etc.

The shutter speed required to arrest movement depends of course primarily on the speed with which the subject moves. Remember, however, that parts of the subject (e.g. the legs of a runner) may move faster than the subject as a whole; you may sometimes have to compromise and show such parts slightly unsharp. Often that is not a serious fault, as slight blurring—provided the main part of the subject is sharp—helps to emphasise the impression of movement. Other factors to consider are the distance of the subject—the farther away, the less noticeable the movement blur; the focal length of the lens—a long-focus lens in effect brings the subject nearer; and the direction of the movement. Objects moving across your field of view blur more than if they are approaching or receding.

The most convenient way of allowing for all these factors is with the aid of a simple table (p. 66).

Aperture and Depth of Field

When you focus the Pentax on a given object, the image of that object will be really sharp on the film. Things nearer or farther away will be gradually less and less sharp, until they are noticeably blurred. The range of distances over

www.butkus.us

which objects are still acceptably sharp, before you do notice the loss of definition, is known as the depth of field.

You can control the extent of this sharp zone by the lens aperture. As you stop down the lens, the zone of sharpness grows in both directions; as you open up the lens, its depth decreases.

You can obtain the actual zone of sharpness at various apertures and distances from tables, but in practice the most convenient way is to use the depth of field indicator. This is a special scale of aperture numbers marked opposite the distance scale. There are two sets of such numbers from the largest stop (f1.8 or f2) to the smallest (f22) on each side of the focusing index (the mark that indicates the distance to which you have set the lens).

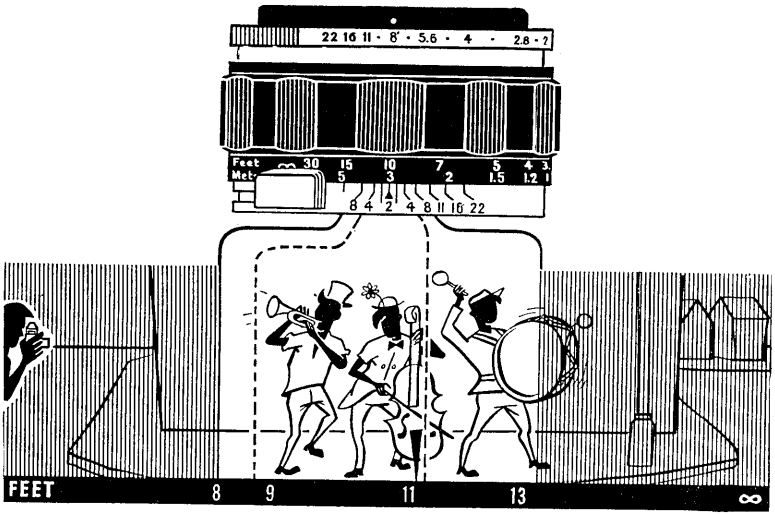
At any distance setting, the distance figures opposite each pair of aperture numbers on the depth of field scale give the near and far limits of sharpness. For example, at 10 ft. you may find the two stop values 8 on the scale (f8) opposite about 8 and 14 ft.—so you have a sharp zone from 8 to 14 ft. At f4, the distances opposite the stop values 4 may be 9 and 12 ft. respectively; at f16 you might get a sharp zone from 6 ft. to 25 ft.

You will also notice that the depth of field is greater at far distances than at near ones. At 4 ft. and f8 the sharp zone only covers from about $3\frac{3}{4}$ to $4\frac{1}{2}$ ft.—less than 1 ft. altogether—against 6 ft. at the 10 ft. setting.

Two more points on depth of field.

First, the depth obtained depends also on the focal length of the lens. Short focus lenses yield more depth and tele lenses less depth. That is why the alternative lenses of the Pentax ● have their own depth of field indicator. Even the fact that the various Pentax models have standard lenses of slightly different focal lengths makes some difference.

Secondly, the sharp zones obtained by the indicator or tables are based on a somewhat arbitrary assumption of how much blurring is acceptable. So depth of field data for different cameras with the same lens may not always agree, and you are also quite safe in rounding off figures obtained



The Pentax carries a depth of field indicator engraved on the lens mount. This shows clearly how much of the subject will be sharp at any given distance and aperture. The figure opposite the triangular index mark is the focused distance (e.g. 10 ft.). The figures opposite the right-hand index line corresponding to the lens aperture indicate the near limit, and the figures opposite the left-hand index line of the same aperture number show the far limit of the depth of field. Thus at *f* 4, the appropriate lines point approximately to 9 and nearly 12 ft., while at *f* 8 the depth of field shown by the indicator extends from about 8 to nearly 14 ft.

www.butkus.us

from such data. And if you intend to make really big enlargements from your negatives, you can use stricter standards of sharpness by simply stopping down the lens by one stop.

Zone Focusing

With action subjects and similar occasions where you want to shoot quickly, determining sharp zones even with the depth of field indicator wastes too much time. There you need prepared settings covering given near and medium distance ranges that you can easily memorise and set on the camera. The focusing zone table (p. 64) gives such settings; then you only have to worry about keeping the subject within that zone while you shoot.

Main text continued after illustrated section.

FLASH WITH THE PENTAX

Flash is an efficient light source where no or insufficient daylight is available such as at night, indoors, etc. In the flashlight you carry your own private "sun" with which you can illuminate your subject or scene at any time and place.

THE FLASH BULB is similar to a small electric bulb. However, when current passes through it, it lights up in an intense flash lasting usually about 1/40 to 1/60 sec. Each bulb will flash only once and has to be discarded afterwards.

The flash bulb is inserted in a flash gun and the current of the battery fires the bulb, while a reflector fixed behind the bulb makes sure that all the light is directed towards the subject. Most flash guns incorporate a capacitor unit which increases the reliability of firing, even when the battery is nearly exhausted.

The shutter speed, provided it is slower than 1/50 sec., has no effect on exposure, since the flash is shorter than the exposure time. With the Pentax, however, the shutter should be set to 1/15 sec., because only at that speed or slower is the film totally uncovered for a sufficiently long period to take care of the flash build-up time.

Popular-size flash bulbs are now being made only in the blue-tinted variety. These can be used for black-and-white or colour (negative or reversal) photography, either as the sole light source or as fill-in lighting by daylight. Clear glass bulbs used to be recommended for negative colour films but this is no longer the case.

ELECTRONIC FLASH UNITS utilise the discharge of a high-tension capacitor through a flash tube. The power is derived from an accumulator or battery (there are also models working from the main electricity supply). The electronic flash outfit is rather bigger and heavier than the flash bulb outfit, its comparative light output equals a small flash bulb and its initial cost higher. On the other hand, anything from 10,000 to 25,000 flashes are obtained from one tube. The flash duration is extremely short (1/700 to

www.butkus.us

1/2000 sec.) and will arrest the fastest movement. The cost of an individual exposure is negligible.

Electronic flash is suitable for black-and-white and negative colour film and for daylight type reversal colour films. It can also be used for fill-in lighting by daylight.

How to use Flash

The Pentax shutter is internally synchronised for use with flash bulbs and electronic flash. Two separate flash sockets are fitted into the front of the camera body.

The lower socket marked "X" is for use with electronic flash (strobe). Electronic flash can be used with shutter speeds up to 1/50 sec. On the shutter speed dial, an "X" is engraved which indicates 1/50 sec. except on the Spotmatic, where the "X" appears against the 1/60 setting. Faster speeds than this "X" setting will not work with electronic flash. At the same time, the illumination with electronic flash is so extremely short (1/700 to 1/2000 sec.), fast-moving objects will be arrested even with 1/50 sec.

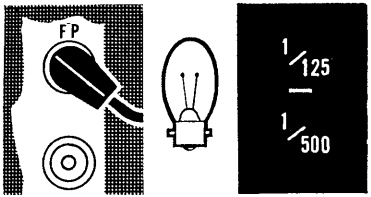
The ordinary M class flash bulbs designed for between-lens shutters can be used with the X flash contact and slow shutter speeds only up to 1/15 sec. (1/15, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 sec.).

The upper socket marked FP, is intended for use with flash bulbs designed for focal plane shutters (e.g. P.F.24 or P.F.45) in conjunction with shutter speeds from 1/125 sec. to the fastest speed (1/500 sec. or 1/1000 sec.). Large F.P. bulbs with screw sockets may be used from 1/30 sec. on to the fastest speed.

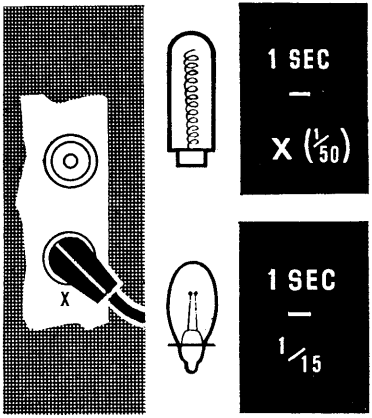
Practical Test Results

A series of practical tests (by the Rank Organisation) shows that synchronisation is effective with most flash bulbs over the full range of shutter speeds of the Pentax SV and S1a. This may well apply to other models.

For consistency, at least six exposures were made at each shutter speed, using the FP contact and the following bulbs: A.E.I. AG1, Atlas Truflash No. 5, Philips PF1, Philips PF5. Both clear and blue-coated bulbs were used.

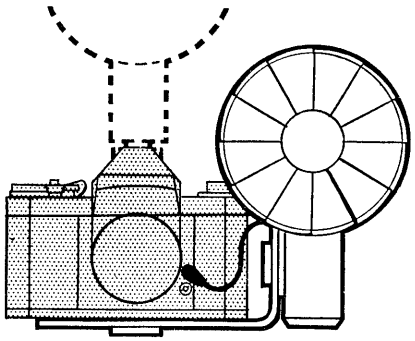


The Pentax carries two flash sockets. When the plug from the flash gun is fitted in the top socket, marked FP, the camera is synchronised for focal plane type flash bulbs at all shutter speeds from 1/125 to 1/500 second (or to 1/1000 second on Pentax models fitted with that speed).



The lower flash socket is marked X, and serves primarily for synchronising electronic flash units. These can be used at all shutter speeds from 1 second to the setting marked X on the shutter speed dial, corresponding to 1/50 second (1/60 on Spotmatic).

The X socket can also be used for ordinary class M flash bulbs at shutter speeds from 1 to 1/15 second.



Most flash guns are available with a camera bracket for mounting on the Pentax camera. The tripod screw in the bracket fixes the latter to the tripod bush in the camera.
Alternatively, certain light-weight flash guns will also fit into the special accessory shoe which can be attached to the top of the camera—as shown by the dotted outline.

www.butkus.us

Slight fall off in illumination occurred at the extreme edge of some negatives, and, while this is of little consequence with black-and-white materials, where compensation can be made in printing, it could prove unacceptable for some workers using colour reversal (transparency) materials. These findings agree with those of the makers, who carried out tests with Sylvania AG1 and Philips PF1 flash bulbs.

Electronic flash tests at all speeds, using the X contact, were satisfactory at shutter speeds up to the "X" setting (approx. 1/50 sec.). Simultaneous use of a flash bulb connected to the FP contact and electronic flash on the X contact is effective providing that the shutter speed dial is set to its "X" position.

Synchro-Sunlight

If you want to use flash in conjunction with daylight, e.g. to lighten deep shadows, the exposure time is taken for the sunlit side of the subject and the aperture used according to this reading. Now take the flash guide number for the shutter speed pre-selected, double it and divide it by the aperture to be used. The result is the flash-to-subject distance for a normal fill-in light. With daylight colour film, use only blue flash bulbs or electronic flash.

Example: Exposure meter reading at 1/60 sec.—*f* 16.
Guide number for the flash at 1/60 sec.—120.
The guide number doubled is 240.
Divide 240 by 16—15.

That means that the flashgun should be 15 ft. from the subject. It is advisable to use an extension cable between camera and flashgun. This enables you to place the flash farther away from or closer to the subject than the camera.

Exposure Guide Numbers

There is a convenient way of working out exposures with flash, and this is by means of a guide number. When you buy

flash bulbs you will always find the guide number for any speed of film printed on the packet.

To find the correct aperture to use, divide the guide number by the distance between the flash and the subject. For instance, suppose you find that the guide number of the bulb with the film in use is 160. If you then want to take a photograph at a distance of 10 ft. from the subject, divide $160 \div 10 = 16$. Therefore, the correct aperture to use is 16. Alternatively, if you want to use an aperture of *f* 8 for any reason, then the correct flash distance is $160 \div 8 = 20$. So the flash must be 20 ft. from the subject.

So far we have assumed that the exposures have been for average shots without much subject movement. For these a shutter speed of 1/50 sec. is long enough to utilise all the light emitted from the bulb. On the other hand, to arrest fast movements a faster shutter speed is required, such as 1/125, 1/250 or even 1/500 sec. With each of these speeds a different guide number is needed (usually printed on the flash bulb packet) to determine the correct exposure. They allow for a wider aperture to compensate for the fact that at fast shutter speeds some of the light emitted from the bulb is lost.

www.butkus.us

USING ALTERNATIVE LENSES

The field of view covered by the standard lens is ideal for the majority of subjects. Occasionally, however, a greater or reduced field of view has distinct advantages. The Pentax has an interchangeable lens mount permitting use of alternative focal length lenses ● for such occasions.

Wide-Angle Lens

A wide-angle lens is a lens of shorter focal length. It sees and reproduces more of the subject in front of the camera than does the standard lens.

Such a wide-angle lens has definite advantages in cases where the practicable distance between camera and subject is limited and the standard lens cannot record the whole of the subject. The wide-angle lens is, therefore, primarily used for architectural photography and interiors.

In view of its short focal length, the depth of field covers a particularly wide zone, even at full aperture. It can, therefore, be employed with advantage as a quick-shooting lens for general purposes where accurate focusing or distance-setting would be inconvenient (e.g. through insufficient time).

To get a large image, even of a near subject, you have to go really close to it. Near objects then tend to dwarf more distant ones, and the resulting picture shows pronounced perspective effects. In this way, the wide-angle lens can be used to emphasize perspective.

Wide-angle lenses made by the makers of the Pentax camera are listed in the lens table ●. Wide-angle lenses made for the Edixa Reflex, Contax S and D, Hexacon, Pentacon and Praktica will fit the Pentax, too (but not necessarily those with automatic iris link).

Telephotography

A tele lens on the other hand has a smaller angle of view than the standard lens. It is of longer focal length, and reproduces less of the subject in front of the camera than the standard lens does, but on a larger scale.

Such a lens is particularly suitable for subjects that are difficult to approach closely, such as animals, children, architectural detail, sports events, etc. In photographing distant views without near foreground, it brings the subject nearer. It also permits a greater camera-to-subject distance in portraiture, producing a more pleasing and subdued perspective. At the same time, its lesser depth of field concentrates definition on the portrait, avoiding a sharp background which would detract from the main object.

Long focus lenses made by the makers of the Pentax camera are listed in the lens table ●. Tele lenses made for the Edixa Reflex, Contax S and D, Hexacon, Pentacon and Praktica will fit the Pentax, too (but not necessarily those with automatic iris link).

Lens Changing

To remove a lens, simply unscrew it from the body. To insert a lens, screw it into the lens aperture of the camera body until it comes to a definite stop without using force.

Lenses which automatically couple internally with the pre-selector mechanism *must* have the protruding coupling pin protected from damage by use of a rear lens cover.

Focusing and Depth of Field

Focusing with a wide angle or telephoto lens is the same as when using a standard lens. The reflex screen enables the image to be focused accurately. At the same time, the reflex screen shows the exact field of view of the particular lens used. There is no parallax error, nor are supplementary finders required.

The alternative lenses have their own depth of field indicator. This works in the same way as with the standard lens.