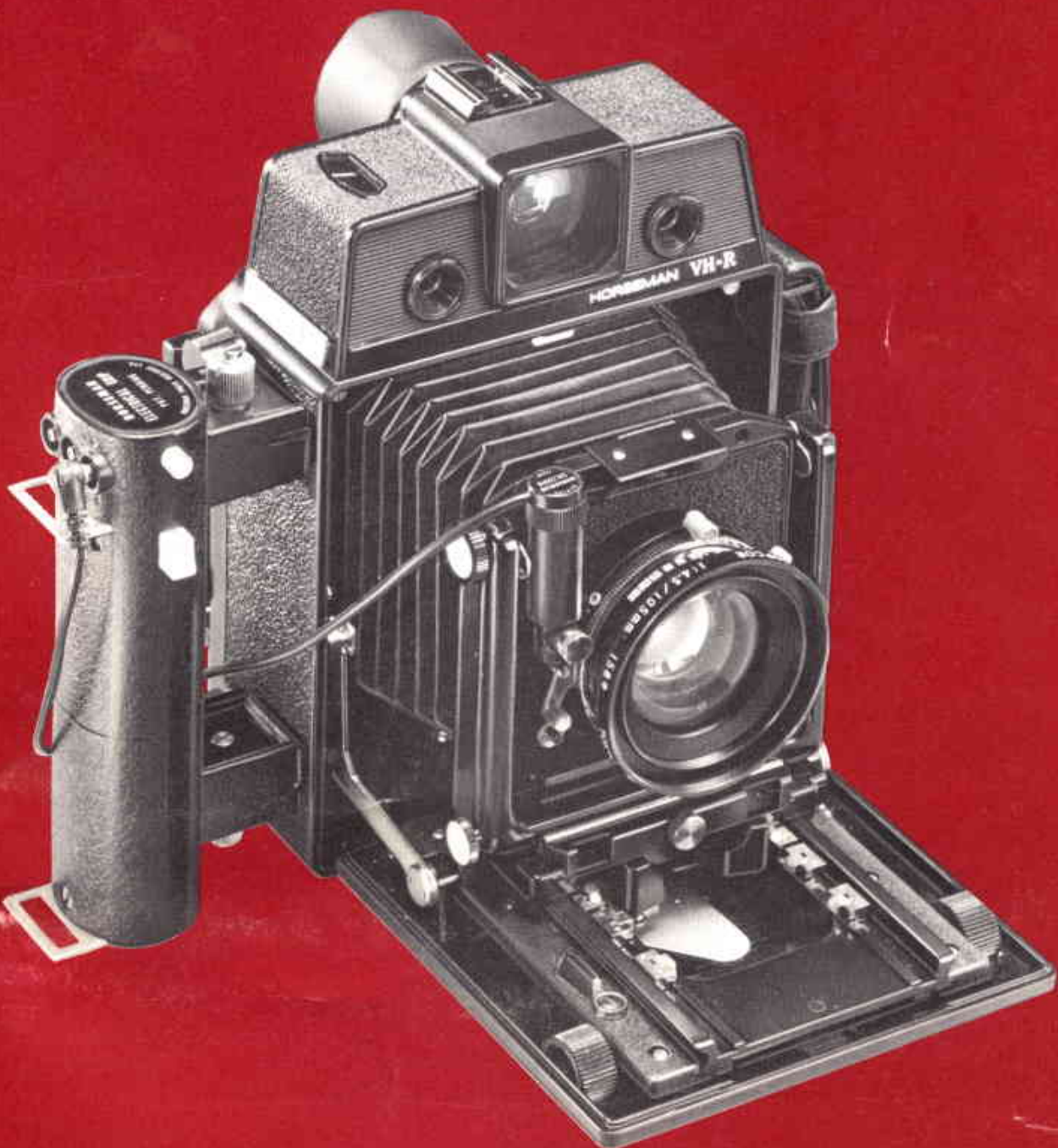


HORSEMAN[®]
OWNER MANUAL

Dept 510
GUNS

VH-R



HORSEMAN VH-R

An Outline of its Construction

The HORSEMAN family of long-selling and fully-fledged technical cameras which have gained top marks for performance among the world's professional photographers now welcomes a new addition, the VH-R, with a new set of functions. The new VH-R achieves even greater refinement through three main features:

- (1) A revolving back
- (2) A revolving viewfinder frame
- (3) A new automatic all viewfinder frame parallax compensation mechanism which can also be used for wide-angle lenses.

The new model features complete compatibility with other members of the HORSEMAN family, and so all the conventional lenses and accessories can be used. By combining the ever-expanding range of HORSEMAN system accessories with the VH-R and its new functions, you will be able to achieve a new dimension in your camera work.

A. Camera body

The VH-R is a press type camera and finished in an attractive black hard-coat layer applied over a basic construction which is made of light alloy diecast. The leather-covered parts are also finished in the attractive black. The camera body contains the finder and the lens standard mechanisms.

The sides of the camera are equipped with a pair of flashgun brackets, and there are two tripod sockets, one on the right and the other on the bottom. In addition, there is an accessory shoe in the center on top, and a release shoe on the left shoulder of the camera body.

B. Finder section

This section houses the rangefinder and the viewfinder. The rangefinder's magnification is 1:1 and so it is not necessary to close one of your eyes. Also, you can focus without having to keep your eye close to the eyepiece. The viewfinder can be turned freely either vertically or horizontally to match the revolving back.

Parallax is automatically corrected with all of the special HORSEMAN lenses, from wide-angle to telephoto models. This is one of the VH-R's major features.

C. Lens board

The board where the lens and shutter are mounted is sturdily built and it features a reinforced design to safeguard against distortion and deflection. Furthermore, the 4-way lens board can be turned freely at your choice.

D. Camera bed

The important camera bed extension mechanism which is made up of the focusing track and rail guide features an oil-less finish which is specially processed.

In order for the camera bed to be opened 90° or 105° from the camera body, and for it to be secured, the bed braces are L-shaped for easy movement when wide-angle lenses are being used.

There are two focusing knobs at each end of the camera bed and a focusing lock is provided at the left.

The whole of the camera bed serves as a front cover for the camera, and the focusing knobs double as mechanisms that lock the front cover.

E. Lens standard

The lens standard which requires a particularly high level of precision processing is composed of a U-shaped standard for which dependability was taken over the quality of the materials, design and manufacture, and also of a base.

F. Camera back

The revolving mechanism which permits a choice either vertical or horizontal settings with a flick of a lever features an oil-less construction for 90° rotation. Moreover, in consideration of future system development, the revolving frame can be detached and mounted with a bayonet.

The mounting of the film holder which conforms to international standards is performed with the top and bottom accessory catches.

G. Groundglass

This section incorporates both the groundglass and a fresnel lens, both of which are covered by the focusing shade frame.

If the focusing shade snap button is released when the magnifier is used, the focusing shade can be opened crosswise about 150°. Hinges are attached to both sides of the groundglass screen frame and these are connected with the revolving frame.

H. Bellows

The surface of the bellows is made of sheepskin and the inside is made of a specially processed cloth. These materials make the bellows flexible in expansion and contraction. They can be adjusted freely to any position and they are very effective in safeguarding against internal reflection. This is why they are characterized by the ability to produce clear pictures and colors.

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1

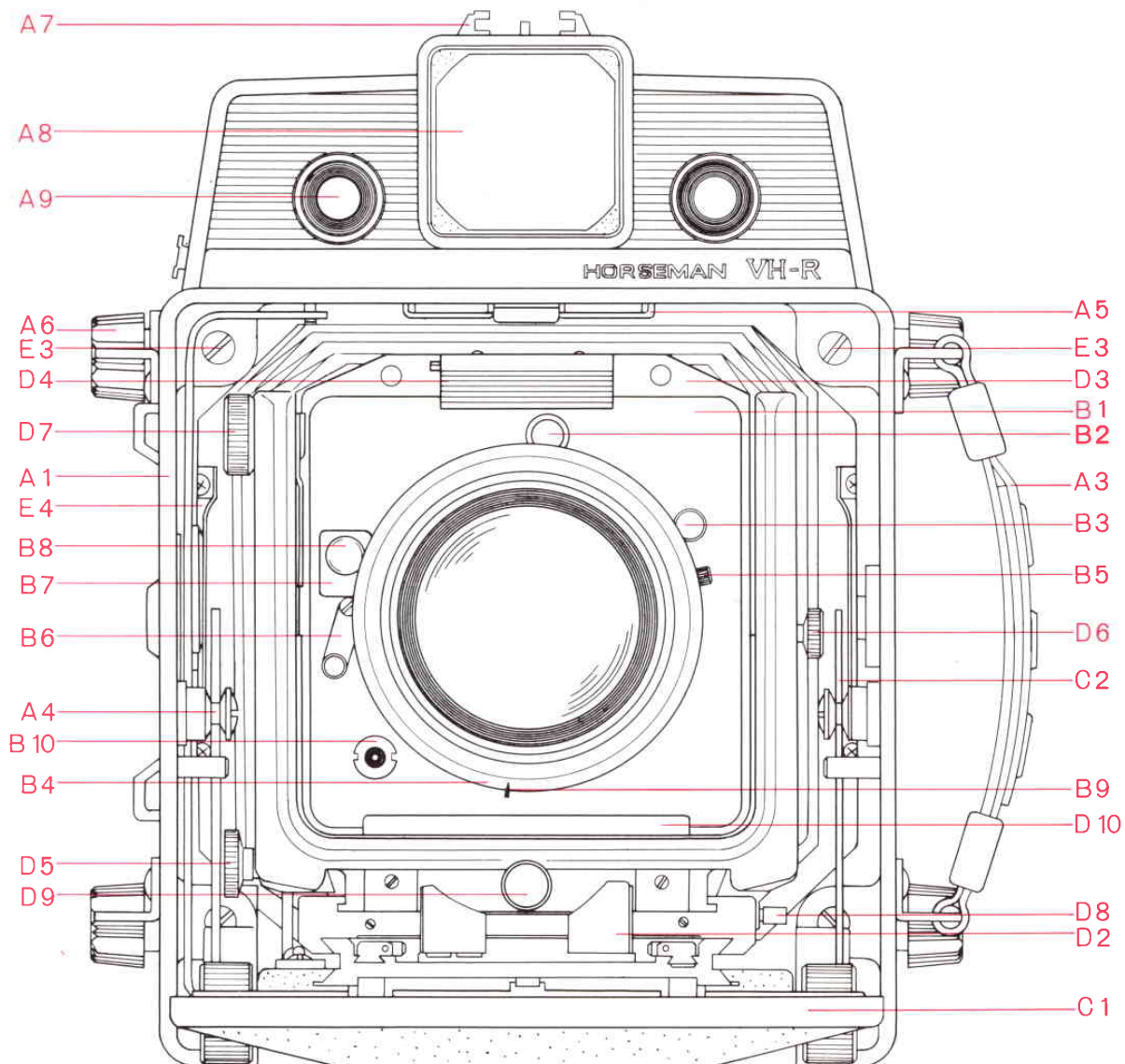
Specifications

- 1) **Type:** Technical Camera
 - 2) **Picture Size:**

Nominal —	6 x 9 cm	6 x 7 cm
Actual —	56 x 82 mm	56 x 68 mm
 - 3) **Films:**
120 and 220 roll films
Sheet film (6 x 9 cm)
Polaroid Land Pack Film (100 and 600 series)
 - 4) **Dimension & Weight:** H:192 mm W:160 mm D:97 mm
2 kgs. (Body only)
 - 5) **Rangefinder:**
Type Double-image coincidence
Base: 70 mm Ratio: 1 : 1
Coupling System . . . Cam Coupling
Coupling Range 65, 75, 90, 105 mm 1 m ~ ∞
120, 150, 180 mm. . . . 2 m ~ ∞
 - 6) **Focusing:**
 - a. by use of coupled-rangefinder
 - b. by the manual setting of distance scale
 - c. by groundglass
 - 7) **Finder:**
Universal, Brilliant Type, Polyfocus Optical Viewfinder
Field of View:
The field of view is indicated in the bright frame viewfinder for the 65, 90, 105, 120, 150 and 180 mm lenses.
The frame is revolvable.
Optional frame unit only for 65, 90 and 180 mm is available.
The ratio of the field of view to the area covered is as follows:
(at infinity)
75 mm lens. 100% to the 65 mm frame
other lenses 85%
Parallax Correction
For all lenses, the parallax is automatically corrected.
 - 8) **Camera Bed:**
Extension: 72 mm
Rack & Pinion operation
Infinity Stops:
All HORSEMAN lenses must be accompanied with its own individual Cam in order to properly couple to the rangefinder and the corresponding set of infinity stops is prepared on the rail and color coded.
-

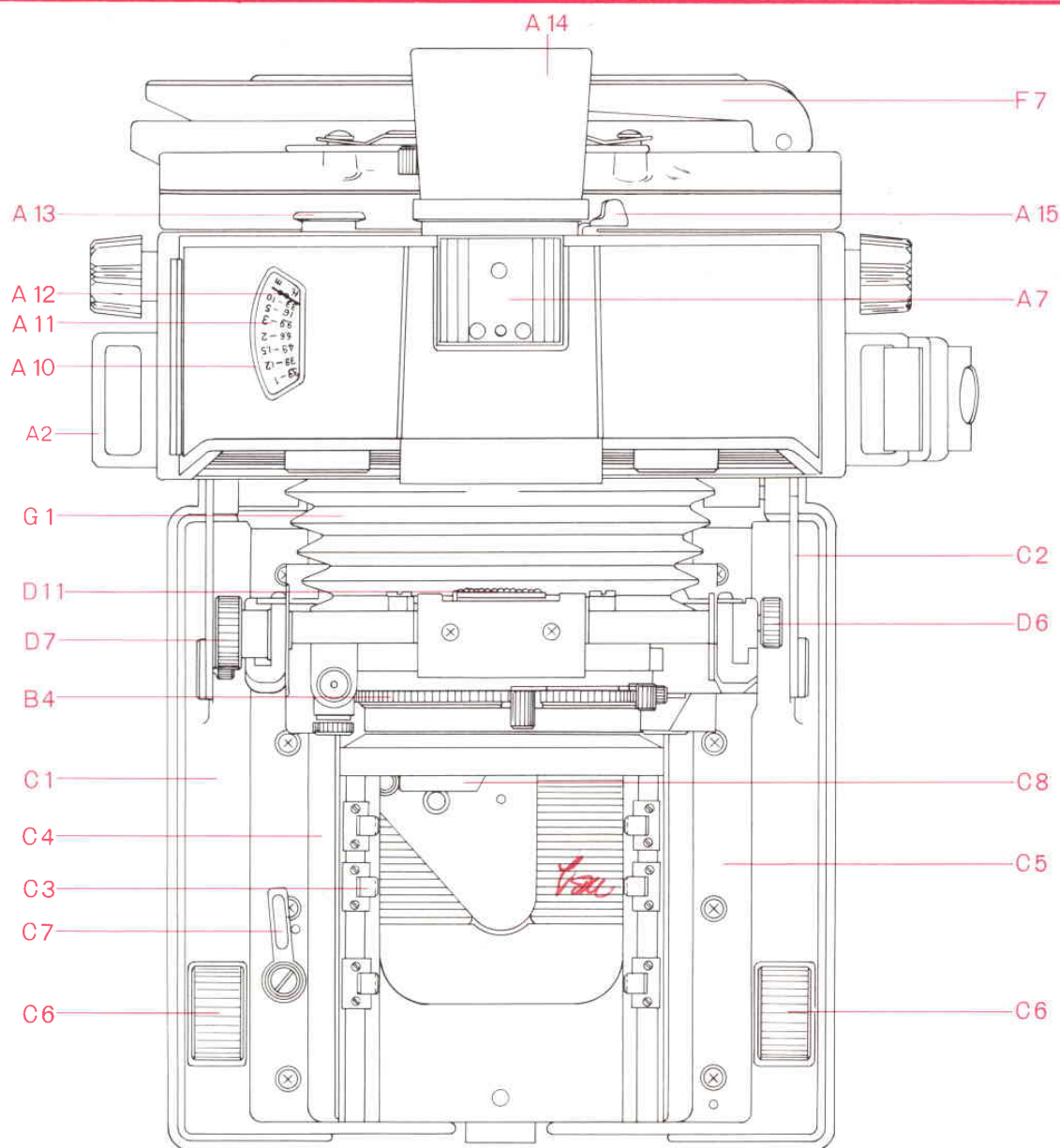
-
- 9) **Camera Back:** Revolving Back System (90°)
Extension 23 mm
- 10) **Groundglass Back:** Spring Back System
Fresnel Lens equipped
- 11) **Camera Movements:** Camera Bed: Down 15°
Lens Standard: Rising 28 mm
15 mm when Wide Angle lens is used
Swing 15° L/R
Tilt 10° forwards
15° backwards
Cross 30 mm L/R
15 mm when Wide Angle lens is used
Camera Back: Swing 10° L/R
Tilt 11° up/down
- 12) **Lens Mount:** All lenses are mounted in the HORSEMAN 4-way Lensboard
(80 x 80 mm) which is exclusively prepared.
Safety Lock is prepared.
- 13) **Lenses:** Wide Angle: Super HORSEMAN 65 mm F:7
Professional HORSEMAN 75 mm F:5.6
Standard: Super HORSEMAN 90 mm F:5.6
Professional HORSEMAN 105 mm F:3.5
Super HORSEMAN 105 mm F:4.5
Super HORSEMAN 120 mm F:5.6
~~Long~~ Long Focal: Super HORSEMAN 150 mm F:5.6 ~~Long~~
Telephoto: HORSEMAN 180 mm F:5.6
* Refer to page 29 & 30 for the specifications.
- 14) **Shutter:** Seiko SLV #0
Shutter Speed: B, 1 ~ 1/500 Sec.
Synchronization: M, X switch
Self-Timer: built-in V
Pre-focus Lever: built-in
-

-
- 15) Others:
- Accessory Shoe
 - Cable Release Shoe
 - Flash-gun Bracket
 - Tripod Sockets
- 16) Accessories:
- Roll Film Holder Model 1 6x9 cm., 8 exp. on 120
 - Roll Film Holder Model 2 6x7 cm., 10 exp. on 120
 - Roll Film Holder Model 3 6x9 cm., 16 exp. on 220
 - Roll Film Holder Model 4 6x7 cm., 20 exp. on 220
 - 6x9 Back for Polaroid Film For Polaroid # 100 & # 600
 - Sheet Film Holder 6x9 cm
 - Rotary Back Model 1 for Models VH-R, VH, 985, 980 & 760
 - Optical Exposure Computer CdS metering
 - Electrical Grip Solenoid release and Remote Control Switch prepared
 - Carrying Set Case compartment housing chemical leather made
 - Metal Case compartment housing aluminum made
 - Flash-gun Clamps for 38 mm ϕ & 45 mm ϕ
 - Lens Shades for each lens
 - Cable Release 40 cm cable
-



A. Camera Body

- | | |
|--------------------------------|-------------------------------------|
| (A 1) Body | (A 9) Rangefinder Front Lens |
| (A 2) Flashgun Bracket | (A10) Distance Scale Cover Glass |
| (A 3) Carrying Strap | (A11) Distance Scale |
| (A 4) Vertical Retaining Screw | (A12) Distance Scale Indicator |
| (A 5) Cam Storage Slots | (A13) Rangefinder Eye Piece |
| (A 6) Swing Back Locking Knob | (A14) Viewfinder Eye Piece |
| (A 7) Accessory Shoe | (A15) Viewfinder Frame Switch Lever |
| (A 8) Optical Viewfinder | |

**B. Lens Board & Shutter**

- (B 1) Lens Board
- (B 2) Shutter Set Lever
- (B 3) Focus Lever
- (B 4) Shutter Speed Ring
- (B 5) Aperture Indicator
- (B 6) Shutter Release Lever
- (B 7) Cable Release Socket
- (B 8) Cable Release Locking Screw
- (B 9) M X V Switch Lever
- (B10) Synchro Terminal

C. Camera Bed

- (C 1) Camera Bed
- (C 2) Bed Braces
- (C 3) Infinity Stops
- (C 4) Focusing Track
- (C 5) Rail Guide
- (C 6) Focusing Knob
- (C 7) Focusing Lock
- (C 8) Coupling Cam

TABLE OF PICTURE SIZE & SPECIFICATION FOR CLOSE-UP

Comparative Table of Picture Size, Focal Length and Angle of View

Angle of view (approx. value)	Nominal picture size	6x7cm	6x9cm	35mm	6x6cm	4"x5"	5"x7"
	Diameter	90mm	100mm	43mm	80mm	150mm	210mm
76°			65mm	28mm	50mm	100mm	135mm
69°		65mm		31mm	55mm	110mm	150mm
68°			75mm	32mm	60mm	115mm	160mm
62°		75mm		36mm	65mm	125mm	175mm
58°			90mm	39mm	70mm	135mm	190mm
53°		90mm		43mm	80mm	150mm	210mm
51°			105mm	45mm	85mm	160mm	220mm
46°		105mm		50mm	90mm	170mm	240mm
45°			120mm	52mm	95mm	180mm	250mm
41°		120mm		57mm	105mm	200mm	280mm
37°			150mm	65mm	120mm	220mm	310mm
33°		150mm		72mm	135mm	250mm	350mm
32°			180mm	78mm	145mm	270mm	380mm
28°		180mm		85mm	155mm	300mm	420mm
27°			210mm	90mm	165mm	320mm	440mm
24°		210mm		100mm	180mm	350mm	490mm
21°			270mm	115mm	210mm	400mm	560mm
19°		270mm		130mm	240mm	450mm	630mm

Remarks:

The above figures of the angle of view show the approximate value onto the diameter of the picture size.

The figures in the above list are the focal length of the lenses.

(Ex:.) A 65 mm lens on 6 x 9 cm picture size has a 76 degree of the angle of view and is equivalent to 28 mm lens on 35 mm picture size.

SPECIFICATION OF THE LENSES ON CLOSE-UP PHOTOGRAPHY

Lens	Close-up Dist.	Max. Magnification
Super wideangle 65 mm	330mm	2.69
Professional wideangle 75 mm	357mm	2.33
Super standard 90 mm	390mm	1.78
Professional standard 105 mm	435mm	1.43
Super standard 105 mm	425mm	1.19
Super standard 120 mm	480mm	0.86
Super long focal 150 mm	625mm	0.67
Telephoto 180 mm	750mm	0.67
Remark: Close-up distance is between object and film plane.		

3

Before and after picture taking

Opening and closing the camera bed

1. Opening

If the focusing knob (C6) is rotated upward, the lock is released and the camera bed is opened.

If the camera bed is opened further, the bed braces will secure it when reaches a 90° angle.

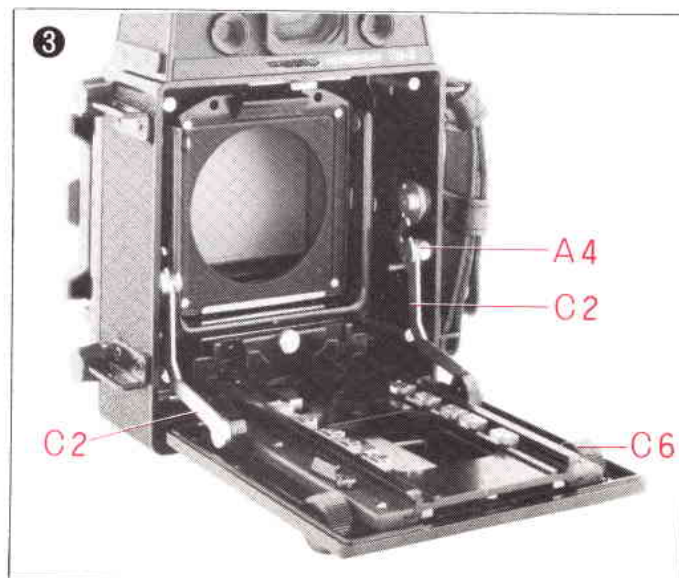
Photo ① ② ③

2. Closing

To close, remove the left and right bed braces (C2) from the vertical retaining screws (A4). Then rotate the focusing knob (C6) downward and lock.

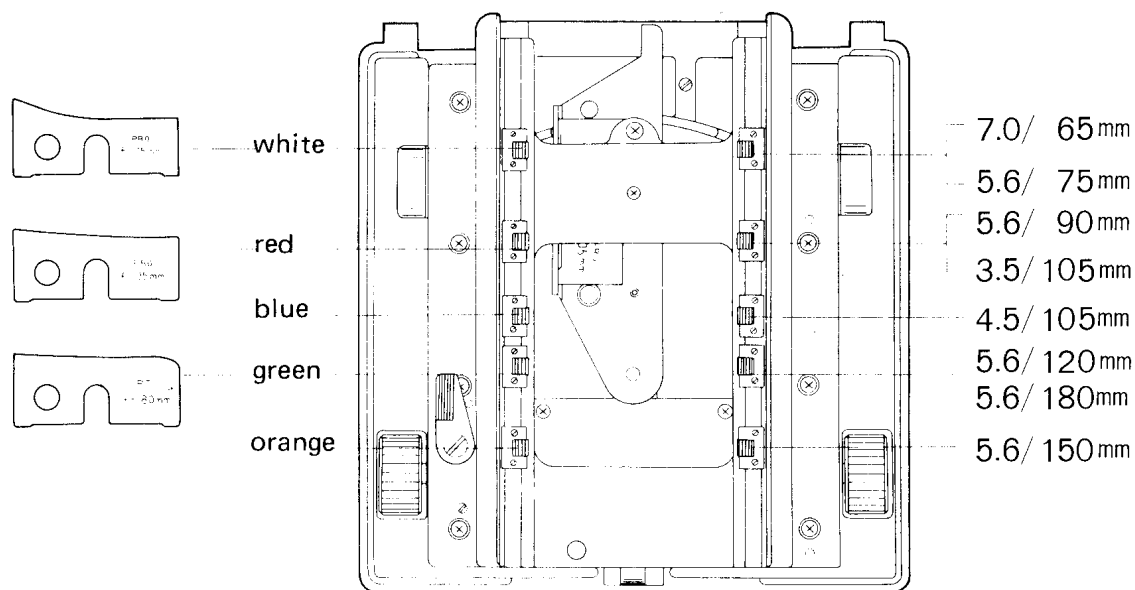
Take the following precautions before closing the camera bed.

- (1) Return the extended rail all the way to the camera body.
- (2) Return the whole of the lens standard's moving mechanism to its original position and check if all the locking knobs are completely tightened.
- (3) Never push the bed braces down and close the camera bed with the lens standard extended on the rail. This is because you may damage the rail section or the lens standard.



4

Changing Lenses and Cams



In order to couple to the camera rangefinder, lens, coupling cam and infinity stops must be used in a set.

All lenses may be changed very easily with little effort. Each lens must be accompanied with its own individual cam in order to properly couple it to the automatic rangefinder, and the corresponding set of infinity stops must be raised.

The camera comes equipped with three cams. These cams are engraved with the lens name and the focal length and are color coded to match the correct lens.

They are for the 105 mm F:3.5, 75 mm F:5.6 and 180 mm F:5.6 lenses. Two of the cams are stored in the Cam Storage Slot (A 5) photo 7 . There are five pairs of infinity stops on the rail of the camera bed.

(1) Select the desired lens to be used.

(2) Select the matching cam for that lens by matching the color coded.

The cam's focal length will be engraved in the correct color and the color on the shutter set lever should be in a matching color.

For another manufacturer's lens, the following focal length lens is usable at infinity.

(a) A general type lenses Max. 210 mm

(b) A telephoto type lenses Max. 270 mm

To interchange Cams

- 1) Push the lens standard (D1) all the way into the body.
- 2) Extend the focusing track (C4) by turning the Focusing knob (C6) until the cam in the bed is completely exposed.

Photo 4

- 3) Loosen the screw and slide out the cam that is there.

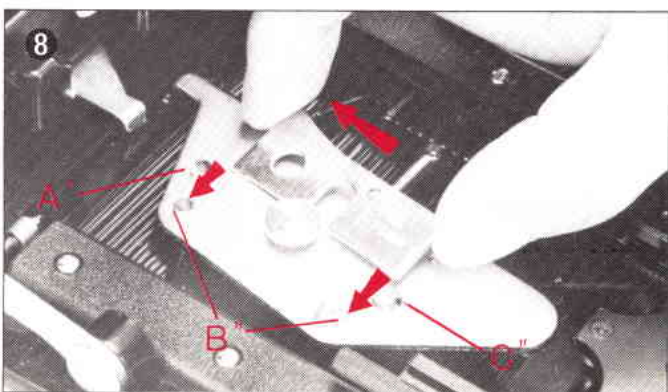
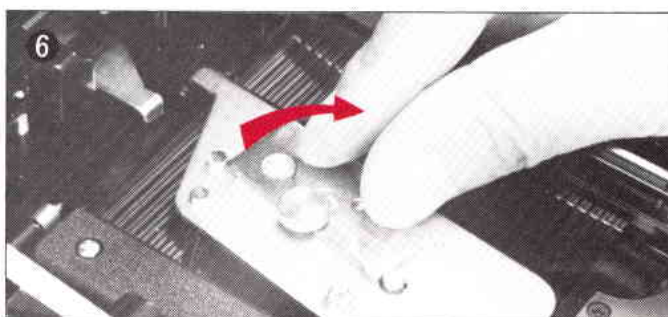
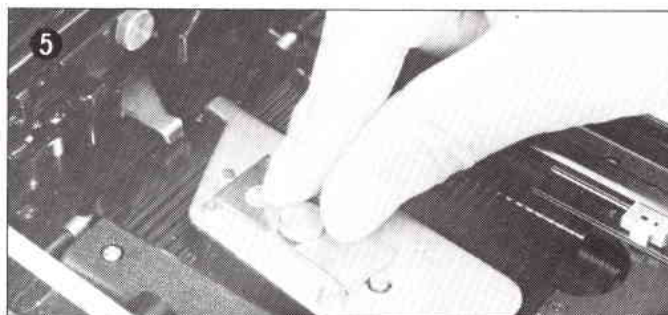
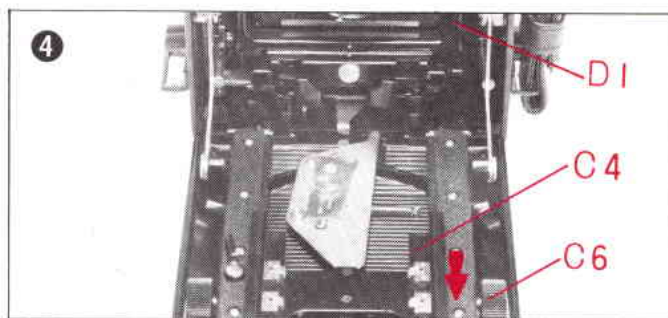
Photo 5 6

- 4) Slide the replacement cam into position, the engraving marks up; push the lower part of the cam in first, against the spring-tensioned guide post;

Photo 8

- 5) With the cam snugly in position all the way in, tighten the locking screw. When lenses are interchanged, the cams must also be interchanged. Without its proper cams placed, a lens will not work in coupled action with the rangefinder.

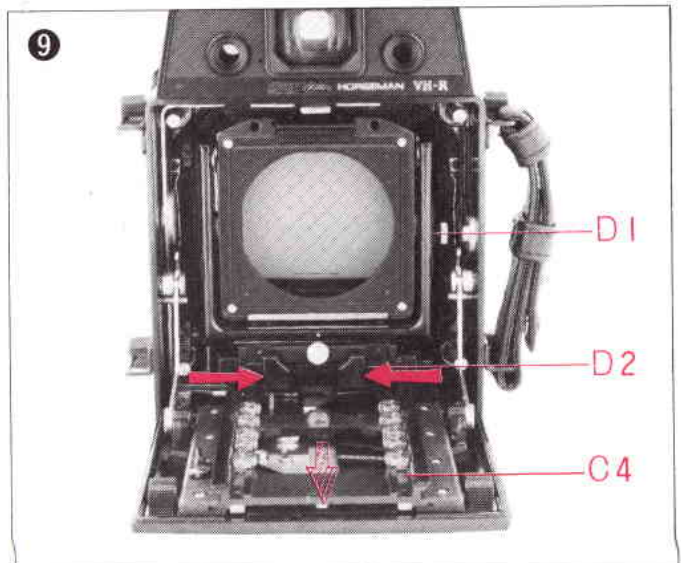
- 6) Slide the focusing track (C4) back into the camera body by turning the focusing knob (C6). And raise up the correct infinity stop (C3) matching the lens to be used.



Pulling out the Lens Standard

1. Grasp firmly and squeeze together the Pull-Out-Grips (D2). Pull Lens Standard onto the Focusing Track (C4) and do it all the way out until it stops against the correct pair of Infinity Stops (C3) to assure proper coupling with the rangefinder.

Photo 9



Closing the camera bed

1. Grasp firmly and press together the Pull-Out-Grips (D2). Push the Lens Standard back into the body of the camera all the way. **Care should be exercised here to make certain that the Lens Standard is completely returned to its storage position.** If it is not, the Camera Bed (C1) will not close and the focusing rail may result. You may confirm whether or not the Lens Standard is completely retracted and the Distance Scale Indicator (A12) is no longer visible in the distance scale window.

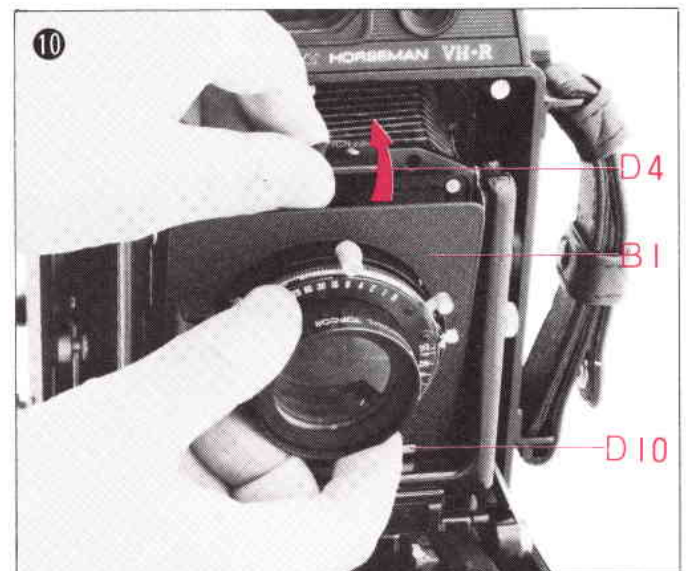
Remark: The camera bed cannot be closed when 105 mm F:4.5 or 180 mm F:5.6 lens is mounted.

To interchange lens

1. Set the lensboard (B1) into the channel across the bottom of the Front Standard; lift up the lensboard lock bar after thrusting the safety lock (D11). And then set its lensboard upper part into the Lock Bar (D4)

Photo 10

2. To remove the lens from the camera, reverse the procedure. Lift up the lock bar after thrusting the safety lock and pull the lens slightly out and up.



5

Focusing

Focusing on the HORSEMAN VH-R is accomplished by following methods;

- a) by use of coupled rangefinder.
- b) by the manual setting of the distance scale.
- c) by groundglass.

a) Rangefinder Focusing

1. Place your eye behind the rangefinder eye piece and center your subject in the rangefinder.

Photo 11

Since the rangefinder's magnification is 1 : 1 it is unnecessary to close the other eye. You will also find it unnecessary to hold your eye tight against the finder window.

2. The rangefinder of the HORSEMAN VH-R is of the double image coincidence type. Turn the focusing knob (C6) slowly until there is only one sharp image in the rangefinder.
3. After the image has been focused you may lock the Focusing Track (C4) in position by pushing the Track Locking Lever (C7) out and forward. This will prevent accidental movement or jarring of the focusing track during exposure.

Photo..... 12

4. The distance from the film plane to the image may be read on the Automatic Distance Scale (A11) in the top of the camera housing.

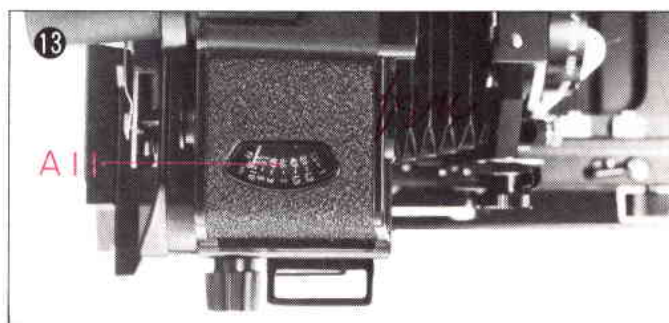
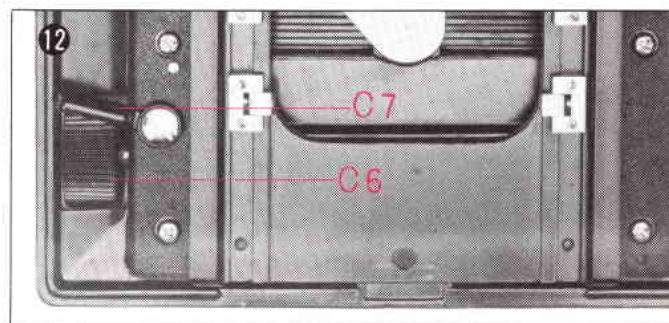
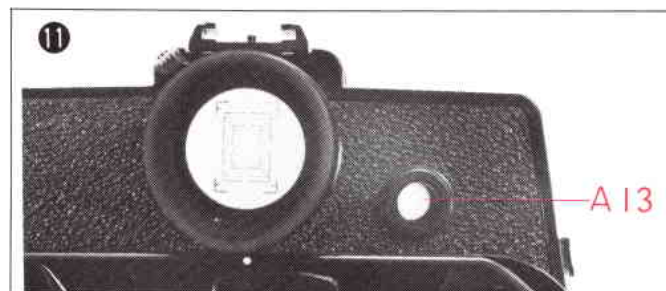
Photo 13

Remark:

The recommended coupling range of the rangefinder is as follows:

65, 75, 90, 105 mm 1 m ~ ∞
120, 150, 180 2 m ~ ∞

In case of any distance less than above recommended minimums, use groundglass focusing.



b) Manual Focusing

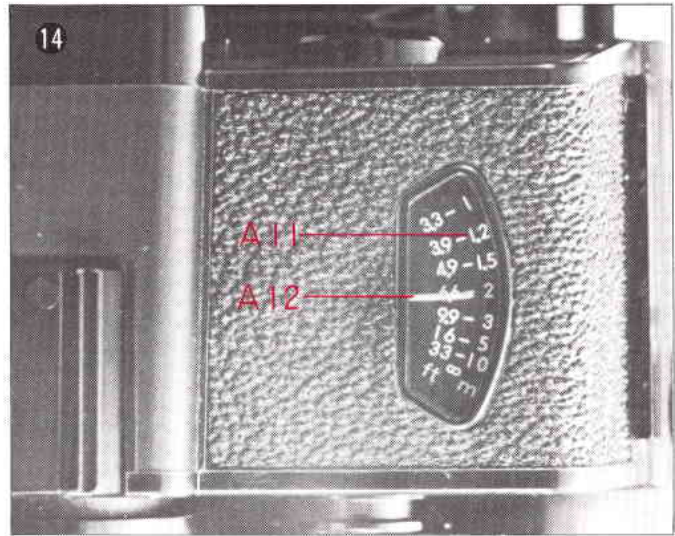
1. Manual focusing may be accomplished by making a visual estimate and then turning the Focusing Knob until the distance scale indicator (A12) shows this distance on the distance scale (A11).
2. The distance may also be taken by means of the indicator (A12) placed at the correct reading on the distance scale (A11) by moving the focusing knob (C 6).
3. When focusing is completed pull out Track Locking Lever (C7) to avoid accidental movement or jarring during exposure.

Remarks:

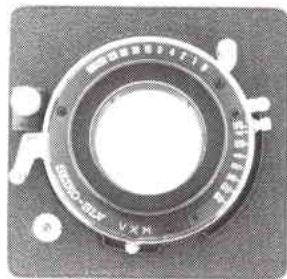
Check the operation of the indicator on the distance scale as follows;

- a) When the Lens Standard is pulled out on the rail and the rail track is in its original fully retracted position the indicator must read infinity.
- b) Please note that there are two engraved distance scale. One is for meters and other is for feet.

Photo 14



c) Groundglass Focusing

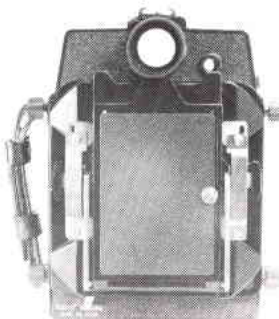
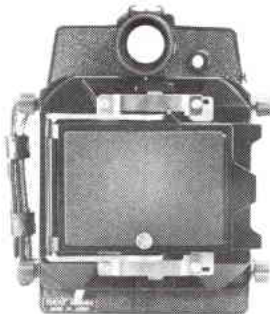


Open the shutter blades fully.

- Cock the shutter by Set Lever (B2)
- Push the focus lever (B3) and the shutter blades will be fully opened.

Horizontal position

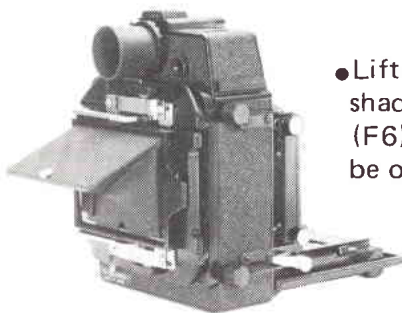
Vertical position



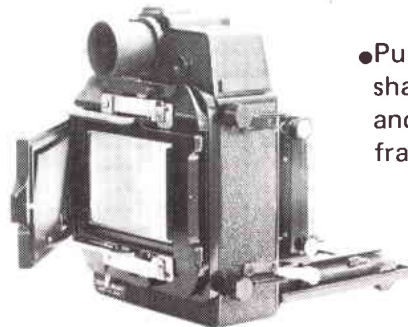
- Refer to page 23 for revolving back operation.

Using focusing hood

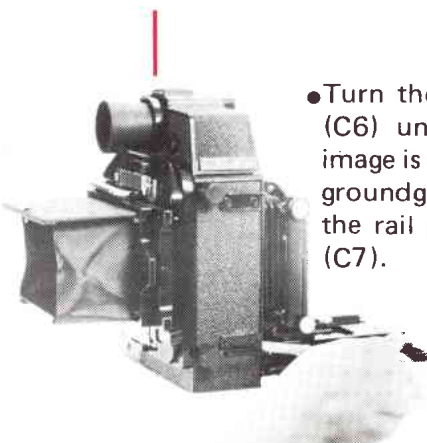
Using magnifier



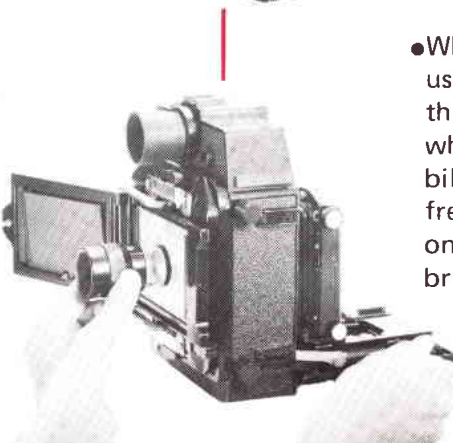
- Lift up the focusing shade closure catch (F6), and the hood will be opened.



- Pull out the focusing shade snap button (F4), and the focusing shade frame can be opened.



- Turn the focusing knob (C6) until the sharpest image is obtained on the groundglass, and lock the rail by locking lever (C7).



- When the magnifier is used, use the image in the center circle only which has focusing visibility. Owing to use of fresnel lens, the image on the glass is fully bright.

6

Finder

1. Locate your subject with one eye through the viewfinder eyepiece (A14).
2. Determine the correct frame to be used according to the focal length of the lens in the camera.

Drawing (A)

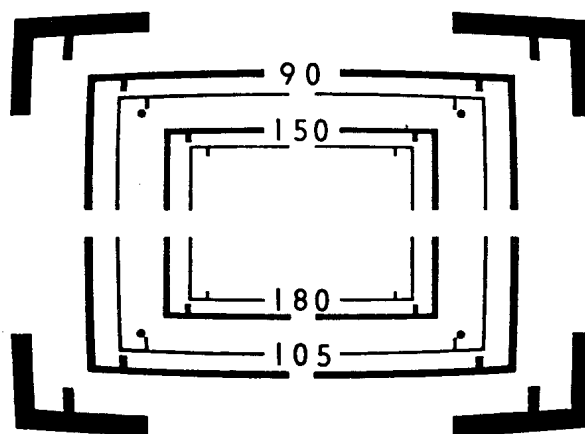
Revolve the frame to the vertical position for the vertical shot. For the detail refer to page 23.

- The ratio of the field of view to the area covered is as follows; (at infinity)
 65, 90, 105, 120, 150, 180 mm.... 85%
 75 mm 100%
 (to 65 mm frame)
- The field of view is indicated as follows;
 65, 90, 105, 150, 180 mm.
 individual frame
 120 mm dots at the 4 corners between 105 and 150 mm frames
 75 mm 65 mm frame

Remark: The parallax for all lenses from 65 to 180 mm will be automatically corrected.

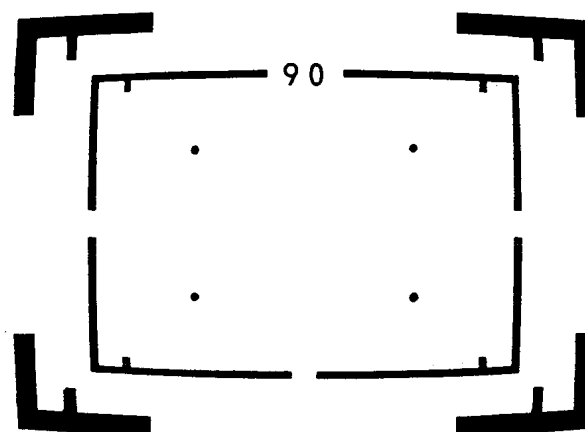
Standard frame unit

(A)

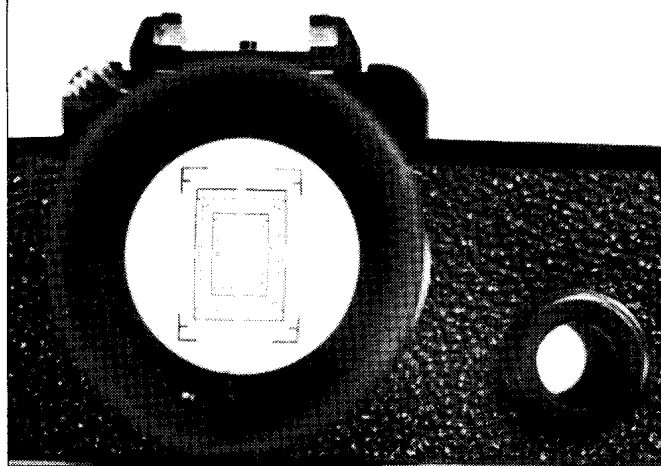


Optional frame unit

(B)



15



1. Shutter

Select the desired shutter speed by turning the shutter speed ring (B4) until the red mark is above the speed selected.

Cock the shutter by pressing the cocking lever (B2) from left to right.

To release the shutter for an exposure press the shutter release lever (B6).

Photo 16

2. Focus Lever

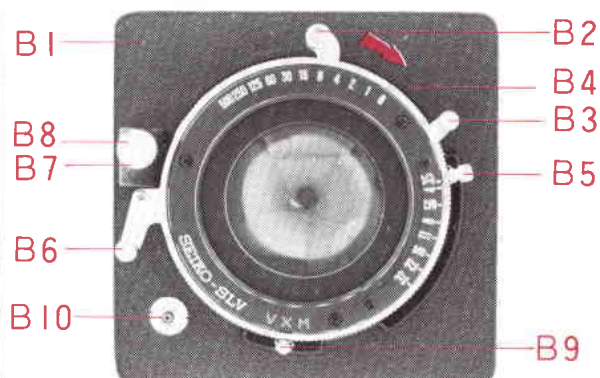
Push the focus lever (B3) to the → direction to fully open the shutter blades for ground-glass viewing.

Photo 17

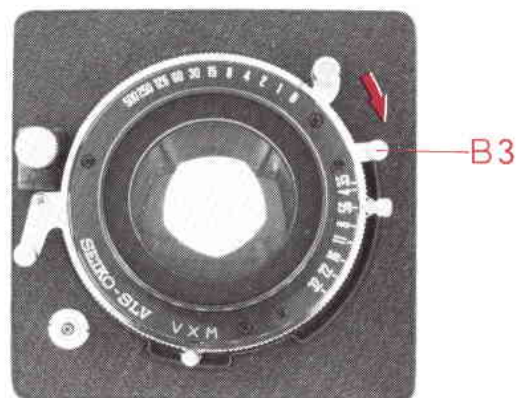
Focus lever (B3) must be closed before pressing the shutter release lever (B6). Damage may result if this procedure is not followed. Do not press the shutter release lever (B6) at the same time the shutter cocking lever (B2) is being pressed.

The focus lever will not be set until the shutter has been cocked.

16



17



3. Flash Synchronization

Select the desired setting by moving the M.X.V. Switch lever (B9).

- a) M — for flash bulbs
- b) X — for electronic units
- c) V — self timer with approximately 10 sec. delay

	Class M	Class F	Electronic Flash
M	Fully sync.	No sync.	No sync
X	1~1/30 sync	1~1/100 sync	Fully sync

Insert the flash synchronization cord into the synchronized socket (B10) located at the lower left corner of the lens board.

4. Self Timer

When the M.X.V. switch lever (B9) is placed the V position the self-timer may be used, also in the V position the X synchronization (electronic flash) remains fully synchronized.

5. Cable Release Socket

The shutter may also be released with the use of a cable release (refer to accessory list). Place the cable release in cable release socket (B7) and tighten the cable release locking screw (B8). Slide the plunger end of the cable release shoe at the right hand side on a top of the camera. This will provide a body shutter release.

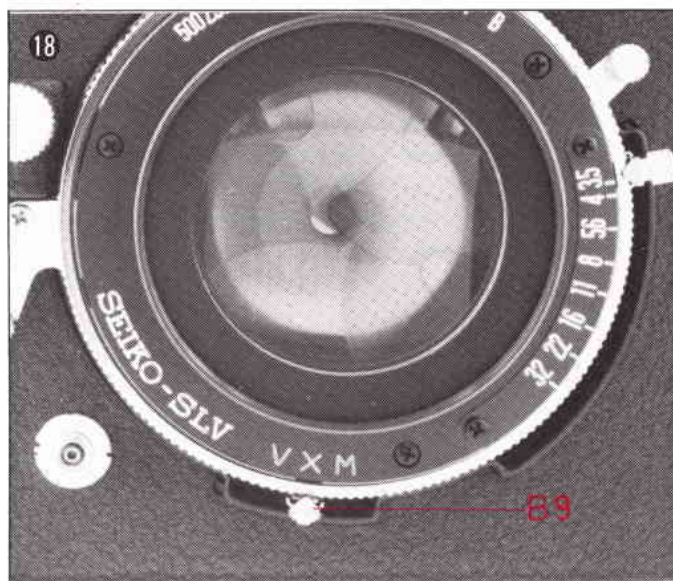
Remarks:

The heavy duty flash-gun brackets on the sides of the camera may be utilized. Brackets are located on both sides of the camera body.

A special pair of heavy-duty clamps are available for large flash units. Smaller flash units may be mounted in the accessory shoe located on the top of the camera body. In the event the cord of the synchronization is too short the HORSEMAN 4-way lens board may be turned in such a manner as to place the synchronized socket (B10) in a position closer to the flash unit.

Important caution:

- (1) Be sure to release the shutter before turning the shutter speed ring.
- (2) Remember to set the M.X.V. switch lever (B9) to the X position when synchronization is not in use.



8

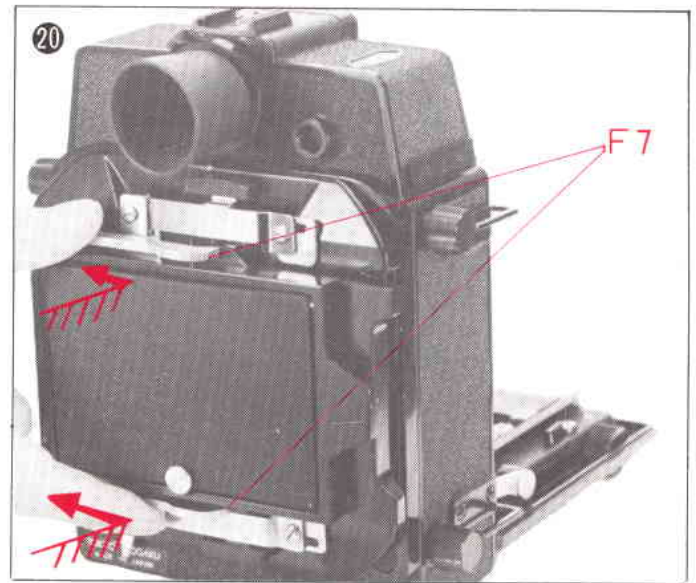
Attachment and Detachment of the Focusing Back

In order to attach the roll film holder or rotary back on the camera body, firstly the focusing back (F2) should be detached.

1. To detach;

Press down and thrust the retaining arms (F7) of the focusing back, and a catch between the focusing back and camera body will be released, so they become free.

Photo 20



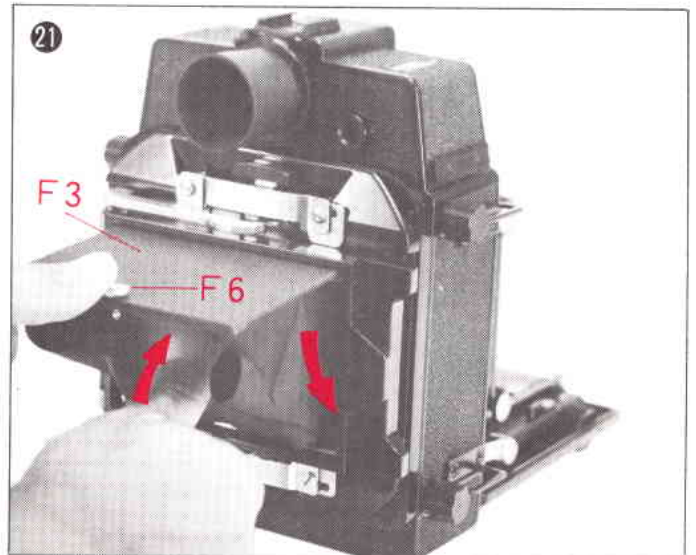
2. To attach;

Put the focusing back on the camera back. Maintaining the retaining arms pressed down, thrust the focusing back slightly to the right.

3. To open and close the focusing shade;

To open, lift up the focusing shade closure catch (F6). To close, fold the shade plate below first and then close the front cover of the focusing back (F3).

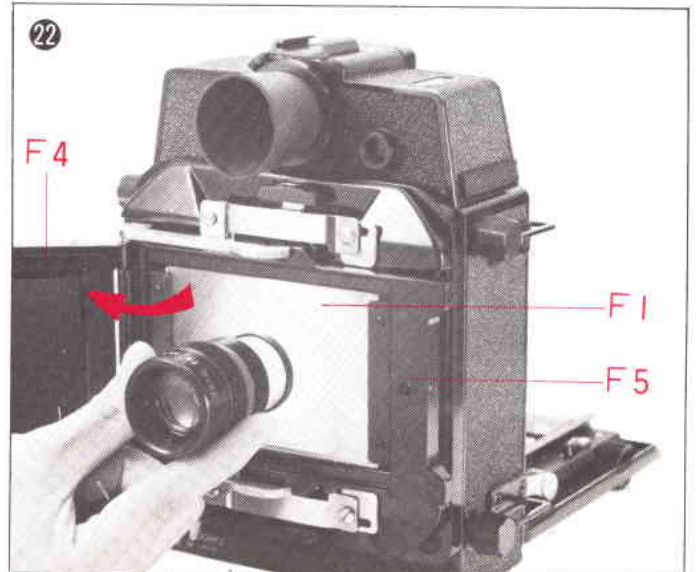
Photo 21



4. Using magnifier;

Pull out the focusing shade snap button (F5), and the focusing frame can be opened.

Photo 22



5. Groundglass

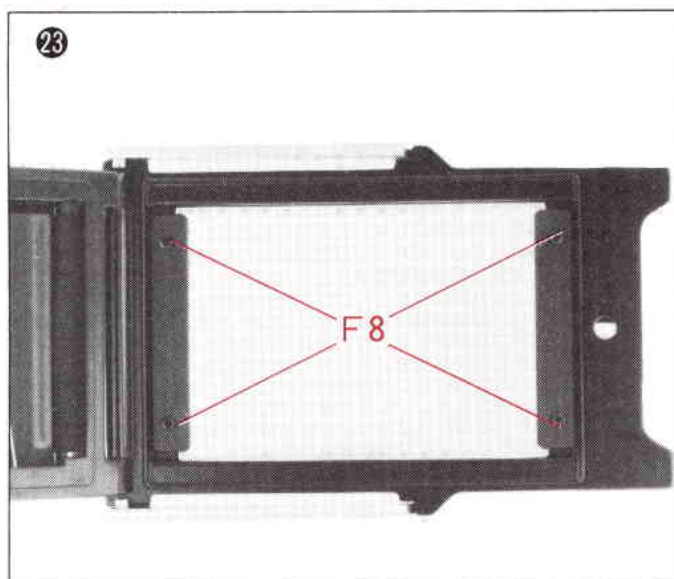
A groundglass and a fresnel lens are equipped in the focusing back.

6. Removing the Fresnel lens

You can detach the Fresnel lens on the groundglass when it is not required.

Unscrew the four screws (F8), remove the groundglass stays and then detach the Fresnel lens and the washers. Next, rotate the groundglass stays through 180° , and tighten with the four screws (F8).

Photo 23



7. To determine the picture taking area;

Field of view on the groundglass screen.

Roll film holder model 1 & 3 (Nominal size: 6 x 9 cm)

a' (56mm) x b (82 mm)

Roll film holder model 2 & 4 (Nominal size: 6 x 7 cm)

a' (56 mm) x a (68 mm)

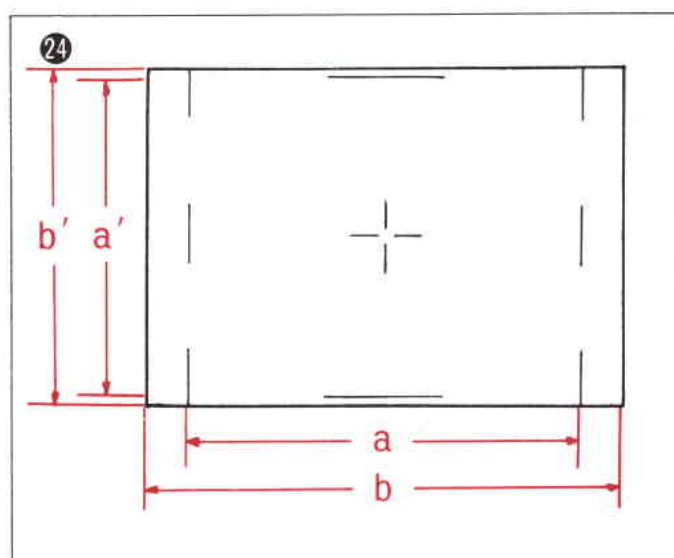
Sheet film holder (Nominal size: 6 x 9 cm)

b' (58 mm) x b (82 mm)

6 x 9 back for Polaroid

a' (56 mm) x b (82 mm)

Photo 24



1. Roll film holder & 6x9 back for Polaroid

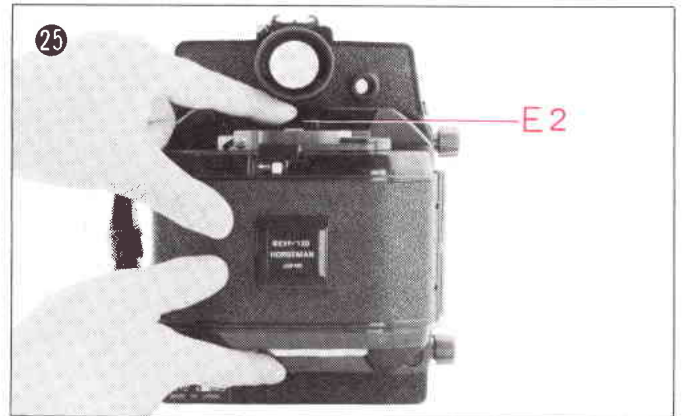
Put the film holder on the back of the camera body as the picture shows. Lock the film holder by the accessory catch (E2) which are on the upper and lower sides of the camera back. The film holder will be completely and firmly attached on the camera body.

Photo 25

To detach the film holder, release the catch of the film holder by the upper and lower sides of the accessory catch (E2), proceeding by reversing the order of attachment.

- * When you have attached the roll film holder, be careful not to allow it to project to the right from the camera body. Also remember to check if the dark slide is completely contained inside when removing the film holder.

Photo 26



2. Sheet Film Holder & Exposure Computer

To attach;

Lift up the tab of the focusing screen frame (F2) and then insert a sheet film holder between the focusing screen frame and swing back frame (E11). The sheet film holder should be inserted in with the safety slide facing to the lens gently.

Focusing screen frame (F2) will give the way to insert the holder, maintaining the holder in parallel. After meeting some resistance on its inserting way the holder will stop at the end, falling down into a spot. The holder is attached completely.

Photo.... 27 28

To detach;

Lift up the tab of the focusing screen frame (F2) and then draw out the sheet film holder.

Important caution:

When detach the film holder be sure to put the dark slide back in.



1. Horizontal picture → Vertical picture

Press the revolving clamp lever (E5) and then rotate the back slightly to the left. Let go of the clamp lever and rotate the back further. It will then lock for vertical pictures.

Photo... 29 30

2. Vertical picture → Horizontal picture

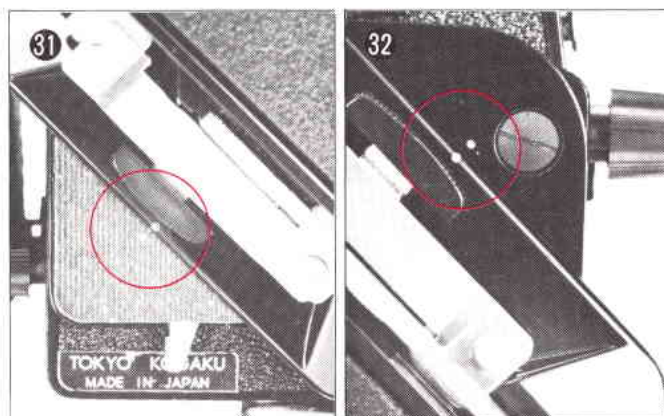
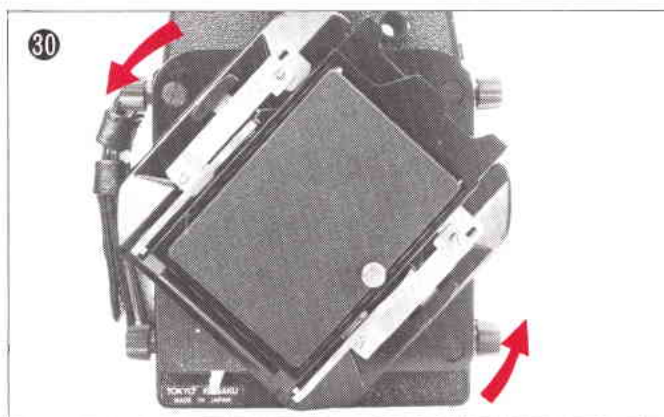
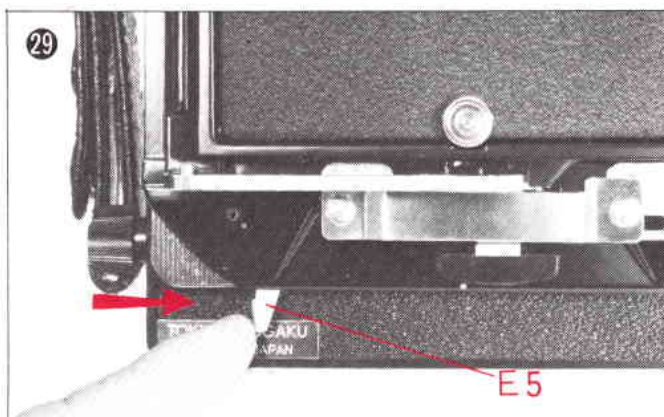
Repeat the same procedure but turn the back to the right.

Detach the viewfinder eyepiece rubber (A14) when rotating the revolving back.

3. Detaching and attaching the revolving frame (E6)

Set the back for vertical picture-taking, press the revolving clamp lever and then turn the back a little further to the left. It can now be detached at that position where the marks (red and white) are aligned. To attach the frame, align the marks, attach and then rotate to the right.

Photo... 31 32

**Rotating the viewfinder frame**

One of the major features of the VH-R is that the viewfinder frame can be rotated. Determine whether you are going to take a vertical or horizontal picture, and adjust the viewfinder frame accordingly. Also check that the revolving back is set to the correct position (vertical or horizontal).

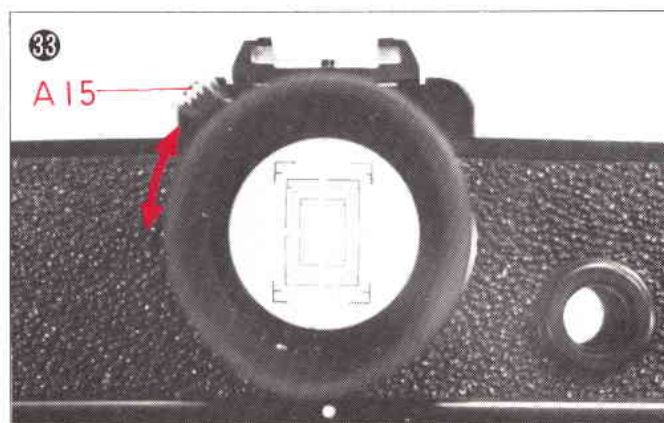
a) Horizontal position

Push the viewfinder frame switch lever (A15) downward.

b) Vertical position

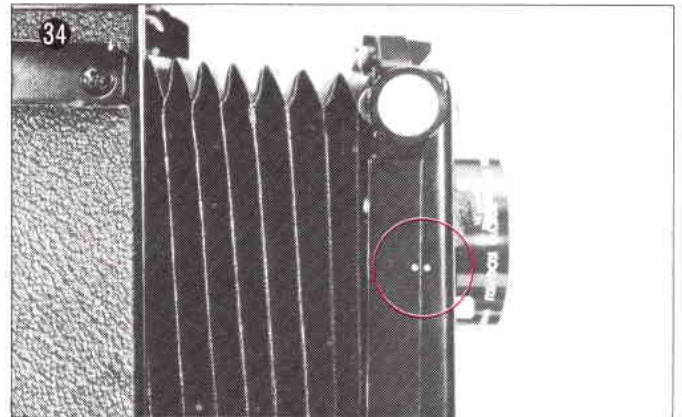
Push the viewfinder frame switch lever (A15) upward.

Photo..... 33



1. If you are using a Super HORSEMAN 65mm F:7 or a Professional HORSEMAN 75mm F:5.6 for vertical picture-taking, the furthest edge of the focusing track will be appearing on the picture.
Therefore, loosen the rising front locking knob (D6) and align the red mark on the lens standard with the rising front control knob (D5).

Photo 34



2. Parallax will occur because of the relationship with the finder frame and so determine the field of view using the groundglass.
3. When it is not suitable to take pictures with rising, set the camera body in the mode for horizontal pictures to the vertical position and then proceed.

4. Old wide-angle lens board
Some of the Super HORSEMAN 65mm F:7 and Professional HORSEMAN 75mm F:5.6 lenses that were available before the VH-R was released to the market are equipped with the old type of lens board. (You can tell by the words 'LENS MADE IN JAPAN' printed in green.)

Photo 35

These lens boards are 5mm shallower than the ones currently used and in some cases the range of movements is limited. Furthermore, the VH-R's infinity stops (C3) are adjusted to infinity according to the current specifications, and so when coupling with the rangefinder, it is necessary either to replace the old lens board with one that conforms to current specifications, or to re-adjust the infinity stops.



1. Bed down

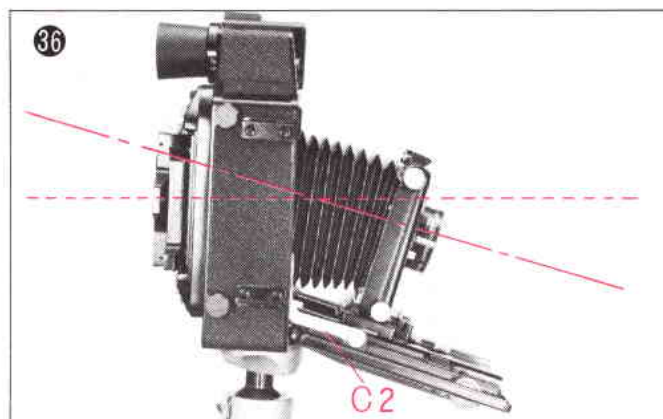
When the camera is opened, the bed automatically comes to rest a 90° (right) angle to the body.

To drop the Bed;

The lens standard (D1) must be on the focusing track (C4) before the Bed is dropped.

With both forefingers on the bed, push the bed braces (C2) furthermore and the Bed braces will extend to their second locking position, now the bed will drop additional 15° , for total drop of 105° .

Photo 36

**2. Rising**

Loosen the Rising front locking knob (D6) that is prepared on the left side (camera back facing you) of the lens standard.

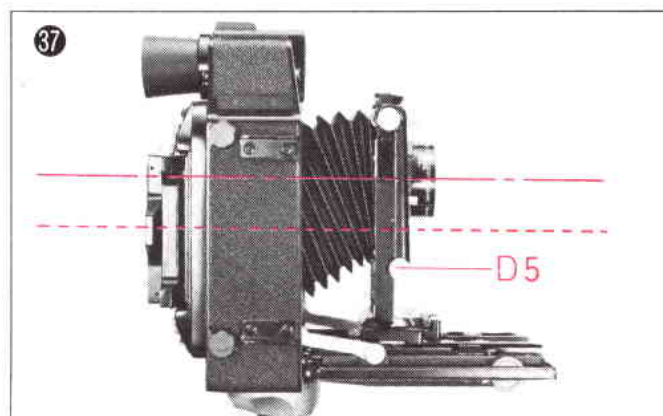
Turn the Rising front control knob (D5) that is located on the right side of the lens standard.

Stop and tighten the Rising front locking knob.

The lensboard rises up to max. 28 mm when the Rising front control knob is rotated.

This action moves the perpendicular surface of the optical axis vertically moving the image with it.

Photo 37

**3. Tilt**

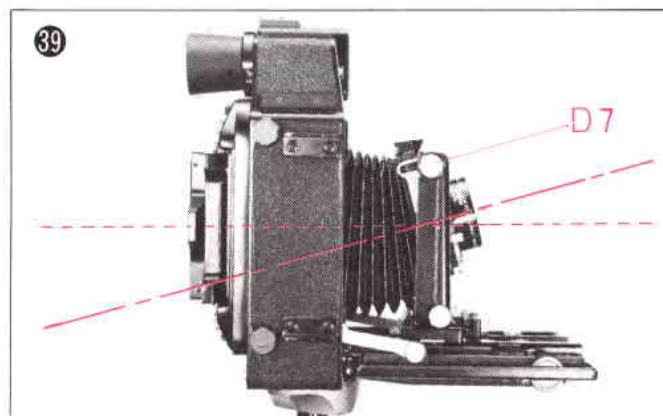
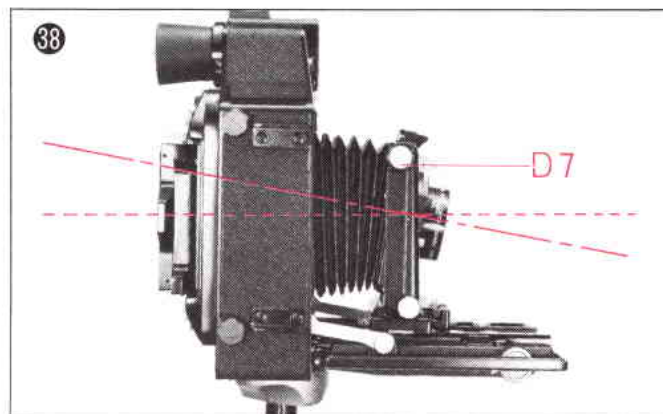
Loosen the Tilt front locking knob (D7).

Move the Lens panel frame (D3) to the desired position (forwards or backwards).

Tighten the Tilt front locking knob and it will remain in the tilted position you have chosen.

At full tilt back, the lensboard can be tilted a maximum of 15° , tilted forwards maximum of 10° .

Photo... 38 39

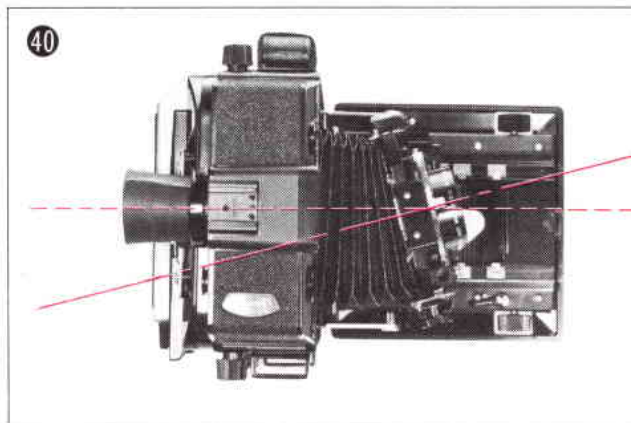


4. Swing

Push down on the Swing front release (D8), and the lens standard can be now swung left or right 15° each way.

When the lens standard has been swung to the position desired, remove your finger pressure, and the lens standard will hold in position. At zero position, the lens standard is click stopped.

Photo 40



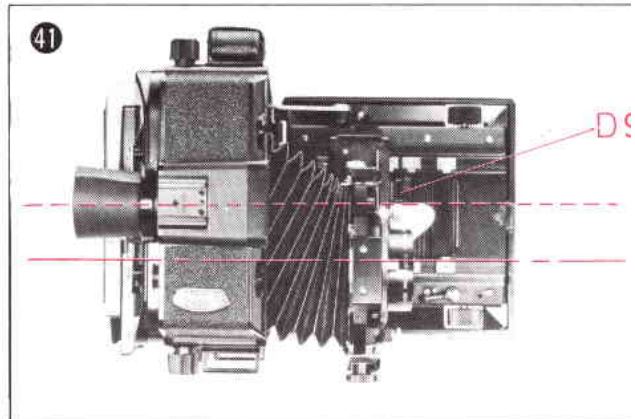
5. Cross

Loosen the Cross front locking knob (D9) which is prepared at the center of the lower part of the lens standard.

Press (Thrust) the lens standard to left or right laterally.

Stop and tighten the Cross front locking knob when the lens standard has been crossed to the position desired.

Photo 41



6. Back tilt & Back swing

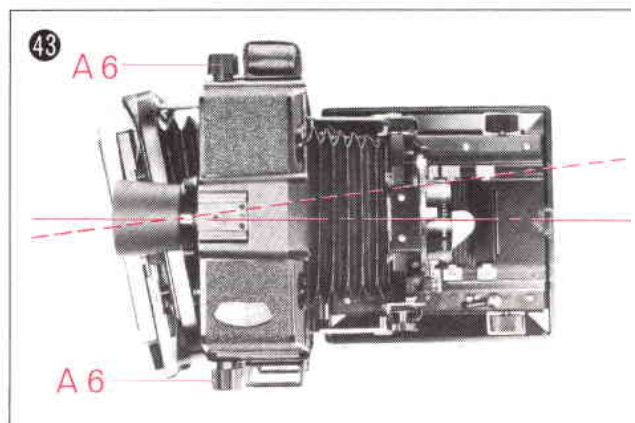
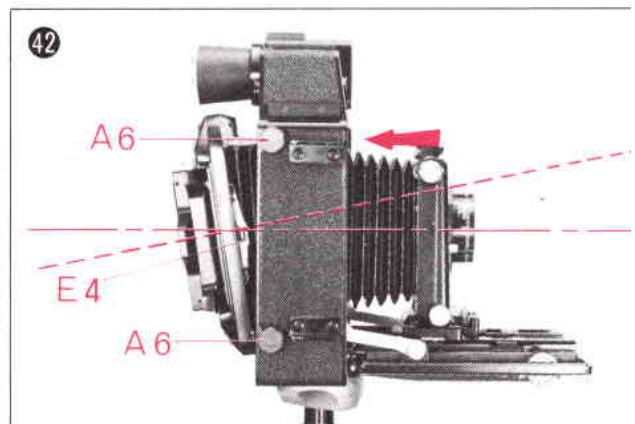
Loosen the four Swing back locking knobs (A6) on the both sides of the camera body and press the Swing back limited screw (E3) strongly to the arrow direction. Now the back can be extended, swung or tilted to any position. Tighten the four Swing back locking knobs (A6) at the desired position.

Photo... 42 43

Maximum back extension is 23 mm.

Swing 10° L/R each

Tilt 11° up/down each



Important cautions

- * All focusing must be done with groundglass.
- * Be sure to tighten the locking knobs of each moving part when photographing.
- * Remember to return each moving part to the original position and to tighten the locking knobs when retract the lens standard.

In general cameras, the light which passes through the center of the lens axis is designed to be vertical to the film picture and it passes the center of the film picture. This is one of the basic design conditions of a camera. These positions cannot be moved in parallel and they cannot be made to intersect.

However, the VH-R incorporates a movable mechanism in the lens standard and camera back, and this can be adjusted within a range permitted by its design.

The objective of operating this movable section is to give photographic expression. This is achieved by adjusting the position of the image on the film, the shape of the image, the parallelism and verticality of the image, and the clarity of the focus, or by exaggerating them. Expression brings the image closer to the human sense of sight or it emphasizes the opposite condition. Improving the picture by using the movable parts of a camera is known as 'camera movements'.

The objectives of adjusting the camera movements can be sub-divided into the following:

1. Back tilt

This adjusts the distortion in the distance with respect to a subject in a vertical direction (I). As a combined camera movement, the lens can be tilted to obtain a clear image. Adjustment can be made to the depth of field required by the subject (II).

2. Back swing

This adjusts the distortion in the distance with respect to a subject in a parallel direction (I). As a combined camera movement, the lens can be swung to obtain a clear image. Adjustment can be made to the depth of field required by the subject (II).

3. Tilt

This provides adjustment to yield a clear all-round focus when the surface of the subject is leaning from the vertical. If combined with back down, the effect can be increased.

4. Swing

This adjustment provides the same effect on the parallel direction and the depth as the tilt. Tilting or swinging the lens enables a clear image to be obtained without changing the shape of the subject image (similar shape).

5. Rising

This is effective in moving the subject image up or down. If the top and bottom of the camera are reversed, then this adjustment proves effective with respect to the downward direction.

6. Cross front

This is effective in moving the image to the left or right with respect to an upward or downward rising direction. Rising and cross front yield a movement effect with a simple operation when there are limitations on the camera position.

Image circle

In order for you to gain the maximum effect from camera movements, it is necessary for the image circle of the lens being used to have the appropriate width.

All the lenses in the Super HORSEMAN series satisfy requirements in this respect. Generally speaking, the more the lens is stopped down, the larger the image circle. Refer to the lens performance table which lists the values for both open and F:22. These figures are all at infinity and so the image circle increases in proportion to the closeness of the distance between the lens and the subject.

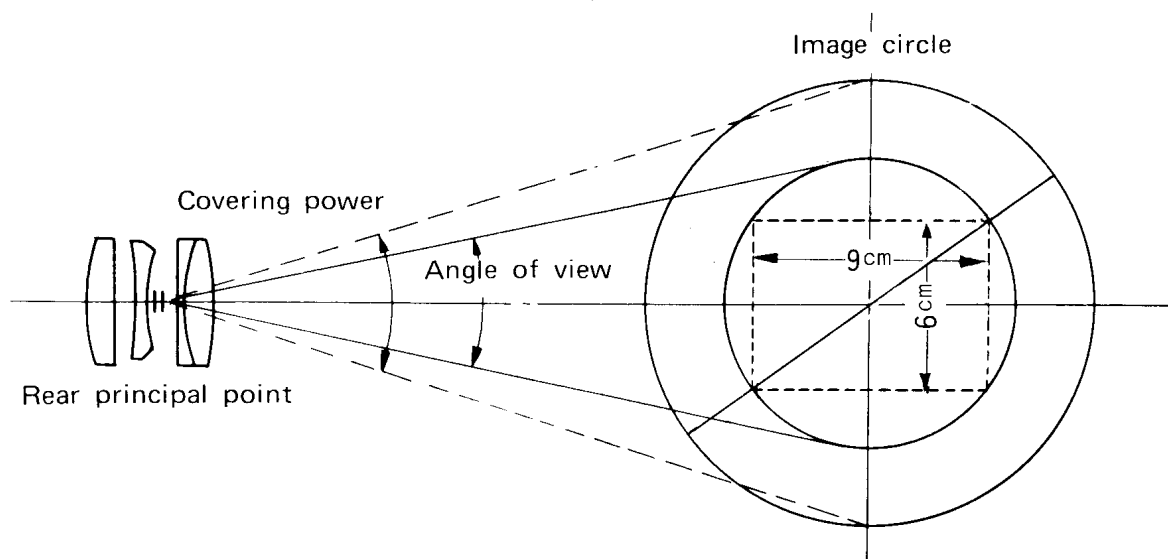


Image circle

This denotes the circle which is provided by a satisfactory image formed on a focusing surface, and it is expressed in terms of its diameter.

Covering power

This denotes the angle covered by the diameter of the image circle with respect to the center of the lens.

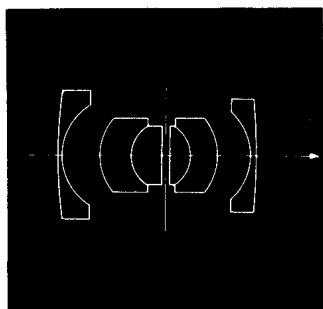
Angle of view

This denotes the angle covered by the picture diagonal with respect to the center of the lens.

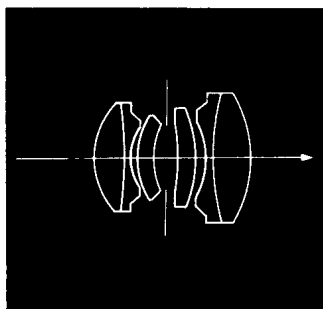
* Bear in mind the following points in order to obtain the maximum effect from the camera movements.

- (1) Use a lens with a long focal length whenever possible in order to safeguard against lens distortion (wide-angle distortion cannot be compensated for by camera movements).
- (2) When adjusting the depth of field, you will obtain clear images even with the aperture open. However, when using other camera movements, stop the aperture down as much as possible.
- (3) When forming the image around the edges of the lens, it is necessary to increase the exposure, depending on how far the bellows has been extended. Use the Optical Exposure Computer (order code: No. S5004) for the correct exposure.
- (4) When it is necessary to expose longer than the exposure time suited to the film being used, the exposure must be increased due to reciprocity law failure. Refer to the data given out by the film manufacturers for the correction values.
- (5) If you intend to use the camera with a tripod and panhead, make sure you use sturdy, good quality ones (the 3-way system is convenient for adjusting the camera in parallel).
When taking pictures outdoors, take note of the wind, vehicles and trains, when taking pictures indoors, take note of the vibrations from machines and air conditioners.
- (6) Be sure not to use the lens shade when the front camera movements are applied. Because it may cause a cut-off problem. The above pre-caution may also be observed when using the filter.

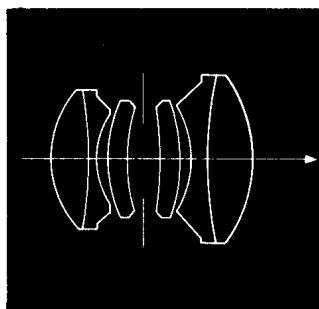
scale 1/2.6



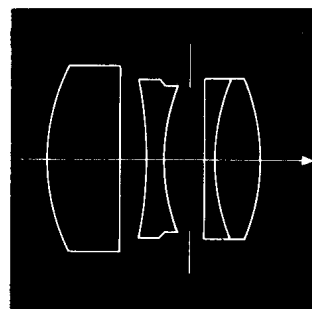
scale 1/1.9



scale 1/1.7



scale 1/1.7



Super HORSEMAN

Wideangle Lens

65mm F7, 4 components, 6 elements

Professional HORSEMAN

Wideangle Lens

75mm F5.6, 4 components, 6 elements.

Super HORSEMAN

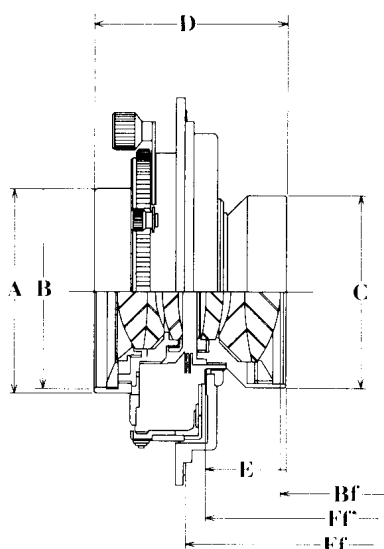
Standard Lens

90 mm F5.6, 4 components, 6 elements

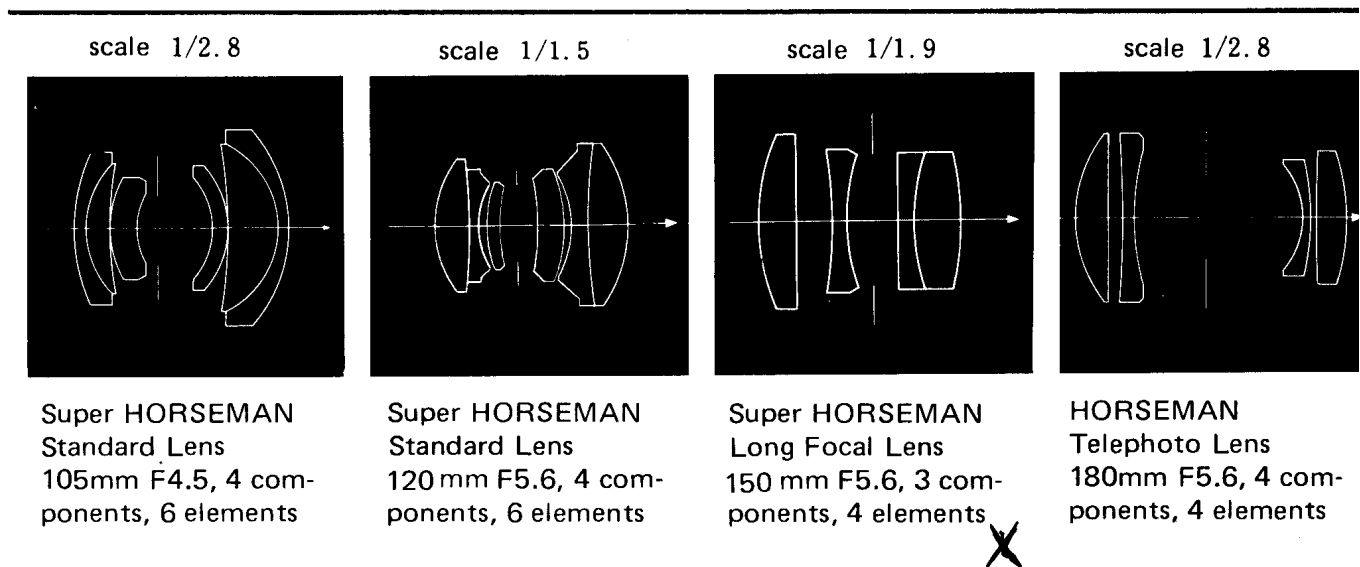
Professional HORSEMAN

Standard Lens

105mm F3.5, 3 components, 4 elements



		Super HORSEMAN 65mm F7	Professional HORSEMAN 75mm F5.6
Angle of view (6 x 7, 6 x 9)		69° · 76°	62° · 68°
Image circle and Covering power	Open aperture	120φ · 85°	100φ · 68°
	F/22	152φ · 99°	120φ · 77°
Minimum aperture		45	32
Outside diameter of front ring (A)		42φ	42φ
Filter (B)		40.5φ P=0.5	40.5φ P=0.5
Outside diameter of rear ring (C)		39.5 φ	31 φ
Overall length (D)		55.8	37.9
Flange back 1 (Ff)		75.3 ± 0.05	75.3 ± 0.05
Flange back 2 (Ff')		70.6	73.7
Back focal distance (Bf)		47.4	60.6
Flange back 2 ~ Rear ring end (E)		25.4	14.6
Weight (g)		280	210
Storage possibility to camera body		Possible	Possible



Super HORSEMAN 90mm F5.6	Professional HORSEMAN 105mm F3.5	Super HORSEMAN 105mm F4.5	Super HORSEMAN 120mm F5.6	Super HORSEMAN 150mm F5.6	HORSEMAN 180mm F5.6
53° · 58°	46° · 51°	46° · 51°	41° · 45°	33° · 37°	28° · 32°
130φ · 72°	100φ · 51°	128φ · 63°	160φ · 64°	140φ · 50°	100φ · 32°
150φ · 80°	125φ · 62°	158φ · 70°	160φ · 64°	160φ · 53°	140φ · 43°
45	32	32	45	45	45
42φ	42φ	65φ	42φ	42φ	54φ
40.5φ P=0.5	40.5φ P=0.5	52.0φ } P = 62.0φ } 0.75	40.5φ P=0.5	40.5φ P=0.5	52.0φ P=0.75
39.5φ	31φ	60.7φ	51φ	31φ	39.5φ
39.5	38.2	64.0	49.8	41.5	74.5
92.6 ± 0.05	92.6 ± 0.05	110.3 ± 0.05	122.4 ± 0.05	141.8 ± 0.05	122.4 ± 0.05
88.6	91.9	112.9	121.3	144.4	124.9
73.4	83.6	81.9	97.4	131.5	90.8
16.6	10.1	32.9	25.1	15.1	34.6
210	240	410	270	230	310
Possible	Possible	Impossible	Possible	Possible	Impossible

Measure unit = mm

Photo	Name	Film	Picture Size		Exposures
			Nominal	Actual	
①	Roll film holder Model 1	120 film	6 x 9 cm	56 x 82 mm	8 exp.
②	Roll film holder Model 2	120 film	6 x 7 cm	56 x 68 mm	10 exp.
③	Roll film holder Model 3	220 film	6 x 9 cm	56 x 82 mm	16 exp.
④	Roll film holder Model 4	220 film	6 x 7 cm	56 x 68 mm	20 exp.
⑤	Sheet film holder	Sheet film (62 x 88 mm) (59 x 82 mm)	6 x 9 cm	58 x 82 mm	1 exp.
⑥	6 x 9 Polaroid back	Polaroid Land Pack Film (#100, #600 series)	6 x 9 cm	56 x 82 mm	8 exp.

Roll film holder Models 1, 2, 3, 4

Each model is operated by winding-lever under ratcheting system and transfer the film smoothly and precisely with automatic film stop and film counter.

Automatic re-setting of film counter number is done by opening the back cover of the holder.

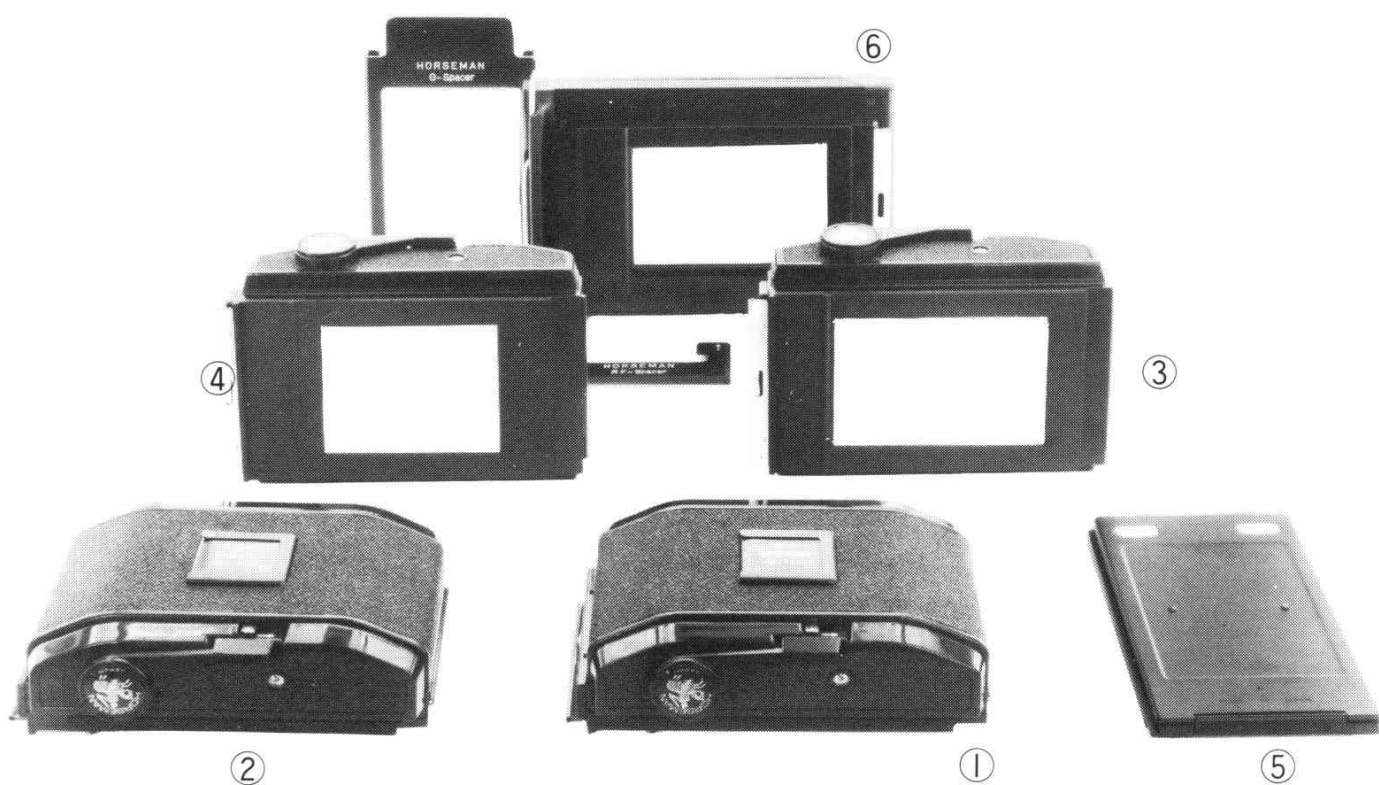
Sheet film holder

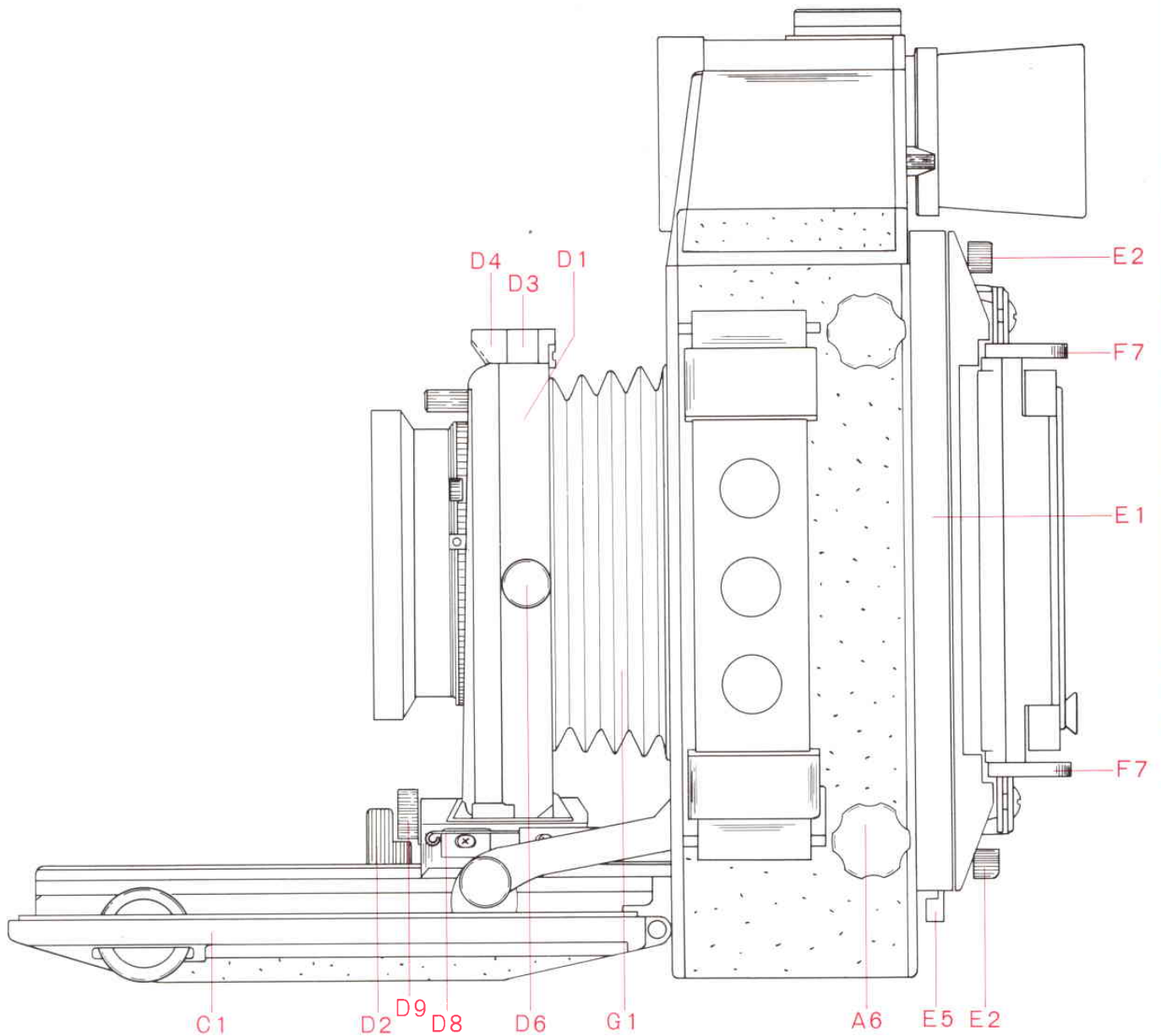
It is for 6x9 cm cut film and single exposure furthermore is designed for preventing from double exposure.

6x9 Back for Polaroid film

Designed for Polaroid Land Pack Film (#100 and #600 series). The HORSEMAN G spacer and RF spacer are provided as standard accessories for focusing convenience.

HORSEMAN Film Holders

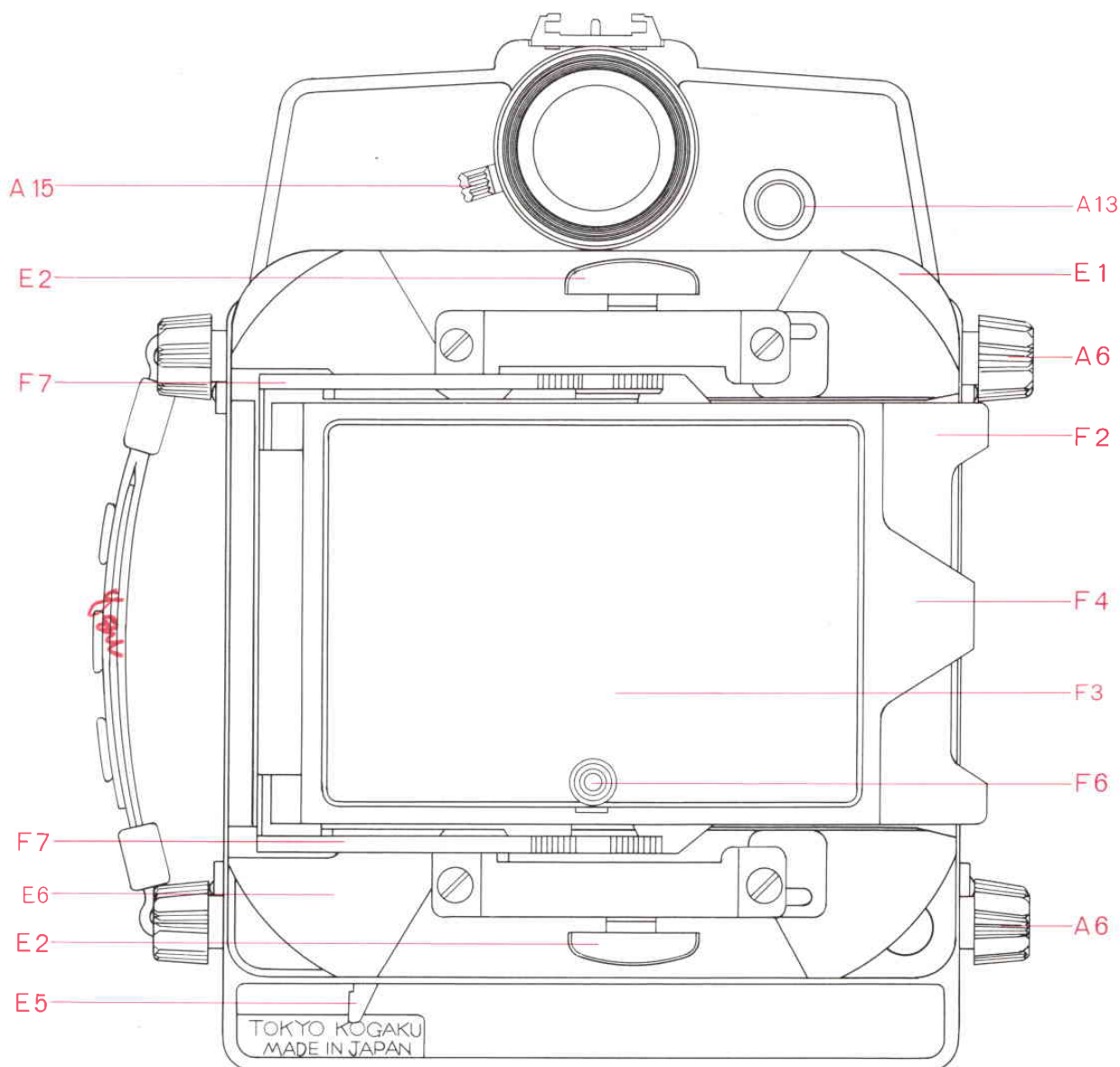




D. Lens Standard

- | | |
|---------------------------------|---------------------------------------|
| (D 1) Lens Standard | (D 8) Swing Front Release |
| (D 2) Pull Out Grips | (D 9) Cross Front Locking Knob |
| (D 3) Lens Panel Frame | (D10) Lens Panel Spring Clip |
| (D 4) Lens Panel Retainer | (D11) Lens Panel Retainer Safety Lock |
| (D 5) Rising Front Control Knob | |
| (D 6) Rising Front Locking Knob | |
| (D 7) Tilt Front Locking Knob | |

Names of the Parts — 4



E. Camera Back

- (E 1) Swing Back Plate
- (E 2) Accessory Catch
- (E 3) Swing Back Limited Screw
- (E 4) Swing Back Plate Spring Hook
- (E 5) Revolving Clamp Lever
- (E 6) Revolving Unit

F. Groundglass Back

- (F 1) Groundglass w/Fresnel Lens
- (F 2) Groundglass Screen Frame
- (F 3) Focusing Shade
- (F 4) Focusing Shade Frame
- (F 5) Focusing Shade Snap Button
- (F 6) Focusing Shade Closure Catch
- (F 7) Retaining Arms for Groundglass Screen Frame
- (F 8) Screws

G. Bellows

- (G 1) Bellows

To bring a focus on the subject is to obtain the sharpest possible image.

When the focusing is accomplished, there is some acceptable distance both in front and back of the subject for the sharpness. This zone is called the Depth of Field.

This Depth of Field increases as much as the aperture is closed or the focal length of the lens is smaller, and decreases in the opposite case.

By means of utilizing this principle, it will be possible to have a object focused sharply but its foreground and background are hazy, or in another case the photographers can preset a deep zone of sharpness and wait the subject to come into the zone to shoot or within more deepened zone it is possible to obtain the sharp image over the wide area before and back of subject.

In the case that the camera movement is used, the picture taking should be made at the proper diaphragm which is always determined by referencing the Depth of Field in order to correct a distortion of the image by utilizing various kinds of the camera mechanism. On the contrary, in like as Close-up photography when a sharp image is required to obtain at the outside of the Depth of Field it will be obtained the same effect as well as the depth of Field is deepened by utilizing the camera movements compensating the ability of the diaphragm.

The following table shows the Depth of Field Table for the various kinds of HORSEMAN lenses and these table are determined at the diameter of circle of least confusion is all 0.07mm.

Super HORSEMAN 65mm 1 : 7

(m)

	F 7	F 8	F 11	F 16	F 22	F 32	F 45
∞	∞ ~ 8.59	∞ ~ 7.53	∞ ~ 5.52	∞ ~ 3.84	∞ ~ 2.83	∞ ~ 2.00	∞ ~ 1.46
100 m	∞ ~ 7.92	∞ ~ 7.02	∞ ~ 5.24	∞ ~ 3.70	∞ ~ 2.76	∞ ~ 1.96	∞ ~ 1.44
50 m	∞ ~ 7.19	∞ ~ 6.58	∞ ~ 5.00	∞ ~ 3.59	∞ ~ 2.70	∞ ~ 1.93	∞ ~ 1.43
30 m	∞ ~ 6.58	∞ ~ 6.06	∞ ~ 4.70	∞ ~ 3.43	∞ ~ 2.61	∞ ~ 1.89	∞ ~ 1.41
20 m	∞ ~ 5.95	∞ ~ 5.52	∞ ~ 4.37	∞ ~ 3.26	∞ ~ 2.51	∞ ~ 1.84	∞ ~ 1.38
15 m	∞ ~ 5.52	∞ ~ 5.07	∞ ~ 4.08	∞ ~ 3.10	∞ ~ 2.42	∞ ~ 1.78	∞ ~ 1.35
10 m	∞ ~ 4.68	∞ ~ 4.35	∞ ~ 3.61	∞ ~ 2.83	∞ ~ 2.25	∞ ~ 1.70	∞ ~ 1.30
8 m	126.00 ~ 4.20	∞ ~ 3.94	∞ ~ 3.32	∞ ~ 2.65	∞ ~ 2.14	∞ ~ 1.64	∞ ~ 1.27
5 m	11.80 ~ 3.22	14.60 ~ 3.06	57.00 ~ 2.68	∞ ~ 2.23	∞ ~ 1.87	∞ ~ 1.48	∞ ~ 1.18
3 m	4.50 ~ 2.27	4.85 ~ 2.19	6.37 ~ 2.00	13.60 ~ 1.74	∞ ~ 1.52	∞ ~ 1.26	∞ ~ 1.04
2 m	2.54 ~ 1.66	2.65 ~ 1.62	3.02 ~ 1.51	4.00 ~ 1.37	6.43 ~ 1.28	∞ ~ 1.06	∞ ~ 0.91
1.5 m	1.77 ~ 1.31	1.82 ~ 1.28	1.98 ~ 1.22	2.33 ~ 1.13	2.99 ~ 1.04	5.85 ~ 0.92	∞ ~ 0.80
1.2 m	1.36 ~ 1.08	1.39 ~ 1.06	1.47 ~ 1.02	1.65 ~ 0.96	1.94 ~ 0.89	2.79 ~ 0.81	6.99 ~ 0.72
1 m	1.11 ~ 0.92	1.12 ~ 0.91	1.17 ~ 0.88	1.27 ~ 0.83	1.43 ~ 0.79	1.82 ~ 0.72	2.90 ~ 0.66

Professional HORSEMAN 75mm

(m)

	F 5.6	F 8	F 11	F 16	F 22	F 32
∞	∞ ~ 14.53	∞ ~ 10.22	∞ ~ 7.47	∞ ~ 5.18	∞ ~ 3.81	∞ ~ 2.67
100 m	∞ ~ 12.71	∞ ~ 9.29	∞ ~ 6.97	∞ ~ 4.94	∞ ~ 3.68	∞ ~ 2.60
50 m	∞ ~ 11.30	∞ ~ 8.51	∞ ~ 6.52	∞ ~ 4.72	∞ ~ 3.56	∞ ~ 2.54
30 m	∞ ~ 9.84	∞ ~ 7.66	∞ ~ 6.02	∞ ~ 4.45	∞ ~ 3.40	∞ ~ 2.47
20 m	∞ ~ 8.47	∞ ~ 6.81	∞ ~ 5.48	∞ ~ 4.15	∞ ~ 3.23	∞ ~ 2.38
15 m	∞ ~ 7.51	∞ ~ 6.18	∞ ~ 5.07	∞ ~ 3.91	∞ ~ 3.09	∞ ~ 2.30
10 m	31.94 ~ 5.98	70.15 ~ 5.11	∞ ~ 4.33	∞ ~ 3.47	∞ ~ 2.81	∞ ~ 2.14
8 m	17.64 ~ 5.21	37.05 ~ 4.54	∞ ~ 3.92	∞ ~ 3.20	∞ ~ 2.63	∞ ~ 2.04
5 m	7.52 ~ 3.76	9.64 ~ 3.41	14.96 ~ 3.05	219.97 ~ 2.60	∞ ~ 2.22	∞ ~ 1.79
3 m	3.73 ~ 2.52	4.17 ~ 2.36	4.89 ~ 2.19	6.95 ~ 1.95	14.29 ~ 1.74	∞ ~ 1.47
2 m	2.28 ~ 1.78	2.44 ~ 1.70	2.66 ~ 1.62	3.14 ~ 1.49	4.04 ~ 1.37	7.97 ~ 1.20
1.5 m	1.65 ~ 1.38	1.72 ~ 1.33	1.82 ~ 1.28	2.03 ~ 1.20	2.35 ~ 1.13	3.24 ~ 1.02
1.2 m	1.29 ~ 1.12	1.33 ~ 1.10	1.39 ~ 1.06	1.50 ~ 1.01	1.66 ~ 0.96	2.03 ~ 0.88
1 m	1.06 ~ 0.95	1.08 ~ 0.93	1.12 ~ 0.91	1.19 ~ 0.87	1.28 ~ 0.83	1.48 ~ 0.78

Super HORSEMAN 90mm								(m)
	F 5.6	F 8	F 11	F 16	F 22	F 32	F 45	
∞	∞~21.04	∞~14.78	∞~10.44	∞~7.48	∞~5.49	∞~3.83	∞~2.78	
100 m	∞~17.40	∞~12.89	∞~9.76	∞~6.97	∞~5.21	∞~3.70	∞~2.71	
50 m	∞~14.87	∞~11.46	∞~8.92	∞~6.54	∞~4.97	∞~3.58	∞~2.65	
30 m	∞~12.43	∞~9.96	∞~8.00	∞~6.03	∞~4.68	∞~3.43	∞~2.57	
20 m	425.48~10.42	∞~8.57	∞~7.08	∞~5.50	∞~4.36	∞~3.26	∞~2.47	
15 m	52.37~8.82	∞~7.51	∞~6.34	∞~5.05	∞~4.07	∞~3.10	∞~2.38	
10 m	18.88~6.84	30.73~6.03	146.72~5.26	∞~4.35	∞~3.61	∞~2.83	∞~2.22	
8 m	12.79~5.85	17.27~5.25	30.96~4.66	∞~3.93	∞~3.32	∞~2.65	∞~2.12	
5 m	6.48~4.08	7.44~3.70	9.14~3.48	14.88~3.07	63.87~2.69	∞~2.24	∞~1.85	
3 m	3.46~2.66	3.70~2.53	4.06~2.40	4.86~2.20	6.40~2.01	13.97~1.75	∞~1.52	
2 m	2.18~1.85	2.27~1.79	2.40~1.73	2.64~1.63	3.01~1.52	3.97~1.38	6.98~1.24	
1.5 m	1.59~1.42	1.64~1.39	1.70~1.35	1.81~1.29	1.97~1.23	2.32~1.14	3.04~1.04	
1.2 m	1.26~1.15	1.28~1.13	1.32~1.11	1.38~1.07	1.46~1.03	1.64~0.97	1.94~0.90	
1 m	1.04~0.97	1.05~0.95	1.07~0.94	1.11~0.91	1.16~0.88	1.26~0.84	1.42~0.80	

Professional HORSEMAN 105mm								(m)
	F 3.5	F 4	F 5.6	F 8	F 11	F 16	F 22	F 32
∞	∞~45.00	∞~39.40	∞~28.20	∞~19.70	∞~14.40	∞~9.84	∞~7.16	∞~4.92
100 m	∞~31.27	∞~28.49	∞~22.19	∞~16.68	∞~12.76	∞~9.19	∞~6.91	∞~4.90
50 m	∞~23.86	∞~22.21	∞~18.19	∞~14.33	∞~11.34	∞~8.44	∞~6.48	∞~4.70
30 m	88.73~18.13	123.11~17.17	∞~14.67	∞~12.06	∞~9.88	∞~7.61	∞~5.98	∞~4.43
20 m	35.65~13.90	40.16~13.30	67.64~11.80	∞~10.07	∞~8.51	∞~6.77	∞~5.46	∞~4.15
15 m	22.29~11.13	23.96~10.95	31.56~9.89	60.46~8.64	∞~7.47	∞~6.11	∞~5.02	∞~3.89
10 m	12.80~8.18	13.40~7.93	15.50~7.38	20.30~6.63	33.10~5.89	∞~4.96	∞~4.17	∞~3.30
8 m	9.65~6.84	9.95~6.70	11.03~6.30	13.20~5.77	17.52~5.24	39.20~4.54	∞~3.92	∞~3.21
5 m	5.63~4.50	5.73~4.44	6.08~4.25	6.70~3.99	7.68~3.71	10.10~3.32	16.50~2.94	783.38~2.48
3 m	3.21~2.81	3.25~2.79	3.36~2.71	3.54~2.60	3.80~2.48	4.32~2.30	5.16~2.11	7.68~1.86
2 m	2.09~1.92	2.11~1.90	2.15~1.87	2.23~1.82	2.33~1.76	2.51~1.66	2.78~1.56	3.37~1.42
1.5 m	1.55~1.45	1.56~1.45	1.59~1.42	1.62~1.39	1.68~1.36	1.77~1.30	1.90~1.24	2.16~1.15
1.2 m	1.22~1.18	1.23~1.18	1.24~1.16	1.26~1.15	1.28~1.13	1.32~1.10	1.38~1.07	1.48~1.02
1 m	1.02~0.98	1.03~0.98	1.04~0.97	1.05~0.95	1.08~0.94	1.11~0.96	1.16~0.88	1.26~0.83

Super HORSEMAN 105mm								(m)
	F 4.5	F 5.6	F 8	F 11	F 16	F 22	F 32	
∞	∞~35.90	∞~28.20	∞~19.70	∞~14.40	∞~9.84	∞~7.16	∞~4.94	
100 m	∞~26.30	∞~22.30	∞~16.78	∞~12.83	∞~9.24	∞~6.94	∞~4.92	
50 m	∞~20.75	∞~18.17	∞~14.31	∞~11.32	∞~8.42	∞~6.46	∞~4.68	
30 m	202.69~16.29	∞~14.66	∞~12.05	∞~9.86	∞~7.59	∞~5.97	∞~4.42	
20 m	45.97~12.83	67.57~11.81	∞~10.06	∞~8.50	∞~6.77	∞~5.45	∞~4.14	
15 m	25.76~10.62	31.29~9.91	59.07~8.67	∞~7.50	∞~6.13	∞~5.04	∞~3.91	
10 m	13.90~7.82	15.30~7.39	20.00~6.65	33.10~5.91	∞~5.03	∞~4.19	∞~3.30	
8 m	10.24~6.58	11.00~6.31	13.12~5.79	17.34~5.25	37.86~4.55	∞~3.94	∞~3.22	
5 m	5.78~4.41	6.07~4.25	6.55~3.99	7.56~3.71	9.23~3.32	16.50~3.05	515.54~2.48	
3 m	3.25~2.78	3.34~2.71	3.53~2.60	3.77~2.48	4.26~2.30	5.01~2.11	7.70~1.87	
2 m	2.10~1.91	2.15~1.88	2.23~1.88	2.33~1.79	2.48~1.69	2.72~1.63	3.30~1.48	
1.5 m	1.55~1.45	1.56~1.42	1.60~1.39	1.66~1.38	1.70~1.33	1.89~1.27	2.13~1.15	
1.2 m	1.23~1.17	1.24~1.16	1.26~1.15	1.28~1.13	1.32~1.10	1.37~1.07	1.47~1.02	
1 m	1.02~0.98	1.04~0.97	1.05~0.95	1.08~0.94	1.09~0.93	1.14~0.88	1.20~0.85	

Super HORSEMAN 120mm

	F 5.6	F 8	F 11	F 16	F 22	F 32	F 45
∞	∞ ~ 36.66	∞ ~ 25.99	∞ ~ 18.44	∞ ~ 13.11	∞ ~ 9.34	∞ ~ 6.68	∞ ~ 4.79
100m	∞ ~ 26.90	∞ ~ 20.69	∞ ~ 15.61	∞ ~ 11.63	∞ ~ 8.57	∞ ~ 6.28	∞ ~ 4.59
50m	∞ ~ 21.24	∞ ~ 17.18	∞ ~ 13.54	∞ ~ 10.45	∞ ~ 7.92	∞ ~ 5.93	∞ ~ 4.40
30m	165.91 ~ 16.59	∞ ~ 14.02	∞ ~ 11.51	∞ ~ 9.20	∞ ~ 7.19	∞ ~ 5.52	∞ ~ 4.17
20m	43.74 ~ 13.02	86.88 ~ 11.39	∞ ~ 9.68	∞ ~ 8.01	∞ ~ 6.45	∞ ~ 5.07	∞ ~ 3.92
15m	25.19 ~ 10.72	35.19 ~ 9.60	81.11 ~ 8.36	∞ ~ 7.09	∞ ~ 5.84	∞ ~ 4.70	∞ ~ 3.70
10m	13.63 ~ 7.92	16.07 ~ 7.30	21.58 ~ 6.57	42.13 ~ 5.76	∞ ~ 4.92	∞ ~ 4.09	∞ ~ 3.32
8m	10.14 ~ 6.62	11.42 ~ 6.18	13.92 ~ 5.66	20.22 ~ 5.06	57.91 ~ 4.40	∞ ~ 3.73	∞ ~ 3.08
5m	5.73 ~ 4.44	6.11 ~ 4.24	6.74 ~ 4.00	7.90 ~ 3.69	10.49 ~ 3.34	19.82 ~ 2.95	∞ ~ 2.54
3m	3.24 ~ 2.80	3.35 ~ 2.72	3.52 ~ 2.62	3.79 ~ 2.50	4.27 ~ 2.34	5.22 ~ 2.15	7.71 ~ 1.93
2m	2.09 ~ 1.91	2.14 ~ 1.88	2.20 ~ 1.84	2.30 ~ 1.78	2.45 ~ 1.70	2.72 ~ 1.61	3.22 ~ 1.49
1.5m	1.55 ~ 1.45	1.57 ~ 1.44	1.60 ~ 1.41	1.65 ~ 1.38	1.72 ~ 1.34	1.84 ~ 1.28	2.03 ~ 1.21
1.2m	1.23 ~ 1.17	1.24 ~ 1.16	1.26 ~ 1.15	1.28 ~ 1.13	1.32 ~ 1.10	1.39 ~ 1.07	1.49 ~ 1.02
1m	1.02 ~ 0.98	1.03 ~ 0.98	1.04 ~ 0.97	1.05 ~ 0.95	1.08 ~ 0.94	1.11 ~ 0.91	1.17 ~ 0.88

Super HORSEMAN 150mm

(m)

	F 5.6	F 8	F 11	F 16	F 22	F 32	F 45
∞	∞ ~ 58.40	∞ ~ 41.00	∞ ~ 29.90	∞ ~ 20.60	∞ ~ 15.10	∞ ~ 10.50	∞ ~ 7.53
100m	∞ ~ 36.97	∞ ~ 29.15	∞ ~ 23.08	∞ ~ 17.17	∞ ~ 13.16	∞ ~ 9.52	∞ ~ 7.04
50m	351.50 ~ 27.04	∞ ~ 22.63	∞ ~ 18.80	∞ ~ 14.70	∞ ~ 11.67	∞ ~ 8.72	∞ ~ 6.60
30m	61.42 ~ 19.91	112.11 ~ 17.43	∞ ~ 15.08	∞ ~ 12.33	∞ ~ 10.14	∞ ~ 7.85	∞ ~ 6.09
20m	30.23 ~ 14.98	38.80 ~ 13.54	60.26 ~ 12.09	848.27 ~ 10.27	∞ ~ 8.71	∞ ~ 6.98	∞ ~ 5.56
15m	20.05 ~ 12.01	23.46 ~ 11.07	29.84 ~ 10.09	54.89 ~ 8.80	∞ ~ 7.64	∞ ~ 6.28	∞ ~ 5.12
10m	12.00 ~ 8.59	13.10 ~ 8.11	14.80 ~ 7.58	19.10 ~ 6.84	29.40 ~ 6.12	317.21 ~ 5.23	∞ ~ 4.41
8m	9.20 ~ 7.08	9.84 ~ 6.76	10.78 ~ 6.39	12.84 ~ 5.86	16.71 ~ 5.33	34.12 ~ 4.72	∞ ~ 4.00
5m	5.34 ~ 4.64	5.63 ~ 4.50	5.92 ~ 4.34	6.47 ~ 4.10	7.29 ~ 3.84	9.28 ~ 3.49	14.60 ~ 3.12
3m	3.14 ~ 2.87	3.20 ~ 2.82	3.29 ~ 2.76	3.43 ~ 2.67	3.64 ~ 2.57	4.04 ~ 2.41	4.74 ~ 2.24
2m	2.05 ~ 1.95	2.08 ~ 1.93	2.11 ~ 1.90	2.17 ~ 1.86	2.24 ~ 1.82	2.37 ~ 1.75	2.57 ~ 1.66
1.5m	1.53 ~ 1.47	1.54 ~ 1.46	1.55 ~ 1.45	1.58 ~ 1.43	1.62 ~ 1.40	1.68 ~ 1.37	1.76 ~ 1.32
1.2m	1.22 ~ 1.18	1.22 ~ 1.18	1.23 ~ 1.17	1.25 ~ 1.16	1.27 ~ 1.14	1.30 ~ 1.12	1.34 ~ 1.09
1m	1.01 ~ 0.99	1.01 ~ 0.99	1.02 ~ 0.98	1.03 ~ 0.98	1.04 ~ 0.97	1.06 ~ 0.95	1.08 ~ 0.94

HORSEMAN 180mm

(m)

	F 5.6	F 8	F 11	F 16	F 22	F 32	F 45
∞	∞ ~ 84.20	∞ ~ 59.05	∞ ~ 43.00	∞ ~ 29.71	∞ ~ 21.71	∞ ~ 15.04	∞ ~ 10.81
100m	∞ ~ 45.81	∞ ~ 37.22	∞ ~ 30.17	∞ ~ 22.97	∞ ~ 17.88	∞ ~ 13.11	∞ ~ 9.77
50m	122.94 ~ 31.48	331.52 ~ 27.20	∞ ~ 23.35	∞ ~ 18.75	∞ ~ 15.24	∞ ~ 11.65	∞ ~ 8.96
30m	46.41 ~ 22.21	60.75 ~ 20.00	99.22 ~ 17.80	∞ ~ 15.05	∞ ~ 12.72	∞ ~ 10.13	∞ ~ 8.04
20m	26.10 ~ 16.24	30.06 ~ 15.03	37.12 ~ 13.76	61.27 ~ 12.07	288.28 ~ 10.53	∞ ~ 8.71	∞ ~ 7.13
15m	18.16 ~ 12.80	19.97 ~ 12.04	22.83 ~ 11.22	30.06 ~ 10.08	49.99 ~ 8.99	∞ ~ 7.64	∞ ~ 6.40
10m	11.20 ~ 8.99	11.90 ~ 8.61	12.90 ~ 8.19	14.80 ~ 7.58	18.30 ~ 6.96	29.80 ~ 6.13	182.71 ~ 5.32
8m	8.79 ~ 7.35	9.18 ~ 7.10	9.72 ~ 6.81	10.80 ~ 6.39	12.46 ~ 5.95	16.85 ~ 5.34	31.54 ~ 4.72
5m	5.29 ~ 4.75	5.42 ~ 4.65	5.60 ~ 4.53	5.92 ~ 4.34	6.37 ~ 4.14	7.30 ~ 3.85	9.06 ~ 3.53
3m	3.09 ~ 2.91	3.13 ~ 2.88	3.19 ~ 2.84	3.28 ~ 2.28	3.41 ~ 2.69	3.63 ~ 2.57	3.99 ~ 2.44
2m	2.04 ~ 1.97	2.05 ~ 1.95	2.07 ~ 1.93	2.11 ~ 1.91	2.15 ~ 1.87	2.23 ~ 1.82	2.35 ~ 1.76
1.5m	1.52 ~ 1.48	1.53 ~ 1.48	1.54 ~ 1.47	1.55 ~ 1.45	1.57 ~ 1.44	1.61 ~ 1.41	1.66 ~ 1.38
1.2m	1.21 ~ 1.19	1.21 ~ 1.19	1.22 ~ 1.18	1.23 ~ 1.17	1.24 ~ 1.16	1.26 ~ 1.15	1.29 ~ 1.13
1m	1.01 ~ 0.99	1.01 ~ 0.99	1.01 ~ 0.99	1.01 ~ 0.98	1.02 ~ 0.98	1.03 ~ 0.97	1.04 ~ 0.96

HORSEMAN Rotary back is a compact, highly efficient unit with easy-to-use features giving fast operation from focusing to shooting. Moreover, it is possible to photograph with the dark slide removed as a light exclusion system has been incorporated.

(1) Remove the groundglass back from camera back, then fit the Rotary back carefully on to the camera back and secure with the camera's accessory catch (E2).

(2) Attach the groundglass back to (A) position of the Rotary back, and the roll film holder to (B) position.

Photo... 44 45

(3) Focus, then immediately close the shutter using the focus lever. Then lightly press the clamp lever (C) and turn the roll film holder.

Photo... 46 47

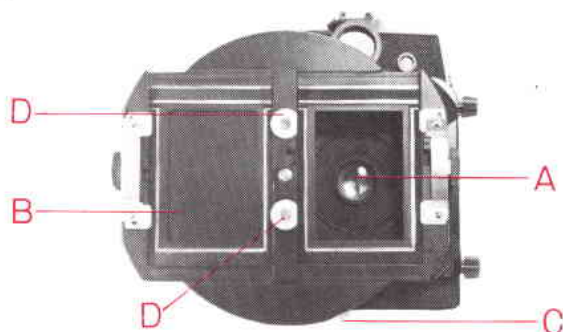
* (1) The film plane with the Rotary back attached is 25 mm further to the rear than in the original camera specifications.

So, a wide-angle lens is not usable as the lens standard will be dropped out of the focusing rail when it is pushed back to the camera body in order to compensate the distance. (Close-up work is, however, possible.)

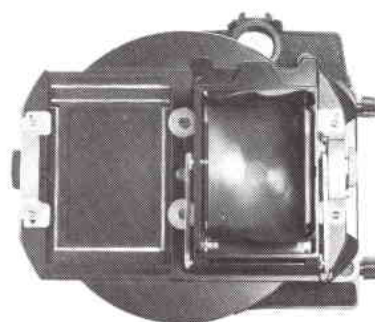
(2) Be sure to close the shutter using the focus lever before rotate the Rotary back.

(3) The roll film holder can also be installed to the (A) position instead of the groundglass back. In this case turn the pivot locks (D) to secure the roll film holder before installation.

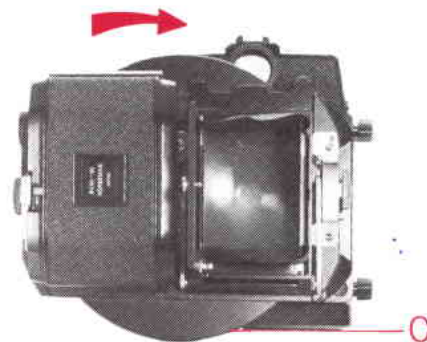
44



45



46



47

