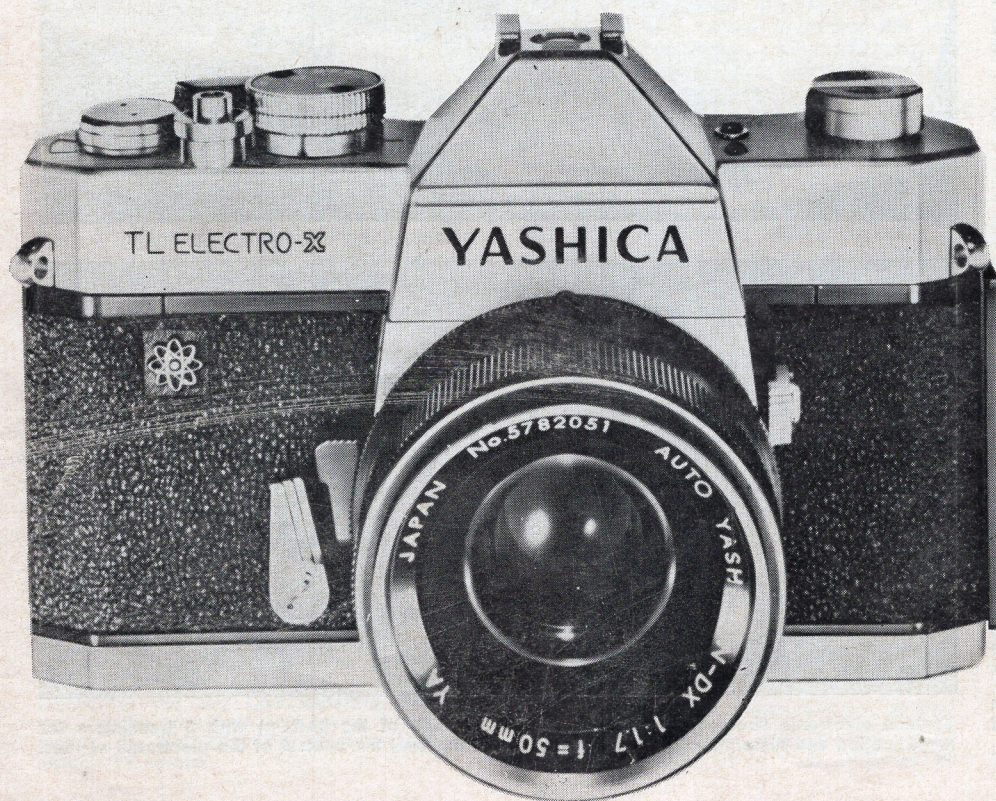


PHOT ARGUS

Supplément au « PHOT'ARGUS », n° 25 - Mars 1969

YASHICA TL ELECTRO X



a full
report
by

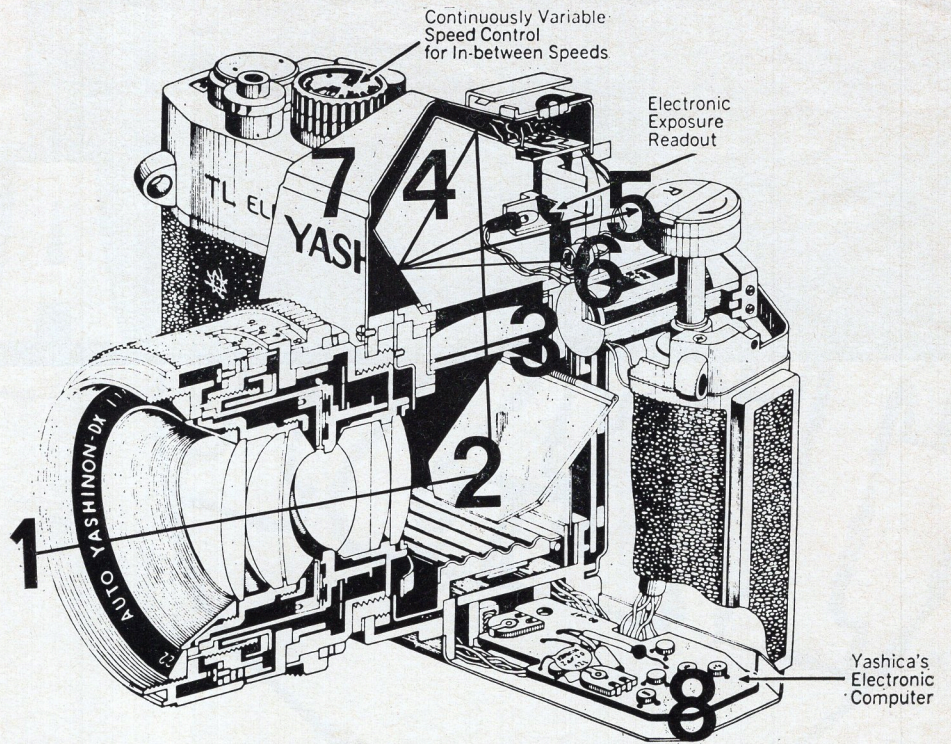
Gérard BOUHOT

The **Yashica TL Electro X** is the first large-production camera to feature an electronically controlled focal-plane shutter. **Yashica** is currently the leader in the use of electronics in photography (see the *Yashica Electro 35* test report). The **TL Electro X** camera is a single-lens, instant-return mirror reflex camera, with interchangeable lenses, electronically controlled metal focal-plane shutter, TTL metering at stopped-down aperture by integration over the entire focusing screen and "visual" indication of the setting without galvanometer (*Readout System*), semi-automatic operation by preselection of either the shutter speed or the f/stop.

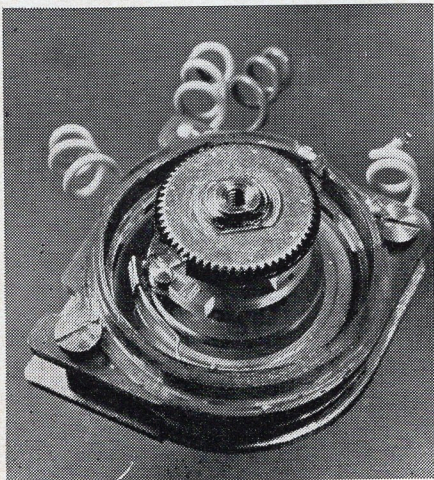
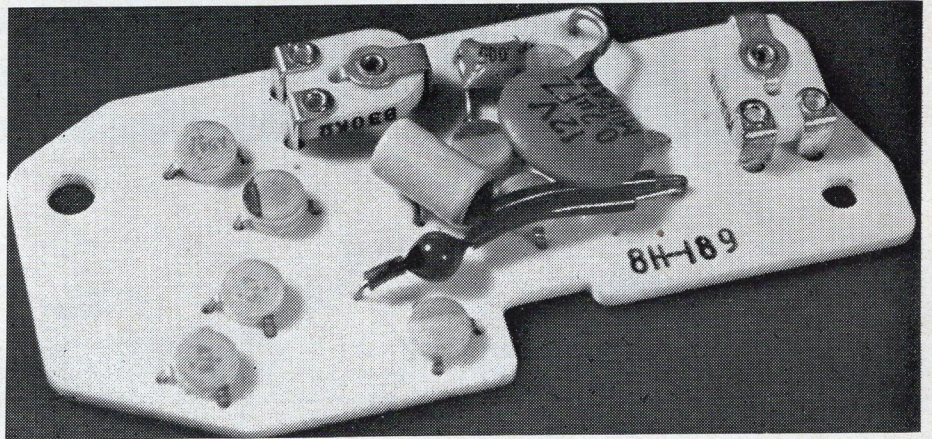
Metering system

The cells are located in the now conventional fashion on both sides of the eyepiece, looking toward the lens. They take an integrated measure over the entire focusing screen. What is less conventional and not visible is their bridge configuration. The variable resistors in the bridge are: on one hand the cells, on the other hand the "brain". This "brain" is connected to an eight transistor electronic "computer", providing the amplification and the discrimination of the metering signals and the control of the shutter. The system is the same type as the one in the *Electro 35*. However, in the *Electro 35* the f/stop is selected first; in the **TL Electro X**, it is either the shutter speed or the f/stop; furthermore, the system being in essence semi-automatic only, a display system for the values in use is necessary. It is the transistorized IC (*Integrated Circuit*) "computer" which performs most of the functions in the **Yashica TL Electro X**.

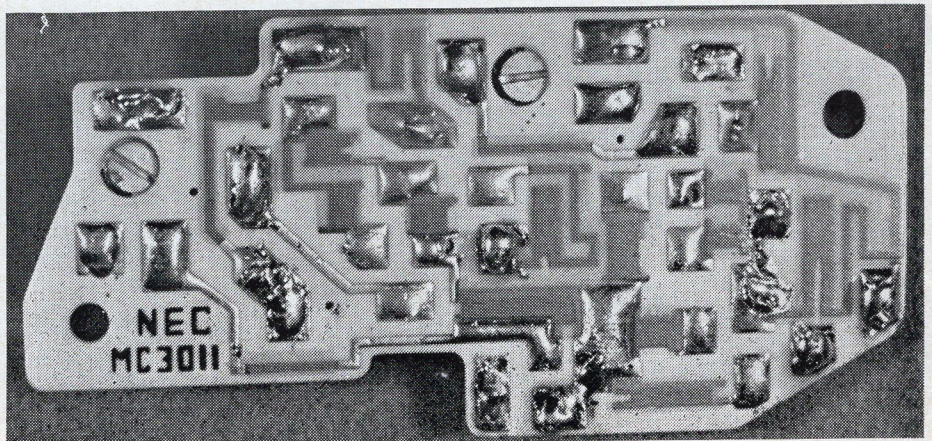
The CdS cells are activated by a 6 volts silver oxide, Eveready 544 battery, 13 mm in diameter and 25 mm long. The resistance of the CdS elements varies according to the light received. The "brain" consists of a set of concentric potentiometers. They are located under the speed selector. The resistance of the "brain" varies ac-



Internal design of the Yashica TL Electro X: 1/Incident light beam. 2/Reflection on the instant-return mirror. 3/Focusing screen. 4/Reflections in the pentaprism. 5/Principal beam coming out through the eyepiece. 6/Similar beam activating the CdS cells. 7/"Brain" located in the speed selector. 8/Yashica electronic "computer".



Potentiometer "brain" for data settings: film sensitivity/speeds (located below the speed selector).



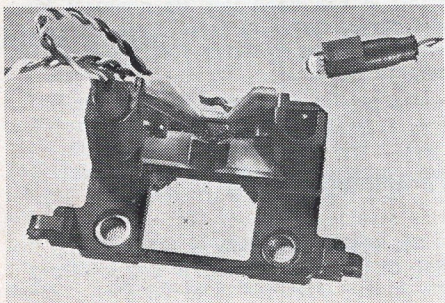
Yashica electronic "computer" (located on the left side of the bottom) with 8 transistors for amplification and discrimination of the metering signals and the control of the electronic shutter.

cording to a program selected when the sensitivity of the film in use (20 to 800 ASA, 15 to 30 DIN), and the shutter speed (2 sec to 1/1000 sec) are dialed. The information concerning the openings (1.7 to 16 with the standard lens) does not require transmission to the "brain" since the diaphragm is used manually during the metering phase, and its actual closing or opening varies the amount of light received by the sensing elements.

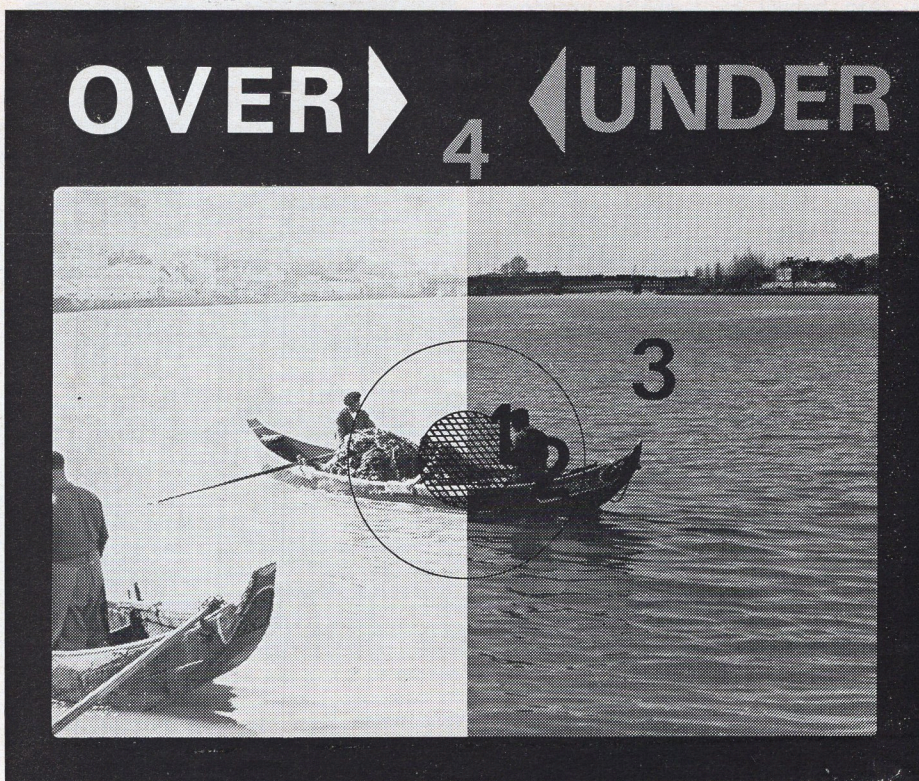
Metering phase

To take a reading: push the large plunger located on the right side of the lens mount (this location makes it somewhat difficult to reach and its movements are a little hard). The diaphragm manually closes down to the selected value (one may also use any non-automatic lens by adjusting the diaphragm). Above the viewing image, one gets a visual display, for example, on the right: UNDER (underexposure), preceded by an arrow pointing to the left. Turn either the diaphragm ring or the speed selector in the direction of the arrow while still pushing on the plunger. Keep turning until the OVER (overexposure mark) followed by an arrow appears above the viewed image, on the left. Turn backwards slightly: all marks are now switched off and the exposure setting is correct. All values of the diaphragm ring and of the speed selector including intermediate positions between stops (which is exceptional), are usable. The switching of the displays is performed accurately. The setting tolerance spreads over half a stop, which means that UNDER and OVER appear for a displacement of 1/4 of a stop on either side of the ideal setting. In the vicinity of that setting, the UNDER and OVER marks glow weakly. As soon as one moves away from the ideal, either will glow brightly. The reduction in brightness is therefore an indication of getting close to the balance.

At balance, no current flows through the sides of the bridge. This system makes the metering very independent from the battery voltage. It is the same single battery which powers the CdS elements, as well as the rice-grain size bulbs located



Mount for the two CdS sensitive elements and the two rice-grain size lamps which illuminate the UNDER/OVER displays and the associated arrows.



Focusing screen, as seen by the operator: 1/Microprisms area. 2/Frosted ring. 3/Remainder of the focusing screen completely frosted, and backed by a Fresnel lens with very fine pitch. 4/OVER display (seen in the illuminated position) and UNDER display (only suggested, for the record, as these two indications never come on simultaneously). The viewed image: 1/2 bright and 1/2 dark, is an indication of the results obtained in OVER and UNDER exposure (the correct setting, everything "off" is between the two conditions).

behind the UNDER and OVER displays, and the shutter control electromagnets.

The OVER/UNDER displays and their arrows are very visible, whatever the ambient light conditions. One has only to view with the eye well centered on the eyepiece (in case of doubt, move the eye in order to bring the centered zone just tangent with the image). When the plunger is pushed in, UNDER and OVER come on, except in the rare case when the setting is by chance properly selected (one may offset the setting slightly in order to switch on either of the displays to check that everything is in working order).

After the metering, when the plunger is released, it springs back into its rest position, and the diaphragm reopens fully. When you shoot, the diaphragm closes down to the preselected value, and reopens immediately after release.

Metering limits

At 100 ASA, the sensitivity of this system covers the range: 2 sec at f/1.7 (exposure index: 0) to 1/1000 sec at f/16 (exposure index: 18). The range remains the same for 25 ASA but decreases steadily from 100 to 800 ASA when it is only 1/4 sec at f/1.7 to 1/1000 sec at f/16. The reduced range is only indicated by a trial process as

follows. At 800 ASA in the dark and on B exposure, UNDER is on, which can be considered as correct (although an infinite duration exposure would produce a normally exposed picture). Then at the 2 sec and 1 sec settings, OVER comes on, although one is in total underexposure; at 1/2 a sec OVER comes on and switches to UNDER after one minute, which is a very long time. Then, finally, at 1/4 sec UNDER comes on and everything is back in order (if one would lighten up the subject, the displays would correctly switch to OVER). We suggest to YASHICA that range limits be indicated by simultaneous illumination of both lamps, which would be easier to understand!

At very low illumination and upper limit of the range, the response time of the system varies. From UNDER to OVER, the switching requires approximately 1/4 sec. But from OVER to UNDER, after a certain illumination of the cells, the switch between displays requires about 5 sec when one closes the diaphragm. If you begin with a very high illumination of the cells (lens wide open), you must wait at least 5 sec on each opening stop to see if the lamp brightness decreases; if it decreases after 5 sec it means that you have reached the critical setting, in fact, after 15 sec the indication of the setting switches from OVER to UNDER.

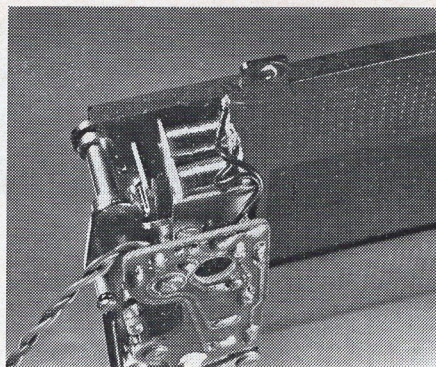
As a rule, start with too small an f/stop, corresponding to underexposure (UNDER),

you then benefit by a shorter response time, 1/4 sec; after switching to OVER, the 1/2 stop move backwards will switch everything off within 5 seconds (this is the fastest way to operate with a sensitive film in reduced light). The tolerance between the two displays at such sensitivity is no longer half a f/stop, but a whole f/stop.

In spite of the above mentioned limitations, this system has two major advantages: no galvanometer is required, and electronic components, especially resistances, replace many mechanical devices usually found in a TTL camera. No one notices the lack of a needle: one gets quickly used to reading the displays. Beginners prefer this system to a needle. Moreover, the lack of a galvanometer makes the camera more resistant to shocks, vibrations, temperature and humidity variations. It makes the camera more reliable than most cameras with TTL integrated light meter systems.

Shutter

These qualities are further enhanced by the use of a metal focal-plane shutter, the **Copal Square S Electronic**. It differs from the usual *Copal Square S* (Konica Auto Reflex T, Nikkormat,...) only in the control of the blades through miniature electromagnets (5×5 mm). This shutter will still work at —40 degrees Centigrade. One should remember that the **Copal** shutter consists of two sets of three blades moving vertically within 7.5 milliseconds, which means a speed of 3.4 m/sec. This amazing speed allows synchronization with electronic flash up to 1/90 sec and the use of any magnesium flashbulbs (including the inexpensive M and FM type, since the shutter moves during the peak illumina-



Electromagnets for the control of the 6 titanium blades of the focal-plane COPAL SQUARE S ELECTRONIC SHUTTER.

tion). It also allows a very large slit width at 1/1000 sec which ensures the repeatability as well as the uniformity of the exposures

Furthermore, this shutter has one outstanding advantage: its silence. Exposures up to 2 sec are achieved electronically, in complete silence, and the blades make less noise than the most famous rangefinder cameras. The instant-return mirror produces only minor noise (but one can keep it permanently in the raised position at the expense of through-the-lens viewing).

The shutter/mirror system remains exceptionally silent for an SLR camera.

Battery fitting and testing

Open the battery compartment located on the left of the eyepiece by turning the cover 1/4 turn in the direction of the arrow.

This is done very easily by the fingertip. Drop the battery in according to the polarity indications in the compartment and replace the cover. On the top left of the camera, push the red "Bat. Check" button. If the battery is good and correctly inserted, the green light comes on. This test is very practical. If the battery is upside down, turn it around; no harm has been done to the electronic components. Without the battery, the shutter will operate at 1/1000 sec, regardless of the speed selector position.

Loading

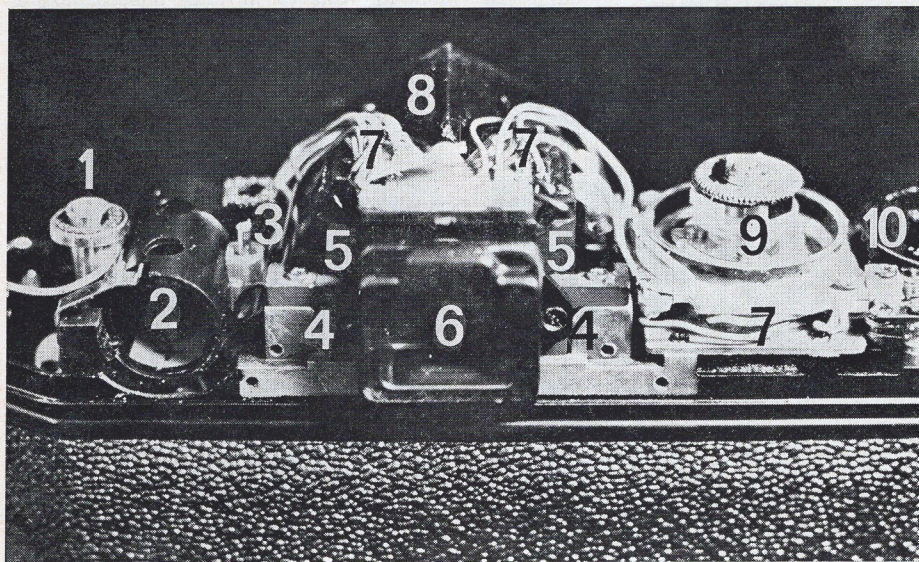
Pull the recessed, very well protected, lever located on the left side. The back springs open and can be opened 180 degrees to the right. It carries a wide pressure plate. The film plane ways are the 4 rail type (2 as film ways, 2 for pressure plate location). The counter automatically resets to S="Start" engraved in red. Lift the rewind knob, drop in the cassette, push the knob back in. Insert the leader into one of the many slots of the two-cage take-up spool. Two perforations will suffice. It is then impossible to build up a double thickness which may interfere with further film transport. Start advancing the film. Check that the teeth of the sprocket engage the film. Close the back by simple pressure. Advance the first frame—the counter advances to the first red dot. Lift the rewind crank and turn it slightly to tighten the film. Release. Advance again—the rewind knob rotation is the only sign that the film is being transported. The counter moves forward during the advance and reaches the second red dot. Release, then advance for the first frame to shoot. There is no cocking signal and the blocked advance lever is the only way to tell that the film has been transported. This loading operation is very easy.

Cocking

The cocking is very quiet. The friction-type film advance lever has a dead sector of 30 degrees. Its 135 degrees stroke must be done in a single movement. If you release it part way, it remains steady where it has been left. Its compact form and plastic covering make it easy to grasp without having to move your hand on the camera body.

Parameters setting

The speed sensitivity is set by lifting the ring of the speed selector and lowering it (25 to 800 ASA or 15 to 30 DIN). One-third intermediate values are marked by dots. The setting is limited to 800 ASA. There is no film reminder for the type of film in use. Then set either a shutter speed or diaphragm opening.



YASHICA DOCUMENT

Three quarter rear view of camera top side (top cover removed): 1. Shaft of the rewind crank. - 2. Battery compartment. - 3. Test push button. - 4. CdS cells location. - 5. Location of indicator lamps. - 6. Eyepiece. - 7. Electrical connexions. - 8. Pentaprism. - 9. Shaft of speed selector and "brain" (see text). - 10. Frame counter disc.

Linear enlargement $\times 10$ approximately

Auto Yashinon DX : $f=35$ mm, $f/2,8$ - No 382878

Center

Edge

2.8

2.8

8

8

Linear enlargement $\times 10$ approximately

Auto Yashinon DX: $f=50$ mm, $f/1,7$ - No. 5790400

Center

Edge

1.7

1.7

8

8

Speed setting

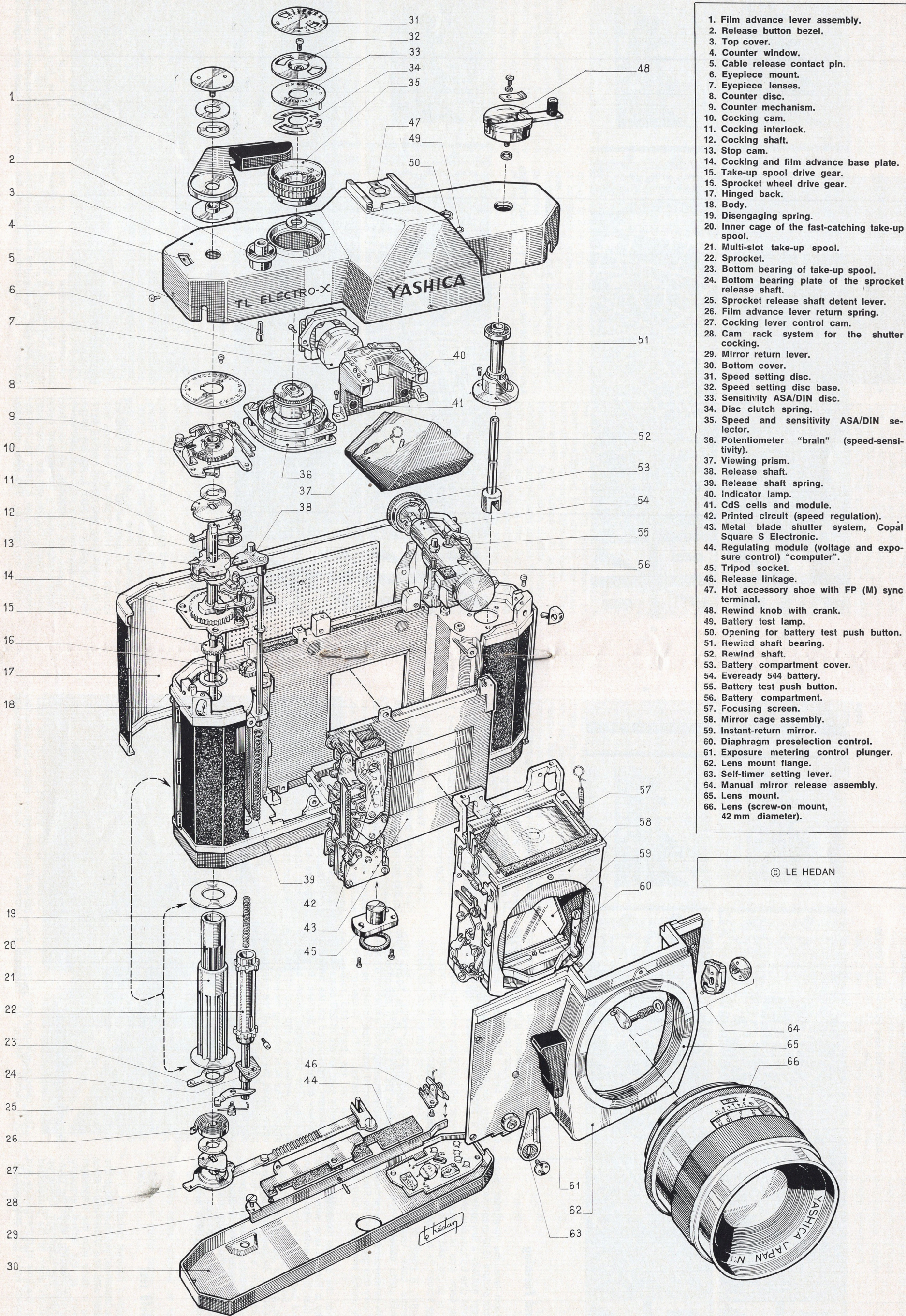
The speed selector can be turned either direction in a continuous movement. There is no stop between B exposure and $1/1000$. The selector does not rotate during the release and features 12 standard indexed speeds from $1/1000$ sec to 2 seconds and B exposure (two seconds is marked by a line, and not the figure 2, as this speed is only approximately accurate). Between $1/1000$ sec and 2 seconds, all the intermediate values outside the indexed ones may be used. Do not use the space between B and 2 sec as it does not correspond to any setting. The very readable

figures are displayed in front of a line engraved on the left of the selector. Do not touch the metal blades of the shutter to avoid any deformation. A plastic finger protects the blades at the time of delivery.

Exposure metering

According to the subject, select the shutter speed or the f /stop (shutter speed for moving subjects, f /stop for depth-of-field control). If after the selection of one parameter, the adjustment range of the

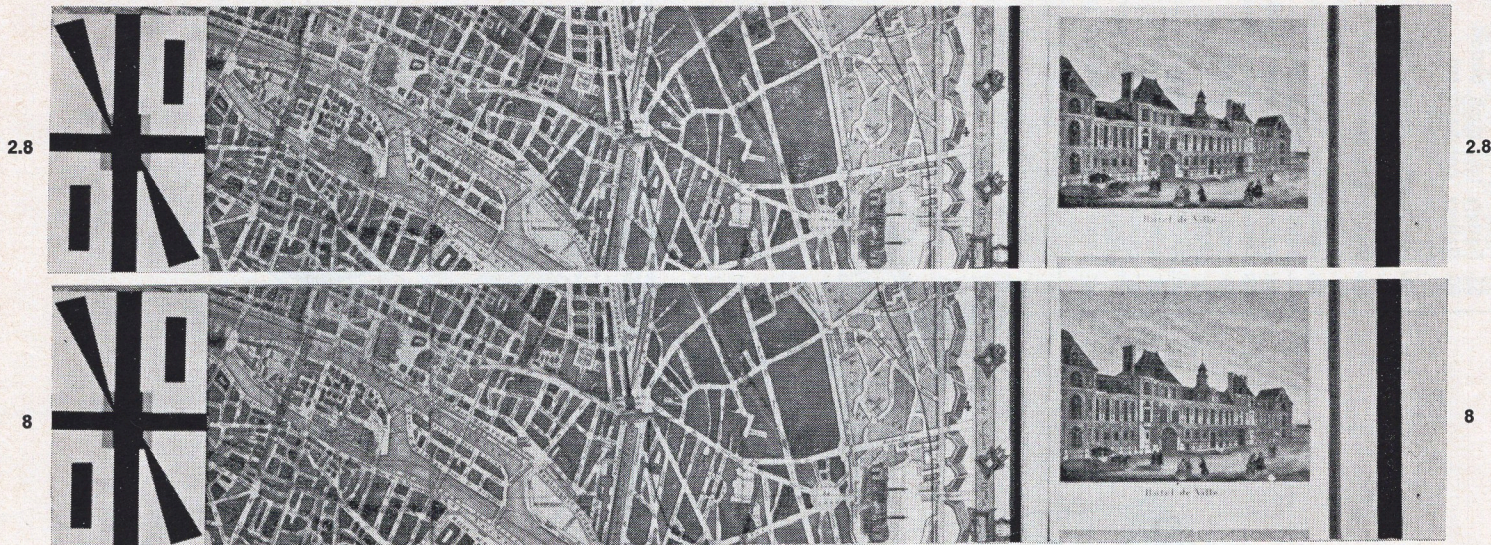
other parameter does not permit compensating for OVER or UNDER, one must change the value pre-selected. Since the TTL metering occurs through total integration of the viewing screen area, it is recommended in back lighting to take the reading at close distance; or, if you cannot get close enough, to open up by one f /stop and disregard the OVER indication which comes on. You may also achieve a selection metering from the shooting location by using telelenses of a much longer focal length than the focal length of the lens to be used for the actual shooting. The cells seem to be well protected from any unwanted introduction of back stray light.



© LE HEDAN

Center

Edge



Viewing and Focusing

With a 50 mm lens, the viewfinder gives a near life-size picture (0.87 magnification). This viewfinder exhibits a few unimportant side reflections (the bottom one shows the two cells on each side of the eyepiece). The picture is bright and distortion free. The focusing screen is as follows:

- in its center, a patch of microprisms with triangle base, usable with the 50 mm lens up to about $f/5.6$;
- this patch is surrounded by a frosted ring with very fine grain and no Fresnel lens, very useful when using long tele-lenses;
- the rest of the screen is frosted and backed by a Fresnel lens with so fine a pitch that it is hardly visible, even at $f/16$.

The prism cannot be removed. The OVER and UNDER displays appear above the viewed image in a black area. In the top of the eyepiece a trapeze opening permits the viewing of these indications. Only the corners of the image are partly hidden to people wearing glasses. There is no eyepiece correcting lens available.

Depth-of-field test

During the metering, you may judge the depth of field with the viewfinder, since the metering is done with the diaphragm stopped down at the actual exposure value. After the metering, when the plunger is released, the diaphragm opens up fully, and closes down to the preselected value only at the time of the exposure and afterwards opens again fully automatically.

A slide control located below the lens barrel permits switching from automatic to manual diaphragm in order to preview the depth of field. This feature is also necessary for the use of extension tubes or of a photomacrography bellows.

Standard lens

The standard lens is the 50 mm **Auto Yashinon DX** $f/1.7$ with 6 components in 5 groups focusing from infinity to 0.5 meter (white marks) and from infinity to 1.7 feet (yellow marks). The focusing ring is located on the front and rotates very smoothly over an arc of 260 degrees. The diaphragm ring located on the back rotates over an arc of 45 degrees, from $f/1.7$ to $f/16$. The diaphragm values appear in a small window on the top of the lens mount. The faint indexing for each normal value allows the use of all the intermediate positions. Between the distance and the diaphragm scales, you will find the depth-of-field scale and infrared mark. The front of the lens mount is threaded to take filters or sunshades with a diameter of 52 mm. You may also use a 54 mm slide-on sunshade. When transporting the lens the vulnerable diaphragm plunger must be protected by a cap.

Another standard lens available is the 50 mm **Auto Yashinon DX** $f/1.4$ to $f/16$ with 8 components in 5 groups, focusing from infinity to 0.5 meter (white marks) and from infinity to 1.7 feet (yellow marks).

Interchangeable lenses

This camera will take all 42 mm screw-mount lenses. Among the **Yashinon DX**

Automatic Lenses worth being mentioned, are:

- the 28 and 35 mm $f/2.8$ wide-angles;
- the 100 and 135 mm $f/2.8$, 200 mm $f/4$, 300 mm $f/5.6$, 500 mm $f/5$ reflex Yashinon DX telephotos;
- the automatic 80 to 160 mm $f/4$ and 75 to 230 mm $f/4.5$ zooms.

The range of **Yashica** lenses with manual diaphragm preselection goes from 28 to 800 mm and includes two zooms. Let us also mention a manual diaphragm lens, the 21 mm **Yashinon DX** $f/3.3$, with a 92 degree field of view, to be used with an auxiliary viewfinder and with the mirror up. Some of these lenses have a built-in sliding sunshade. All have an anti-reflection dichroic treatment. Their control rings are all located in the same order. 42 mm screw thread lenses from other manufacturers exist in great numbers.

Manual Mirror lifting

The mirror is conventionally hinged, but it can be raised or lowered at will by turning a knob located on the left of the lens mount. Light baffles on the back of the mirror and at the bottom of its recess minimize stray reflections.

Self-timer

The self-timer, variable from 1.5 to 8 seconds in accordance with the cocking angle of from 15 to 80 degrees, can be cocked before or after the shutter is cocked. Once cocked, it must be used since the release is done through the normal release button. Its conventional

mechanical movement makes the usual sound.

Time exposure

The release button is extremely smooth, its stroke is 5 mm. It is threaded in order to accept a cable release. The use of a lockable cable release permits "T" time exposure shots. The tripod socket, with Kodak pitch is located at the bottom of the body, in the axis of the lens, and close to the center of gravity. Speeds at which a tripod is advisable are engraved in green, 2 seconds to 1/15 sec and carry also the designation "slow".

Synchronization

The synchronization speed for electronic flash is marked on the selector by a red X. The exposure time is 1/90 second. The X synchronization terminal, of 3 mm standard diameter, is located on the top of the left side. On the X terminal you can use the class M and MF (AG) magnesium flashbulbs from B to 1/30 second. Normally you would use magnesium bulbs in a direct contact flash fitted in the "hot" accessory shoe on top of the prism housing. With the shoe contact, the class M bulbs are synchronized from B to 1/60, the MF (AG) class bulbs from B to 1/500, and the FP class bulbs from B to 1/1000.

Rewind

The frame numbers 20 and 36 are marked in red on the counter. Beyond 36, the

counter slips on 37. At the end of the film, the film advance lever is blocked during this movement. Push the rewind button located on the right side of the base; it stays in and will only spring back out at the next cocking. Unfold the very well designed metal rewind crank, wind it in the direction of the arrow and remove the cassette.

Camera Body

The nice looking and well-designed body is 151 mm wide, 97 mm high, 94 mm deep and weighs 965 grams when fitted with the 50 mm f/1.7 lens. It certainly bears a family resemblance to other *Yashica* models. The serial number is engraved on the top right of the body, and the film plane reference is behind the speed selector. Two eyelets located on the tilted sides of the front permit the attachment of a carrying strap, delivered with the camera together with the eveready black semi-soft case. The packaging is pleasing and the instruction manual luxuriously printed.

Accessories

Many accessories are available, common to the preceding *Yashica TL* models:

- Sunshades of the sliding and the screw-on type, filters and accessory close up lenses with two components in one group (55 and 52 mm in diameter).
- Set of 4 screw-on extension tubes without automatic diaphragm control (the lenses are then used manually).

- Monorail bellows with camera and lens orientation settings.
- Microscope adapter.
- Angle view-finder.

Although it is less revolutionary than the *Electro 35*, which is an all-time photographic star, the **TL Electro X** is a very interesting camera that presages the 1970/75 generation of cameras.

INDICATED SPEEDS	MEASURED SPEEDS
2	2
1	1.1
1/2	1/2.3
1/4	1/4.5
1/8	1/7.8
1/15	1/12
1/30	1/37
1/60	1/50
1/125	1/111
1/250	1/200
1/500	1/416
1/1000	1/833
Camera tested: No. 80 900 826	



Use of the focal length variation of the 75 to 230 mm ($\times 3$) *Yashica* f/4.5 zoom, during a 3 second long exposure.

Bad features :

- Light meter range limited for very high speed at low light levels. Very slow response near the limit and decreased accuracy (see text).
- Focusing screen not entirely visible by people wearing glasses. No eyepiece correcting lenses available.
- Light meter range limits poorly indicated.
- Battery rather unusual up to now.
- Exposure meter range limited at ASA 800.
- TTL metering through integration over the entire focusing screen area must be compensated under backlight conditions.
- TTL metering with stopped-down diaphragm: viewing sometimes dark, be careful for stray light interference.
- Exposure meter plunger sometimes awkward to use.

- No cocking signal.
- Cocking must be done in one stroke.
- No film advance signal.
- No film reminder disc of the type of film in use.
- Self-timer must be used after being cocked.
- Preselection linkage plungers on rear of lenses vulnerable when no rear lens cap is fitted.

Good features :

- Electronic "sturdiness" of the exposure system. Bridge configuration.
- Readout display of the exposure setting UNDER/OVER.

- Bright viewed image, aberration free, 0.87 magnification with the 50 mm lens. Easy focusing. Excellent focusing screen.
- Modern metal shutter with electronic control. Synchronization for electronic flash at 1/90 sec. Ability to raise the instant return mirror manually.
- TTL metering with stopped-down diaphragm, enabling the use of most 42 mm screw-on interchangeable lenses.
- Semi-automatic metering with previous selection of speed or diaphragm.
- TTL metering with stopped-down diaphragm: depth of field directly visible, all lenses are usable. UNDER and OVER exposure indications in the viewfinder.
- Speed selector with continuous setting rotation, not turning upon release. All intermediate speeds usable.

- Film advance and release noise very low.
- Short film advance stroke. Very accessible lever.
- Very smooth release button.
- Depth of field easy to check.
- Easy battery check.
- Fast and easy loading.
- Lenses can be interchanged with one hand.
- Back opening lever well protected.
- Nice appearance. Serial number on the camera body. Strap eyelets. Film reference plane. Standard X synchronization terminal and FP (M) synchronized "hot" accessory shoe for all magnesium bulbs.
- Automatic counter reset and rewind button return. Back opening to 180 degrees. Rewind crank.

SOME TIPS ABOUT OUR BENCH TESTS

Orientation :

During the descriptive parts, the cameras are assumed to be in a horizontal shooting position. The lens is directed towards the subject, and the back of the camera towards the operator. The indications top/bottom, right/left are given relative to such a position.

Dimensions, weights :

The measurements are overall dimensions, the camera being fitted with its standard lens, focused on infinity, and without bag. The weight is given in the same conditions, the camera not being loaded. When special measurements are given, their conditions are clearly expressed.

Shutter speed check :

These checks are made with an electronic shutter tester providing an accuracy better than 0.2%. The measurements are taken 3 to 5 times for the same setting if they are consistent, and at least 10 times if the results are scattered, so that a significant average value is obtained. If the shutter blinds translation speed varies from one side to the other, only the average exposure value is given. The table of measured speeds is therefore a faithful indication of the average results of the camera under test. In order to make the comparison easier, the measurements are expressed in terms of fractions and not in milliseconds.

Lenses tests :

Lenses tests based on linear patterns give variable results according to the light-contrast of the grid, and this method

has been abandoned. Comparative enlargements are presented instead.

The shots are taken with a general purpose high resolution film (Kodak Panatomic X), processed in a fine grain developer (Kodak Microdol X) by a professional processing laboratory (which gives results of a constant reproducible quality). Such conditions are available to the demanding amateur: they are not a special treatment.

The basic test pattern is an old 18th century Paris map which gives a good indication of the sharpness through the combination of the lens intrinsic definition with the actual focusing done through the viewing system of the camera itself. The focusing is done at full aperture on the center part of the pattern. When the focusing is not the same on the different zones of the focusing screen, the zone used is the one giving the most accurate results: the frosted ring. The center of the pattern is first aligned with the center of the focusing screen. The outer viewing frame is then more or less superimposed over the

black outline of the pattern. The picture taken gives the respective coverages of the viewfinder and the shooting windows. The black lines on the sides and at the bottom of the picture are indicative of the distortion. As one wants to compare the definition obtained through different lenses, the pattern is shot in such a way as to cover always the entire area of the film. The shooting distances are adjusted accordingly, and vary with the focal length of the lens under test.

The pattern is illuminated with two 1000 watts quartz halogen flood lights. Its reflection coefficient is very close to the standard value of 18%. The exposure times are approximately 1/1000 at f/1.4, 1/30 at f/8, and 1/8 at f/16. Three shots are made for each aperture value selected (normal speed; twice the speed, half the speed) in order to make the best use of the film capabilities. The exposures are taken on a tripod, but this tripod is only the sturdy amateur type and not the studio type. A cable release is always used.

The pictures are enlarged with a high quality equipment, on paper of the same grade for all pictures (in order to show up the contrast due to the picture-taking lens).

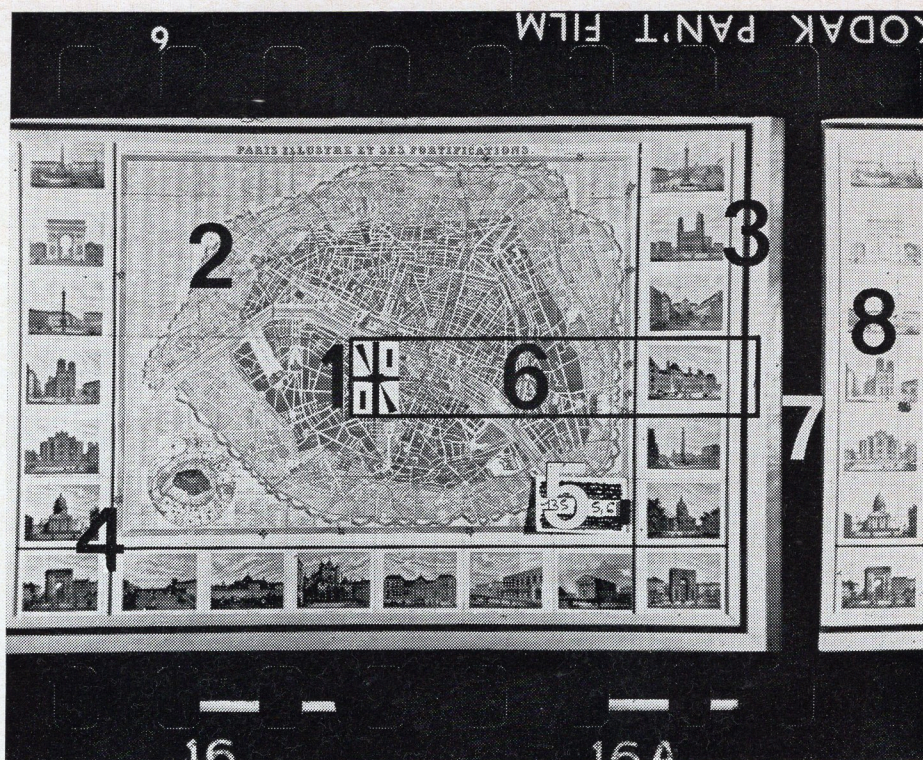
Sometimes a full enlargement of the pattern is enclosed to show up the distortion. In general, one only features identical strips ranging from the center to the edge, with an enlargement ratio of 10 approximately. They provide sharpness comparison:

- at full aperture;
- at the aperture immediately next to the maximum (diaphragm stopped down 1 stop relatively to full aperture);
- at f/8, a very widely used aperture value for outdoor shooting, and corresponding to the maximum definition of most lenses.

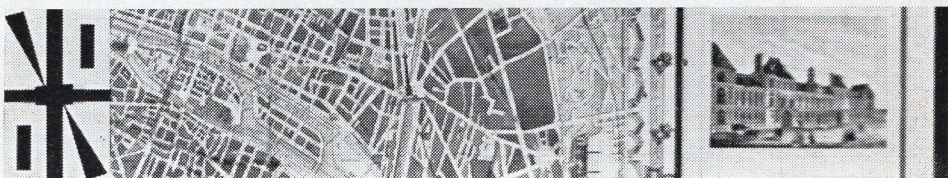
On occasions, supplementary strips are featured:

- at f/16 for photomacrography lenses;
- in fully off-centered position for lenses with tilting capabilities;
- with a previously raised mirror in order to compare the shutter induced vibrations and those due to the combination shutter/mirror.

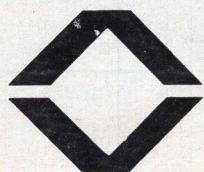
When many test trips are featured, they are printed in half width only.



Example of test pattern picture made with a camera giving many defects: 1. Set up to facilitate focusing and enable the centering of the pattern on the focusing screen. - 2. Complete pattern for sharpness evaluation. - 3. Black frame for judging the centering and the respective fields covered by the viewfinder and by the shooting window. - 4. Black lines giving indication on distortion when the frame under 3 is partially blanked during shooting (when viewfinder and shooting window coverage differ appreciably). - 5. Reference of the type of equipment and of the aperture used. - 6. Area featured for comparison. - 7. Outline of the shooting window. - 8. One of the pictures shot at the next speeds than the nominal one (here slower), enabling the best use to be made of the film qualities (see text).



Area normally featured in the lenses tests (for different apertures) and corresponding to area 6 of the complete pattern picture.



National Camera, Inc.
Englewood, Colorado, 80110

VM Éditions, 3, place Malesherbes, 75 - PARIS (17^e). Phone: 227-25-44.

US Edition published in France by VM Éditions. Abstract from « PHOT'ARGUS ».

Copyright © 1969 by VM Éditions (PARIS). Chief Editor: Robert MONNIER.

All rights reserved

including the right of reproduction in whole or in part in any form (with the exception of the right to use short quotations for review of book).

Made and Printed in France by :
Busson Ltd., PARIS.

Dépôt légal : 1969/4^e trim., n° 5 001.