

Info 33

Controlled zones
of sharpness

studio
industry
nature
architecture
reproduction

sinar®

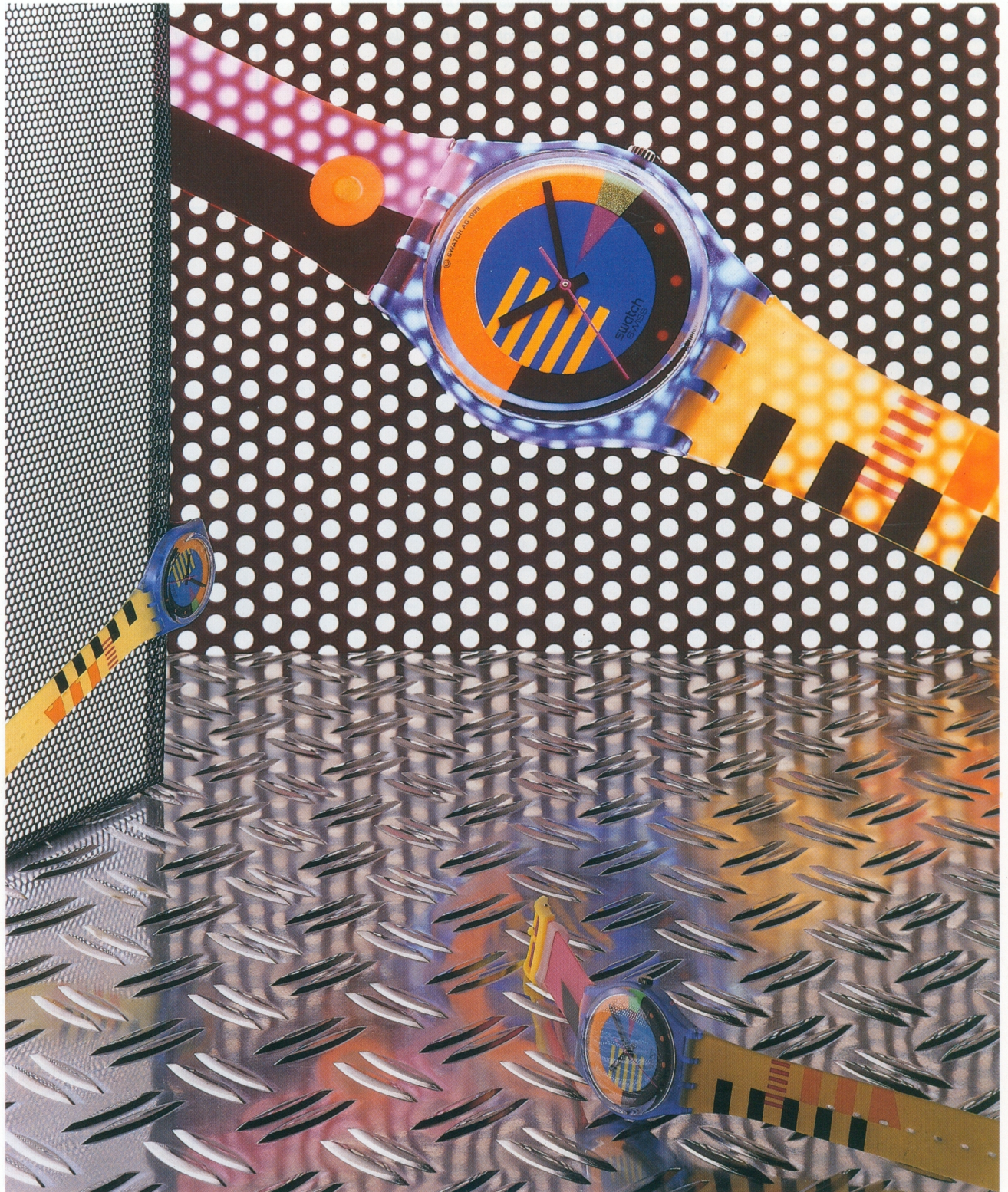


Photo: Victor Goico, Stuttgart/Germany

Not infrequently the assignment layout from the artist or art director expects the photographer to photograph the impossible (Fig. 1). The problem is usually perspective rendering or an unrealisable depth of field. But by knowing something about sharpness distribution control and depth of field – and especially with the right view camera outfit – you can often achieve more than you thought feasible.

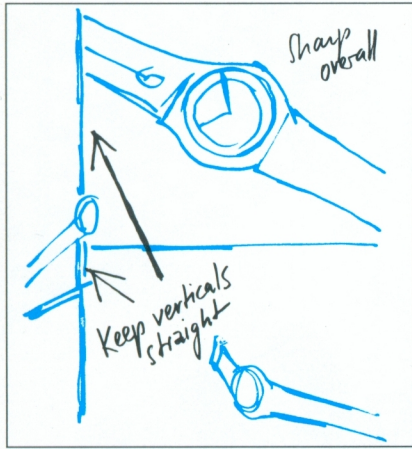


Fig. 1: Often the artist's or art director's layout specifies photographically impossible requirements.

Preparations

The starting point for any approach is the subject to be photographed. Select the camera viewpoint according to the requirements of the layout. The viewpoint in turn dictates the focal length of the lens to be used – and so already restricts your creative scope. In deciding what is feasible, consider what effects can be achieved with controlled sharpness and deliberate unsharpness. The actual focus setting on the camera should become merely the means to an end. However, this is possible only with an up-to-date view camera design of simple, handy and precise focusing adjustments and movements. Here are some practical case studies.

First problem: Sharpness in main subject plane, no sharpness wanted elsewhere

Solving this first problem relies on the Scheimpflug condition of intersecting planes (Fig. 2). The idea is to restrict sharpness to a principal plane in the subject space. Important here in practice are simple, precise and fully controllable camera movements.

Fig. 2: The Scheimpflug rule:
If the three main optical planes (image, lens, subject) are parallel, the image is evenly sharp over its whole plane. Once one of these planes is inclined relative to any other, you achieve overall sharpness in the image plane only if the three planes intersect in a common line.

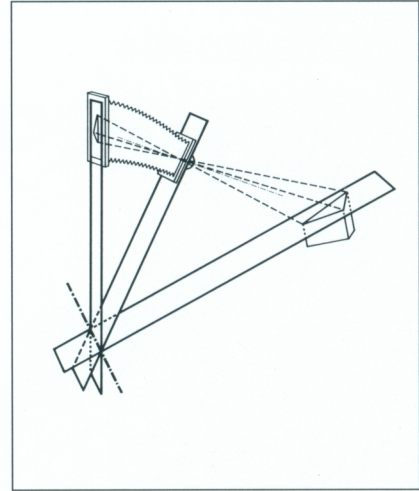
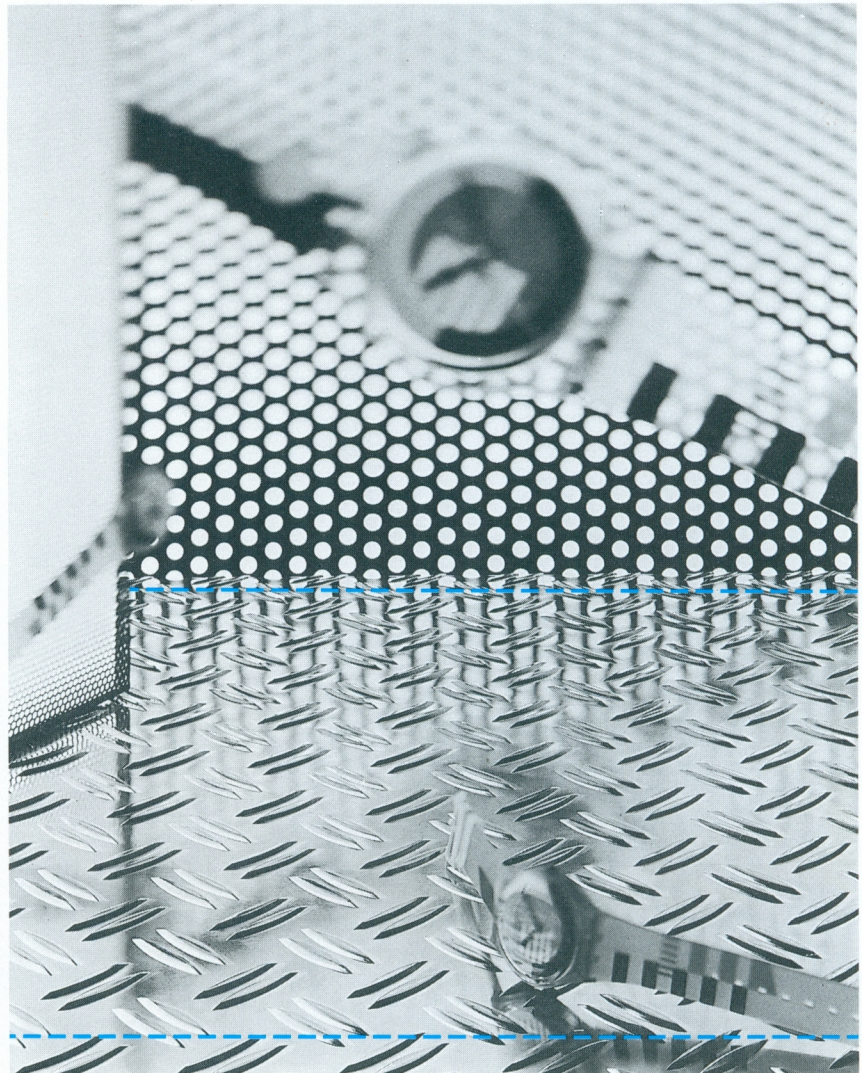


Fig. 2

Fig. 4: First problem:
Locate point H on the asymmetric tilt axis and tilt until the image is sharp at H1. That is all.

Fig. 4



H

H1

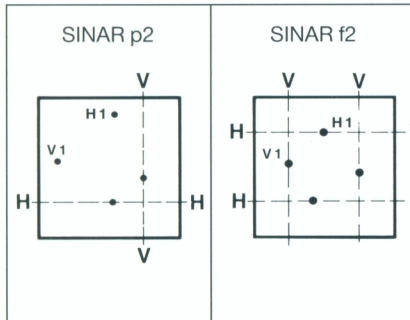


Fig. 3

Tilts and swings with the SINAR p2:

- (1) Thanks to the asymmetric axes you can locate on the marked tilt or swing axis a point of the subject plane that is to be sharp.
- (2) Focus on that H (or V) axis.
- (3) Tilt by the rack-and-pinion adjustment until the image is sharp also at H1 (or V1). That is all. (See Figs. 3 and 4.)

Fig. 5: The counter tilt: Locate an "anti-Scheimpflug" plane at right angles to the subject plane. The sharp zone is in this case confined to the watch. Selective sharpness control calls for large apertures; that in turn needs very precise focusing.

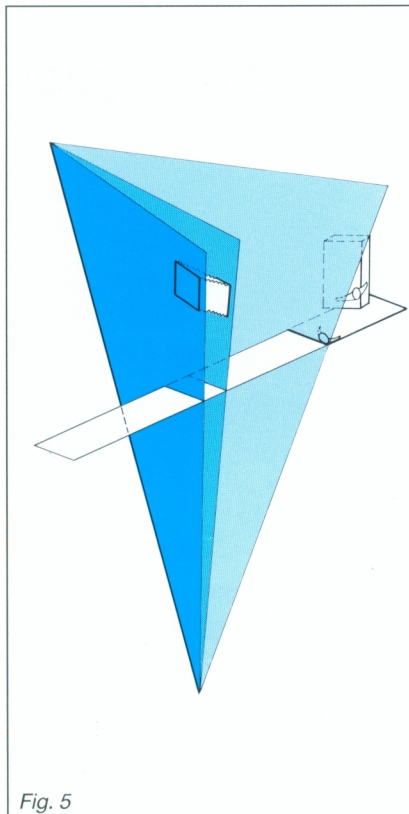


Fig. 5

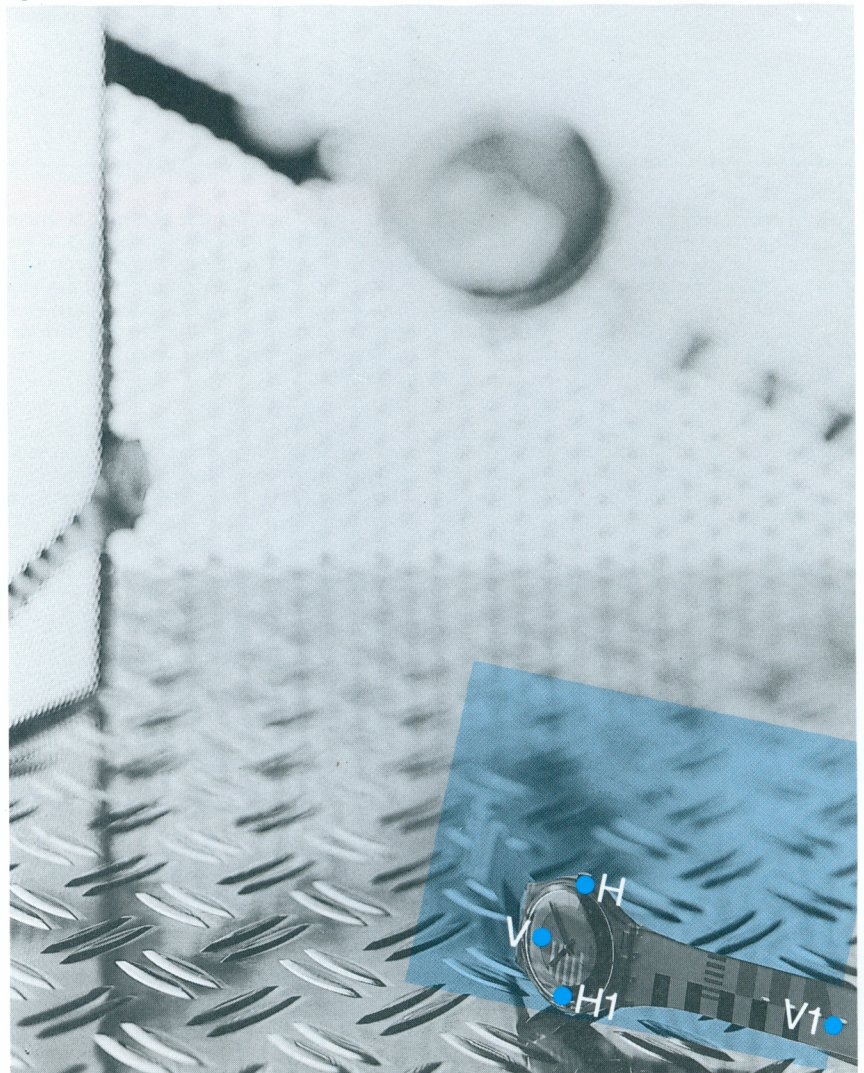
Tilts and swings with the SINAR f2:

- (1) Locate a point of the required subject plane on the tilt or swing axis.
- (2) Focus on H (or V).
- (3) Set the angle scale dial to 0; focus until H1 (or V1) appears sharp.
- (4) Read off tilt/swing angle, set it on the camera, refocus. That is all. (See Figs. 3 and 4.)

Second problem: Emphasising a single item by selective sharpness

Here we have to establish a counter-tilted plane, a kind of "anti-Scheimpflug" situation. The best way of identifying such a plane is to set up a printed card (as a focusing aid) in the subject, at right angles to the subject plane that you want to isolate in sharpness. Focus the camera and tilt or swing in the same way as in the first case. Usually you will have to do both, covering the card

Fig. 6



sharply by tilts between H and H1, and then by swings between V and V1. (Remove the card before exposing.) See Fig. 5. To maintain correct perspective, the swings and tilts – carried out with the rear standard – are then transferred to the lens standard. If the camera movements are not yaw-free, that involves cumbersome successive approximations, as each adjustment upsets the sharpness of previously focused points. And to make the focus really selective, this kind of shot needs the largest available lens aperture. Hence you must be able to locate a plane of maximum sharpness precisely where needed. (Fig. 6)

Fig. 6: Effect of counter-tilting in our example: Selective sharpness picks out an object against the background to enhance image impact.

Third problem: Limited depth of field behind and in front of an inclined plane

The strength of the view camera is its ability to focus on an inclined plane located anywhere in the subject space. In addition you can of course stop down the lens to control depth of field in front of this plane and behind. On 35 mm cameras a depth of field indicator on the lens shows the extent of the sharp zone at different apertures. On a view camera you can use a depth of field scale on the focusing knob (Fig. 7).

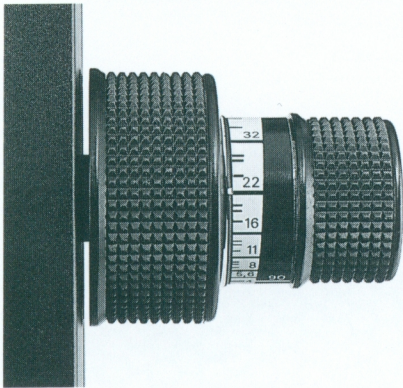
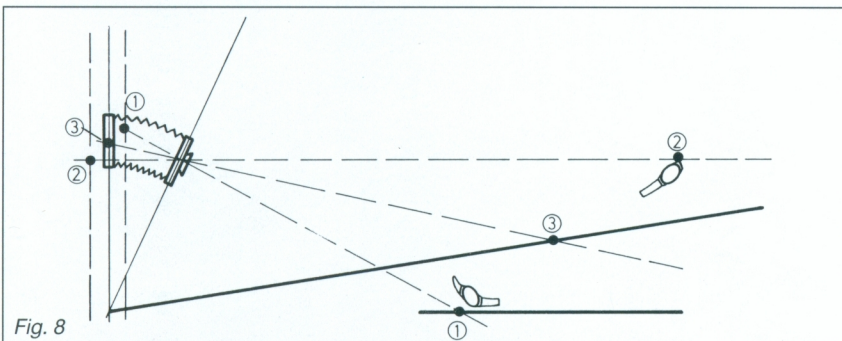


Fig. 7: With the depth of field scale you keep close control over the aperture – without the need for safety margins by additional stopping down (which impairs lens performance).

The focusing procedure is tailored to the view camera, too: Fine focus on your distant subject point, reset the scale to zero, focus on the nearest point, read off and set the required aperture, turn the focusing knob back by two f-stop divisions on the scale. That is all: you have optimum sharpness where you want it (Fig. 8).

Fig. 8: Using the depth of field scale:

- (1) Fine focus on distant subject point (1); reset scale to zero.
- (2) Fine focus on near point (2), read off required working aperture and set on lens or behind-lens shutter.
- (3) Set optimum focus point by turning focusing knob back by 2 f-stop intervals on scale (3).



A common error is the idea that you only need to focus at a distance one-third of the way into the subject space. For this is a very rough rule of thumb – in reality depth of field depends on a number of factors: focal length, scale of reproduction, working aperture and permissible circle of confusion (COC)*.

The equation below indicates the distribution of the sharp zone in front of and behind the plane of maximum sharpness (see Fig. 9):

$$\% \text{ of depth zone behind sharpest plane} = \frac{\text{Focal length} + [(1 : \text{scale}) \times \text{aperture} \times \text{COC}]}{2 \times \text{Focal length}} \times 100$$

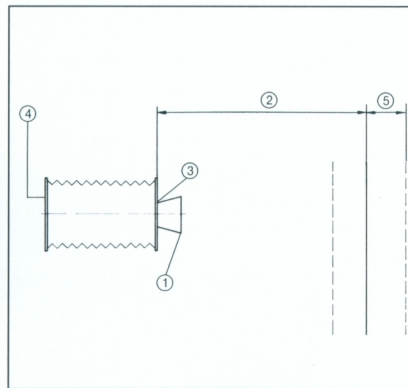


Fig. 9

- ① = Focal length in mm
- ② = Scale of reproduction
- ③ = Working aperture
- ④ = Limiting circle of confusion in mm
- ⑤ = % share of sharp zone behind sharpness plane

The rule of thumb, specifying a depth of field zone split 1/3 in front and 2/3 behind the sharp subject plane, is valid for instance at a 1:30 scale of reproduction with a 210 mm lens stopped down to f/22 (rounded off; the real f-value is 22.6) and a 0.1 mm circle of confusion (Fig. 10):

$$\frac{210 \text{ mm} + \left[\left(\frac{1 \times 30}{1} \right) \times 22.6 \times 0.1 \right]}{2 \times 210 \text{ mm}} \times 100 = 66.2\%$$

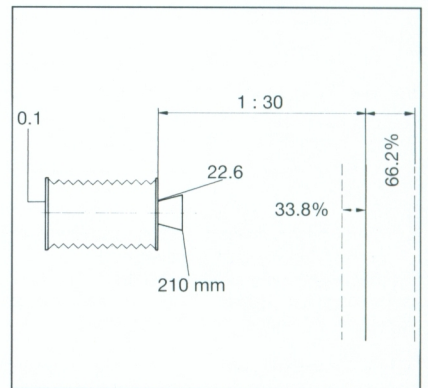


Fig. 10

If you alter just one of these variables, for instance using f/8 instead of f/22, relative sharpness zones immediately change (Fig. 11):

$$\frac{210 \text{ mm} + \left[\left(\frac{1 \times 30}{1} \right) \times 8 \times 0.1 \right]}{2 \times 210 \text{ mm}} \times 100 = 55.7\%$$

Here only a little over half of the depth zone is behind the sharpness plane and nearly half in front.

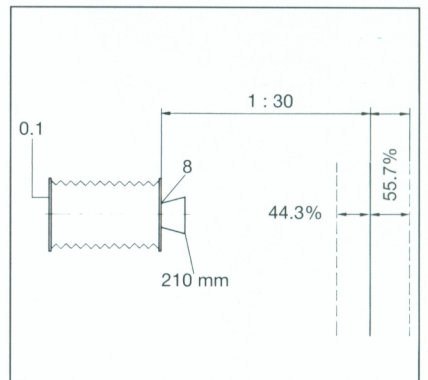


Fig. 11

* Permissible circle of confusion: for 4 × 5" : 0.10 mm
for 5 × 7" : 0.14 mm
for 8 × 10" : 0.20 mm

Fig. 12

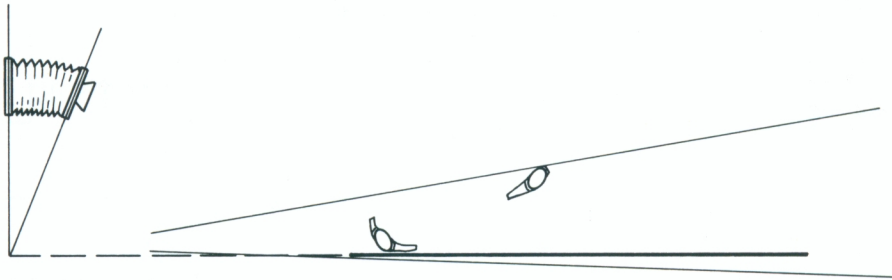


Fig. 12: Once you tilt for Scheimpflug-type sharpness distribution, the limiting planes of the depth of field are wedge-shaped.

Hence a depth of field scale is indispensable for precise operation. Unlike depth of field in the subject space, the sharp zone at the film end (depth of focus) is always symmetrical in front of and behind the film plane. Hence the depth of field scale of the SINAR cameras offers a quick way of precise focusing.

With no camera movements, the limiting planes of the sharp zones are parallel. But once you control sharpness distribution with tilts or swings, these limiting planes intersect in a common line. They are opening to the back to the depth of the scene and therefore form a wedge-shaped sharpness zone. (Fig. 12)

With a view camera, this spreading depth of field can save the day when you need extended sharpness in depth. But that in turn demands precise screen focusing on the right subject points, using simple and logical swings and tilts plus a depth of field scale to indicate how far you should stop down. (Fig. 13)

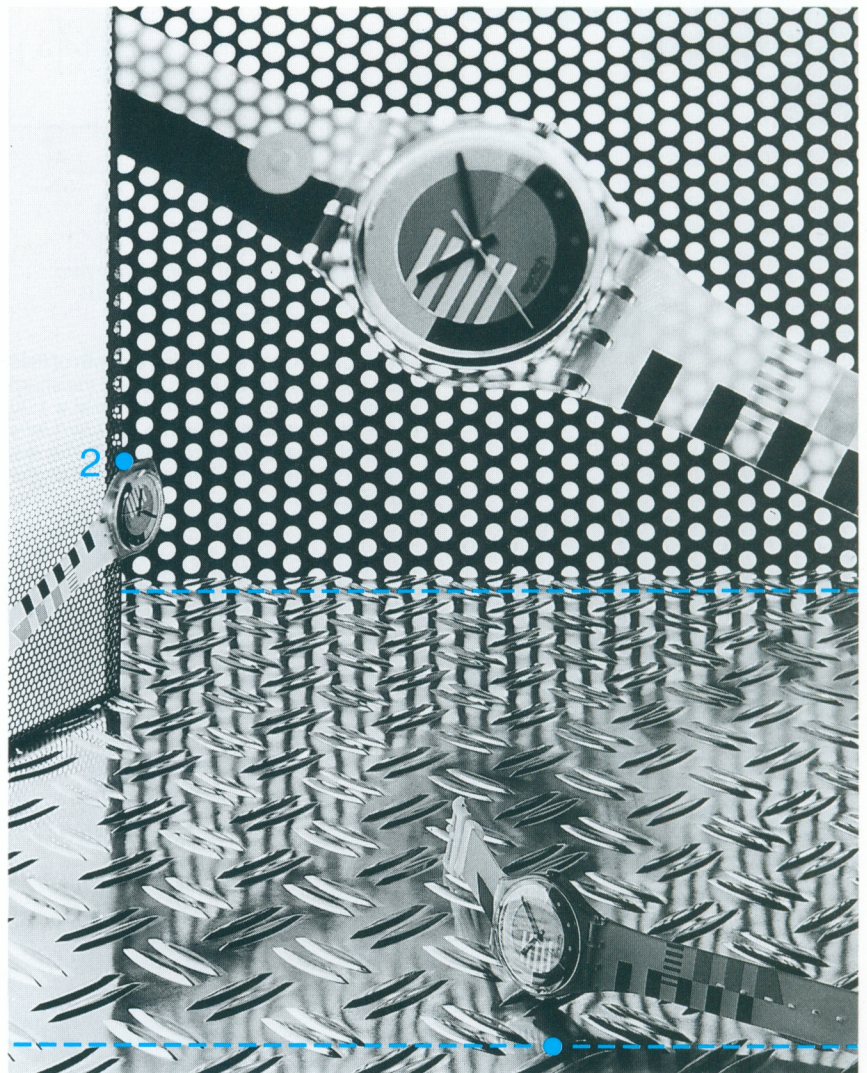
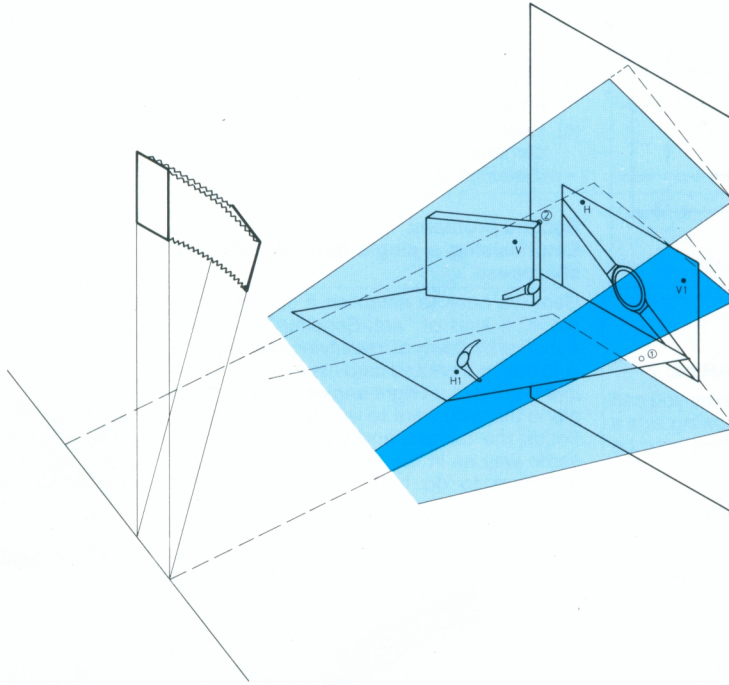


Fig. 13: Depth of field control on our example: Tilt as described for sharpness from H to H1, focus on distant limit point (1), reset scale to zero, focus on near limit point (2), stop down to working aperture, turn focusing knob back through 2 f-stop intervals. That is all. ▷

Fig. 14



**Fourth problem:
Achieving maximum overall sharpness
with precise tilts or swings and
controlled stopping down**

What is wanted is often a long way from what is feasible. A graphic artist's imaginative sketch may have little in common with the real three-dimensional world. Yet producing a best possible rendering of that three-dimensional world on the two-dimensional film is a measure of the photographer's skill. Obviously the tool – the camera – must help and not hinder. Fine-tuning maximum sharpness with tilts and stopping down depends on systematic procedure. For combinations of two-way swings and tilts with stopping

down often extends the sharp zone more than you might think by just looking at the scene. Fig. 14 illustrates this wedge of sharpness which was needed for the title picture of this INFO issue. Depending on the subject, you have to situate such a three-dimensional sharp zone more or less obliquely in space.

Systematic use of straightforward and logical camera movements can cope with many difficult problems – or show where changes in the subject setup or dropping impossible requirements can yield acceptable compromises.

Fig. 14: Maximum depth by sharpness distribution:

Use both tilt and swing for optimum location of sharp plane (H/H1, V/V1). Focus on distant (1) and near (2) limit points, set working aperture as described and turn back focus by 2 f-stop intervals.

*The result appears on the title page.
(SINARON S 210 mm, 1/30 sec., f/45)*



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