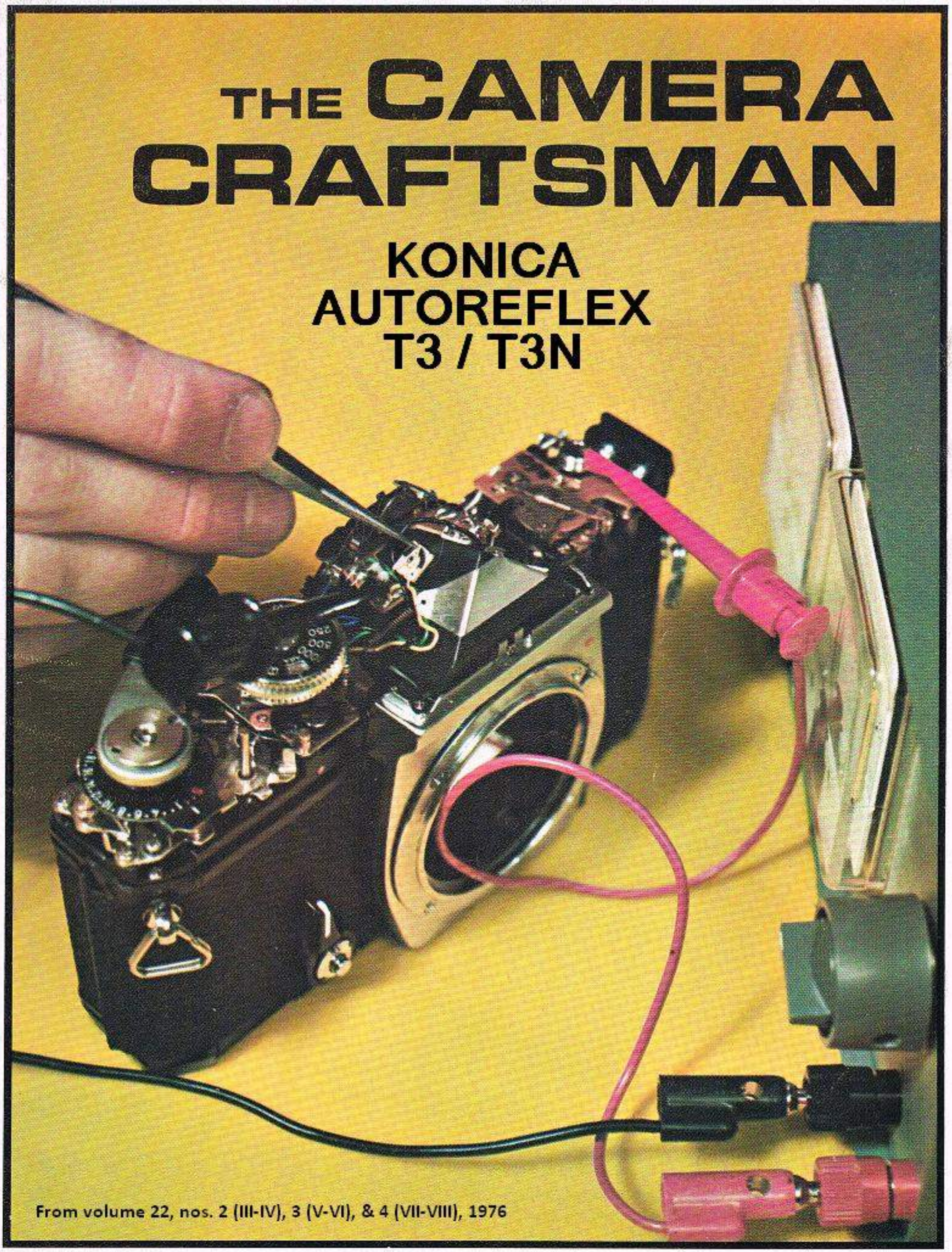
THE CAMERA CRAFTSMAN

KONICA AUTOREFLEX T3 / T3N



From volume 22, nos. 2 (III-IV), 3 (V-VI), & 4 (VII-VIII), 1976

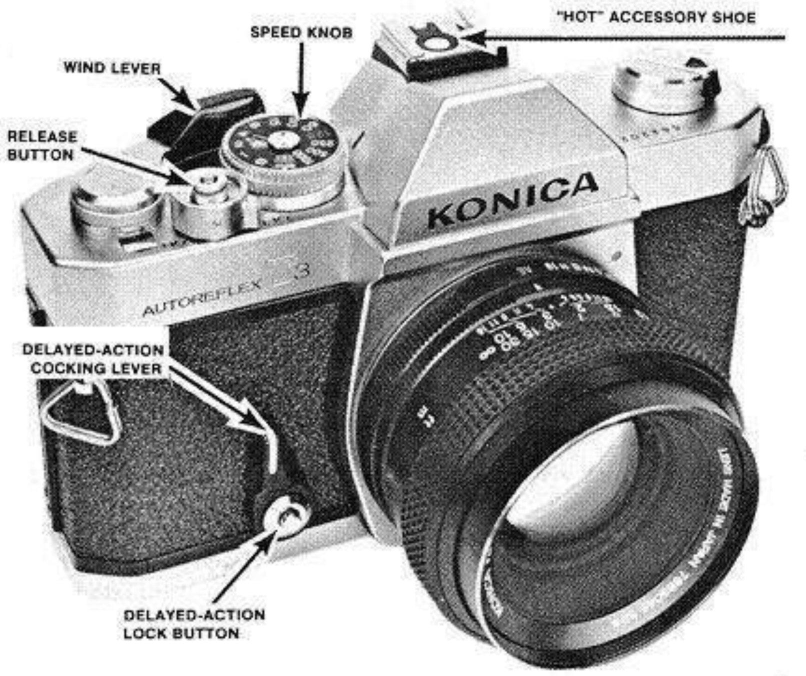


Figure 1

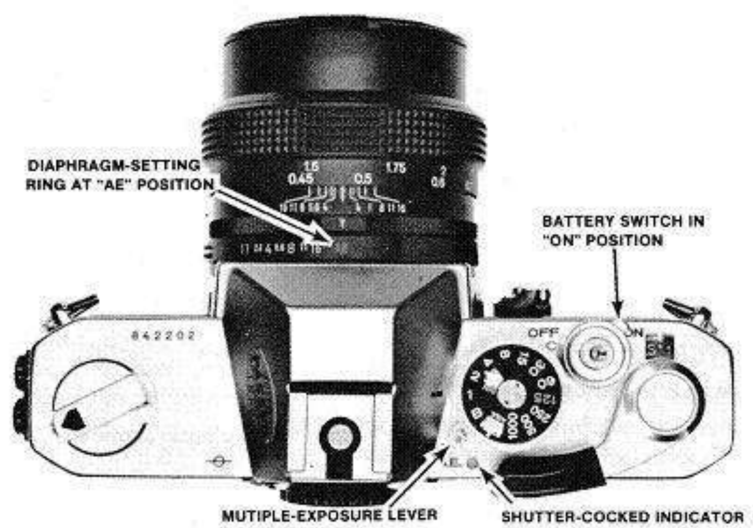


Figure 2

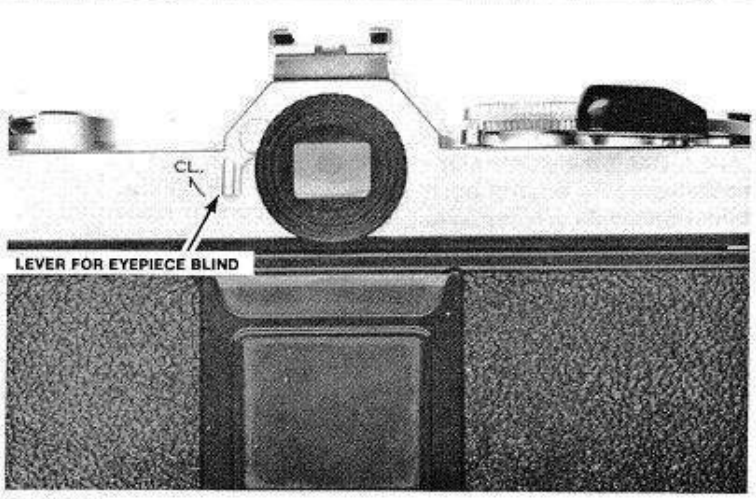


Figure 3

by Lawrence C. Lyells

KONICA

PART 1

Way back in 1964, Konica introduced its revolutionary Autoreflex — a fully automatic SLR using the Copal Square shutter. As the first automatic SLR on the market, the Autoreflex proved to be a step ahead of the field. And it soared to wildfire popularity. Yet Konica, not content to rest on its laurels, has continued to improve and refine the line.

Konica's latest version is the Autoreflex N-T3. For the most part, the N-T3's an improved version of the familiar Autoreflex T. There's still the same automatic system — a trap-needle design that automatically controls the diaphragm opening. Konica also stuck with a mechanical-linkage system, tying things together with a coupling cord.

You won't find the letter "N" anywhere on the N-T3. But you can distinguish the N-T3 from its immediate predecessor, the T3, by the features. For one thing, the N-T3 has a built-in "hot" accessory shoe — not a removable shoe as in the T3. Konica's also added an easy-to-see white index on the delayed-action cocking lever. And the multiple-exposure lever, Fig. 2, is bigger — a lot easier to use.

Having multiple-exposure capability is a Konica feature we especially like. Just push the multiple-exposure lever from left to right. That disengages the film-advancing mechanism. So, as you're holding the multiple-exposure lever, you can cock the shutter without advancing the film. And you can shoot as many pictures as you want on one frame.

Another handy feature, new on the N-T3, is the blind for the eyepiece. Close the eyepiece blind by turning the lever at the back of the camera, Fig. 3. Now, light can't sneak through the eyepiece and get to the focusing screen.

Normally, your eye covers the eyepiece. That keeps light from spilling

The Camera Craftsman acknowledges with thanks the cooperation of the Konica Camera Company, a division of Berkey Photo, Inc., in providing the camera used for our study.

AUTOREFLEX T3

onto the focusing screen and affecting the exposure. Since the exposure meter takes its reading from the focusing screen, light coming through the eyelens can make quite a difference — it doesn't affect the exposure to the film, but it does affect the reading.

So the eyepiece blind is good for those picture-taking situations when your eye isn't covering the eyelens (like self-timer shots). And it's a special bonus to the repair technician. With most automatic cameras, you have to somehow cover the eyelens while you're testing the automatic system. But with the N-T3, you just have to close the eyepiece blind.

Operation of the Autoreflex N-T3

Talk about a full-information viewfinder — the Konica N-T3 shows you just about everything on the focusing screen, Fig. 4. Fig. 4 illustrates the standard focusing screen. But you can also get an optional focusing screen with a split-image focusing aid rather than the microprism cluster. Changing the focusing screen is a job for the technician, not for the camera owner. So, when we get into the disassembly, we'll describe the procedure.

To turn on the exposure meter, move the battery switch clockwise, Fig. 2. Normally, you can leave the battery switch in the "off" position to preserve battery life. The batteries, two 1.35 volt PX-675 mercury cells, sit in the compartment at the bottom of the camera.

You don't even have to worry about forgetting to turn the battery switch. The battery switch turns on automatically as you advance the wind lever. Besides, in the "off" position, the battery switch blocks the release button.

With the battery switch turned on, the needle moves along the diaphragm scale, Fig. 4. That shows you what f/stop you're going to get automatically. What if you don't like that f/stop? Just change your shutter speed until the needle points to the aperture you want.

Set the diaphragm-setting ring on "AE" ("EE" with some lenses) for automatic operation, Fig. 2. For manual operation, depress the diaphragm-setting ring lock button, Fig. 5. And turn the diaphragm-setting ring to a manual f/stop calibration. Now, the letter "M" (manual) appears in the upper right-hand corner of the focusing screen — more information to make sure your eye sees what's going on.

The focusing screen also shows you the metering limits. A movable red vane couples to the linkage system, Fig. 4. At extreme film-speed/shutter-speed combinations, the metering-limits vane moves down. So it covers part of the diaphragm scale, indicating a shortened metering range. At its uppermost position, the metering-limits vane tells you the maximum aperture of the lens in use.

Another feature we like about the camera is the memory lock. You don't have to hold down a separate button to lock the exposure reading. Just partially depress the release button. That locks the exposure-meter needle at the f/stop indication.

Other convenience features include the shutter-cocked indicator, Fig. 2. It gives you a green signal when the shutter's cocked, a red signal when the shutter's released. And, to make sure you have all the information you need, there's even a special bracket on the camera back to hold the film-carton tab.

But there's one feature that may leave you open to error the first time you adjust a Konica SLR — the battery-test feature. Checking the batteries is a rather involved and unusual procedure. First, you have to **remove the lens**. Then, you must set the proper combination of settings — **1/125 second and ASA 100** (lift and turn the speed knob to set the film speed). When you push the battery switch counterclockwise to the "C" (check) position, the needle should move into

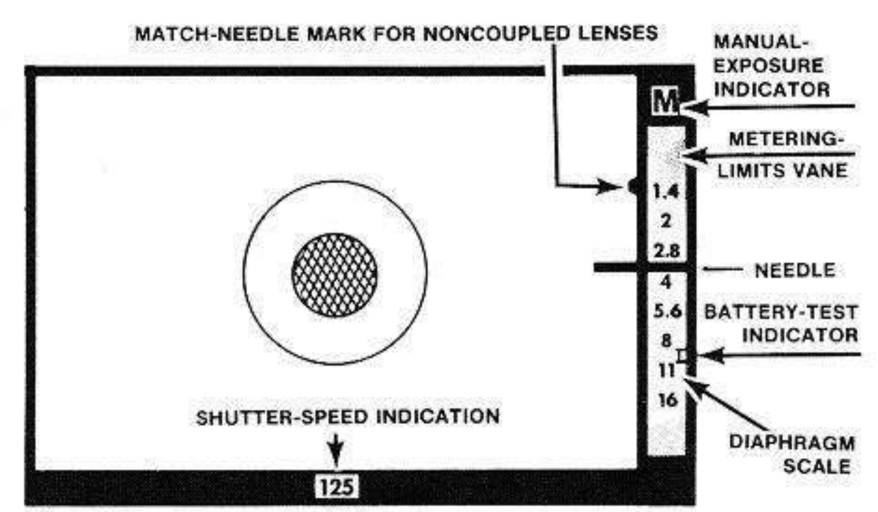


Figure 4

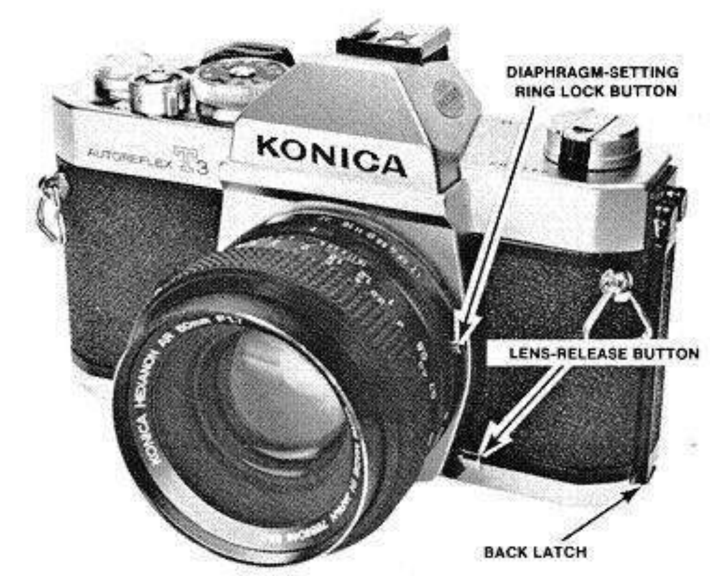


Figure 5

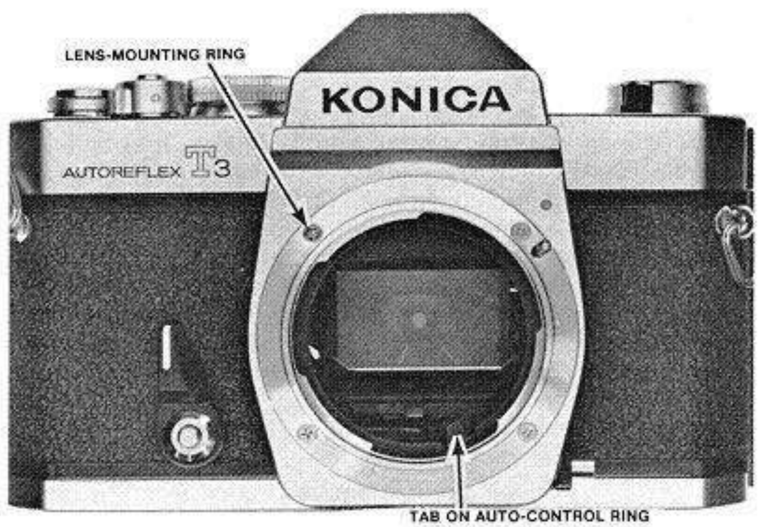
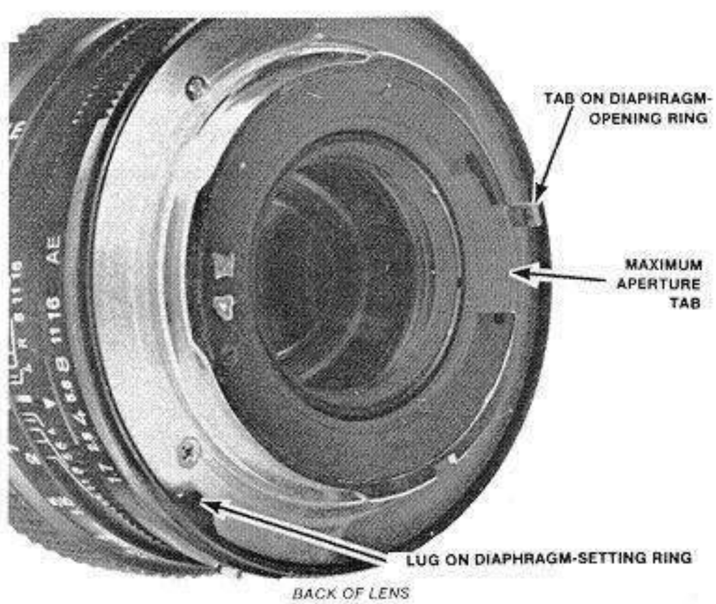


Figure 6



BACK OF LENS

Figure 7

the battery-test indicator, Fig. 4.

Unless you're a Konica owner, that strange combination may be tough to remember. And it has to be right when you're adjusting the battery-test circuit. The N-T3 has a reminder sticker on the bottom plate. Not all models have the sticker. But they do calibrate the battery-test settings in red (ASA 100 and 1/125 second). So you only have to remember to remove the lens and select the red settings.

There's another feature that may be disturbing the first time you work on a Konica T3. That's the depth-of-field preview. Pushing the delayed-action cocking lever toward the lens closes the diaphragm to the taking aperture, Canon fashion. If you're set to a manual aperture, the diaphragm stops down to the f/stop you've selected. On automatic operation, the diaphragm closes to the f/stop indicated by the needle. There's only one problem — it really takes a hard push to actuate the depth-of-field preview.

Turning the delayed-action cocking lever in the other direction tensions the self timer. First, depress the lock button at the front of the delayed action cocking lever, Fig. 1. Then, turn the delayed-action cocking lever away from the lens. As with other cameras using Copal Square shutters, the delayed-action escapement releases when you push the camera's release button. You can't override the self timer.

Lens Coupling System

You can use all of the Konica Hexanon and Hexar lenses with the N-T3 — both in the automatic and in the manual modes. To remove the lens from its bayonet mount, first push the lens-release button, Fig. 5. Then, turn the lens in a counterclockwise direction. When you replace the lens, just align the red dots — one on the side of the lens and one on the front decorator plate of the camera. Turn the lens clockwise to lock it in place.

Removing the lens gets you to a couple of basic adjustments. The mirror-angle adjustment's the stop screw under the lower left-hand corner of the mirror. To adjust the flange-focal distance, remove the lens-mounting ring. You'll then find spacer washers under the screw holes. The washers control the parallelism and the flange-focal distance.

Our evaluation camera measured 40.52mm from the front surface of the lens-mounting ring to the film-guide rails. Konica specifies a flange-focal distance of 40.68mm in the T and 40.66mm in the T3. But these measurements are to the pressure-plate rails.

Naturally, you must hold open the shutter when measuring the flange-focal distance. But you don't need a locking cable release. Just hold open the shutter on "bulb." Then, turn the battery switch to the "off" position. That locks down the release button, keeping the shutter open.

With the lens removed, you can see the lens-to-camera coupling system, Fig. 6. Notice that the lens, Fig. 7, now stops down to the smallest aperture (when set to "AE"). But normally the tab on the diaphragm-opening ring, Fig. 7, sits against the tab of the camera's **auto-control ring**, Fig. 6.

So the auto-control ring holds the diaphragm-opening ring all the way clockwise. In turn, the diaphragm-opening ring holds the spring-loaded diaphragm fully open. The auto-control ring can't as yet turn — it's held by the camera's **diaphragm-closing lever**, Fig. 8.

But as the mirror rises, the diaphragm-closing lever swings from right to left, Fig. 9. Now, the spring-loaded auto-control ring spins in a clockwise direction. The diaphragm-opening ring in the lens also turns clockwise, allowing the spring-loaded diaphragm to close.

How far the diaphragm can close depends on the position of the exposure-meter needle. The trap-needle system couples to the auto-control ring. If the exposure meter wants the smallest f/stop, the auto-control ring turns all the way clockwise, Fig. 9. But if the exposure meter wants a larger f/stop, the trap-needle linkage stops the rotation of the auto-control ring. The sooner the auto-control ring stops, the larger the resulting aperture.

After the exposure, the mirror returns to the viewing position. Then, the diaphragm-closing lever drives the auto-control ring in a counterclockwise direction. And the auto-control ring reopens the diaphragm to the largest aperture.

The linkage still goes through all the motions at the manual f/stop settings. But now, the spring-loaded diaphragm stops down to the f/stop you've selected. What about the auto-control ring? The auto-control ring always turns its full distance — nothing arrests the rotation.

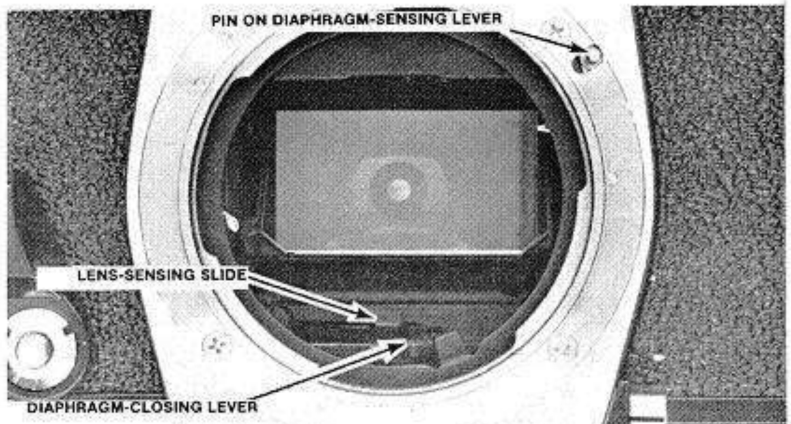


Figure 8

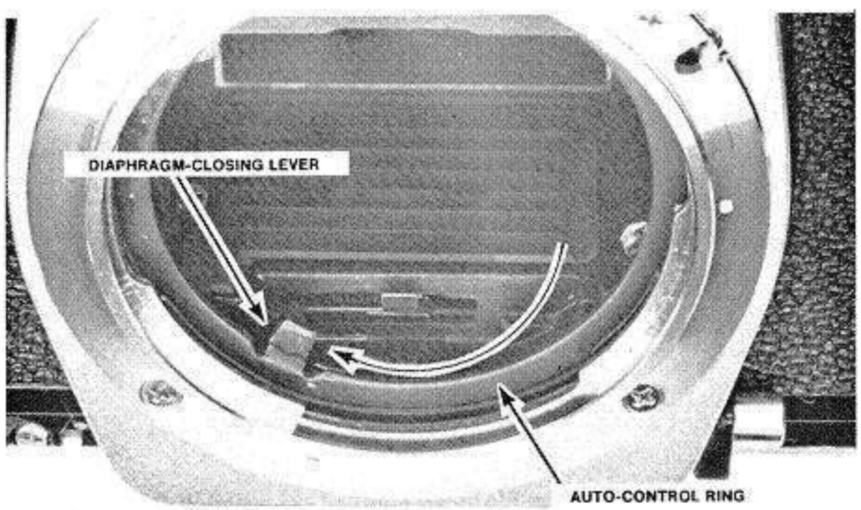


Figure 9

You can observe the manual action by watching the auto-control ring as you release the shutter. Notice that the auto-control ring turns all the way clockwise, Fig. 9. There's no lens on the camera. So the exposure-meter system thinks the lens is set to a manual f/stop.

It's the lens that tells the exposure-meter system when you're set at a manual f/stop. At "AE," a lug on the diaphragm-setting ring, Fig. 7, comes against the pin extending through the lens-mounting ring, Fig. 8. That pulls the pin toward the lens.

The pin is on the **diaphragm-sensing lever**. That's the lever responsible for programming the automatic mode. When the diaphragm-sensing lever moves down, it couples the auto-control ring to the trap-needle linkage. So the auto-control ring can only rotate to the position indicated by the exposure-meter needle.

Besides programming the exposure-meter linkage, the diaphragm-sensing lever controls the focusing-screen mask (the mask that covers the "M" at the automatic setting). At the manual f/stop settings, the mask uncovers the "M," Fig. 4.

There's one other coupling part you can see from the front of the lens opening — the tab on the **lens-sensing slide**, Fig. 8. The lens-sensing slide tells the exposure-meter system the maximum aperture of the lens you've installed — necessary information for full-aperture metering.

Notice the stepped **maximum-aperture tab** extending from the rear lens flange, Fig. 7. When you install the lens, this tab comes against the lens-sensing slide. Turning the lens clockwise to lock it in place pulls the lens-sensing slide from right to left. How far depends on the width of the maximum-aperture tab — the slower the lens, the wider the tab. The lens-

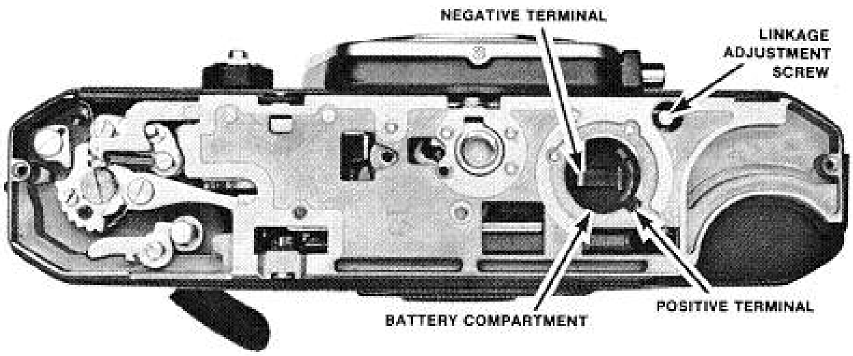


Figure 10

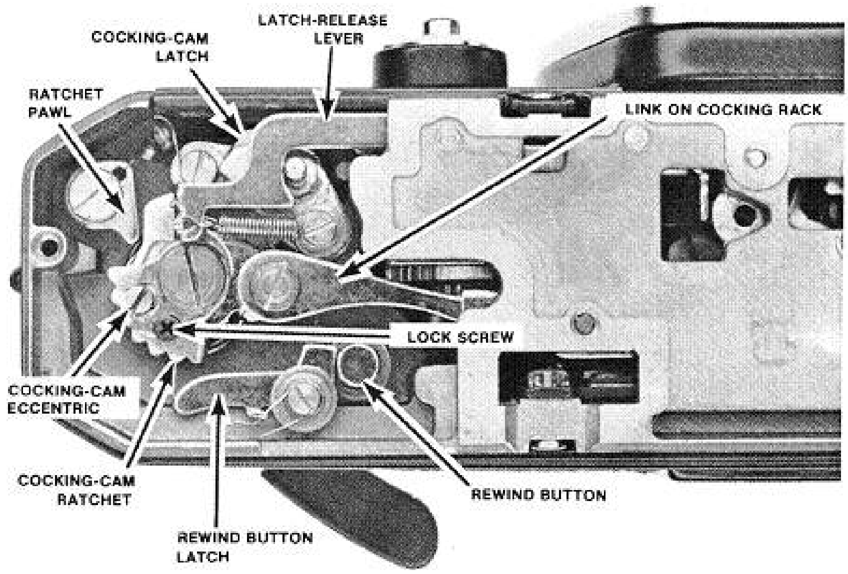


Figure 11

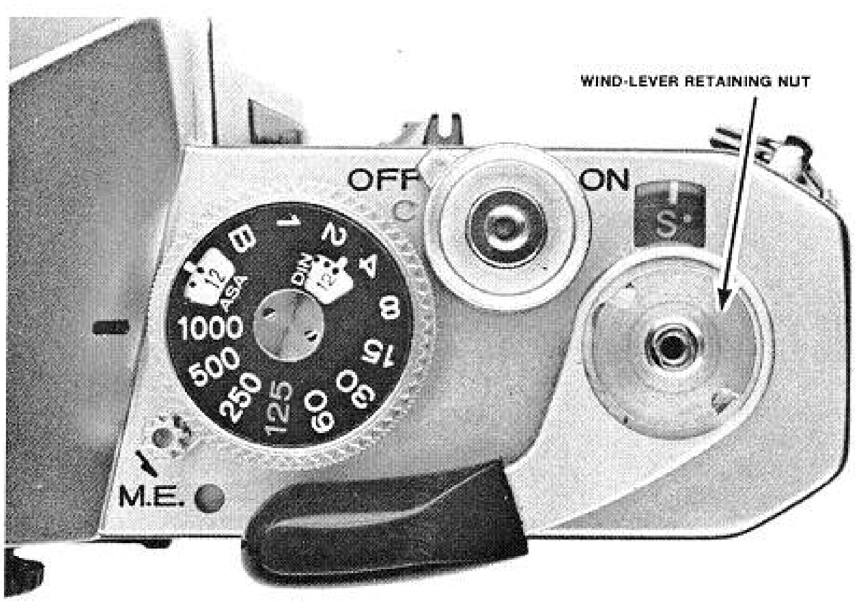


Figure 12

sensing slide then positions the galvanometer and the metering-limits vane to correspond with the particular lens.

Other than sticking diaphragm leaves, there seems to be only one common problem with the lens itself. The diaphragm-opening-ring tab is pretty thin. So a careless photographer may accidentally bend the tab when he has the lens removed from the camera. As a result, the lens fails to couple properly to the autocontrol ring.

Adjustments at the Bottom of the T3

To remove the bottom cover plate, just take out the batteries and the three retaining screws. You can't see much in Fig. 10. The body casting almost completely covers the mechanism.

But the mechanism you can see looks typically Copal Square, Fig. 11. During the cocking stroke, the cocking cam pulls the cocking rack. The cocking rack both cocks the shutter and tensions the mirror. Following the release cycle, the latch-release lever disengages the cocking-cam latch. That allows you to advance the wind lever a second time.

The adjustment visible near the battery compartment, Fig. 10, is for the needle-trapping system. There're two trapping blades that come against the needle — the step-cam blade and the needle-trapping blade. The needle-trapping blade engages the needle first. That holds the needle in position. Then, the step-cam blade comes against the needle to actually select the diaphragm opening.

As you start depressing the release button, the needle-trapping blade engages the needle to provide the memory-hold feature. The adjustment screw you can see in Fig. 10 is on a lever linking the release button to the needle-trapping blade. You'll notice that the adjustment screw moves toward the top of the camera each time you depress the release button. This movement allows the needle-trapping blade to engage the needle.

So the adjustment decides how far you have to depress the release button to trap the needle. It's a little easier to see what you're adjusting after you remove the top cover plate. So we'll wait a moment to describe the adjustment.

But notice one thing now — a red-colored lacquer locks the adjustment. Red lacquer locks most of the adjustments in the camera. The red lacquer does more than secure the adjustment — it also gives you fair warning when you're about to disturb a critical timing point.

There's one other adjustment visible from the bottom of the camera — the cocking-cam eccentric, Fig. 11. By first loosening the cross-point lock screw, you can turn the eccentric. And that shifts the position of the plate on top of the cocking cam.

The plate has a downward-projecting tab. This tab acts as the last tooth of the cocking-cam ratchet, Fig. 11. As you advance the wind lever, the cocking cam turns clockwise. The ratchet pawl then engages the teeth of the cocking-cam ratchet. So, if you let go of the wind lever without completing the wind stroke, the cocking cam can't return to the rest position.

But at the end of the wind stroke, the tab of the cocking-cam plate must clear the ratchet pawl. What if it doesn't? Then, the wind lever won't return to the rest position. That's a problem you might have if you disassemble the transport mechanism. You can then use the cocking-cam eccentric to assure a full wind stroke.

Removing the Top Cover Plate

The procedure for removing the top cover plate differs a little from the procedure in earlier Konica Autoreflexes. It's a little easier. Use the shutter settings of the fastest shutter speed (1/1000 second) and the slowest film speed (ASA 12 in the T3, ASA 25 in the T). Those are the settings for minimum exposure. And they let off most of the galvanometer spring tension.

Now, unscrew the cap screw above the wind lever. There're no spanner notches. But the screw has a regular right-hand thread. Next, unscrew the wind-lever retaining nut. Remove the spring washer, Fig. 12, and lift off the wind lever.

You can now see the wind-lever cam, Fig. 13. Notice that the cam lobe points toward the back of the camera. Lift off the wind-lever cam. Then, unscrew the top-cover retaining ring at the wind-lever end of the top cover plate. Also, lift off the round plate that has a hole fitting over the wind-lever stop pin.

Compared to earlier models, the speed-knob disassembly in the T3 is pretty easy. Remove the screw passing through the center of the shutter-speed calibration plate, Fig. 13. Lift off the shutter-speed calibration plate and the film-speed calibration plate. Notice the small brass washer sitting on top of the film-speed calibration plate.

The downward-projecting tab on the edge of the film-speed calibration plate fits into a slot in the speed knob, Fig. 14. So the speed knob carries the film-speed calibration plate when you change shutter speeds. At the same time, the speed knob turns the **setting-shaft gear**, Fig. 14. And the setting-shaft gear turns the speed-setting shaft to change the shutter-speed setting.

Lifting the speed knob to change film speeds disengages the speed-knob teeth from the teeth of the setting-shaft gear. So the setting-shaft gear stays put as you turn the speed knob. The compression spring that returns the speed knob remains inside the speed-knob assembly. You can remove the speed knob, spring, and setting-shaft gear as one unit — without disturbing any timing. From a service viewpoint, that's quite a design improvement over the early models.

In earlier Autoreflex T models, there's a cam held to the speed-setting shaft by an E-ring. The spring sits under the cam. So, if you're working on an earlier model, notice that the lobe of the cam now points toward the front of the camera. Remove the E-ring and lift off the cam and spring. Then, remove the speed knob.

But with the T3, all you have to do is lift off the speed knob. You can then see the **cord-control disc**, Fig.

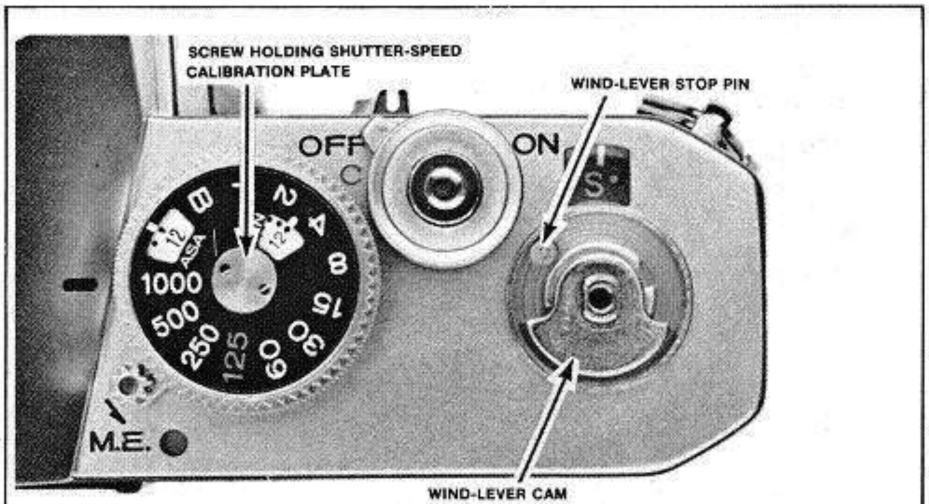


Figure 13

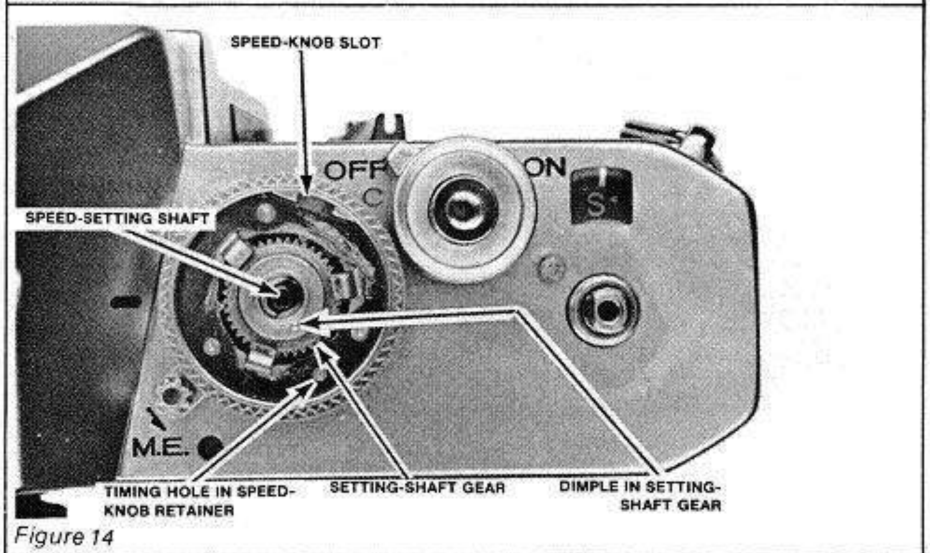


Figure 14

15. A pin on the top of the cord-control disc passes into the hole at the bottom of the speed knob. So the cord-control disc turns whenever you move the speed-knob — whether you're changing the shutter speed or the film speed.

The cord hooked to the cord-control disc runs to the galvanometer at the other end of the camera. If you're familiar with the early Autoreflex T, you can spot the variation here. The cord-control disc in the Autoreflex T has two lugs straddled by the speed knob. Removing the speed knob then allows the cord-control disc to turn counterclockwise against a stop lug — it's pulled by the spring tension on the galvanometer.

So replacing the speed knob in the Autoreflex T is a little tricky. Start the speed knob over the speed-setting shaft — make sure the lug at the top of the speed knob points toward the front, rather than toward the back, of the camera (this is the lug that receives the film-speed calibration plate). You'll now find that the speed knob won't seat fully. Its slots aren't aligned with the lugs on the cord-control disc.

What you have to do is reach under the speed knob with a fine tool. Then, turn the cord-control disc in a clockwise direction until the speed knob seats fully.

Reassembly's a lot easier in the T3. For one thing, you don't have to worry about the speed-knob spring. And there's no E-ring to fight. Also, if you try turning the cord-control disc with your tweezers, you'll find that there's some resistance. The cord-control disc doesn't turn freely. A clamping spring tends to hold the cord-control disc in place — against the pulling force of the galvanometer spring.

So the T3 speed knob should seat properly with no extra help. Make sure the speed-setting shaft's at 1/1000 second (all the way counterclockwise). And turn the cord-control disc to ASA 12. That's all the way counterclockwise, bringing the pin on the cord-control disc against the lug on the speed-setting shaft.

The setting-shaft gear and the speed knob should still be at the settings of 1/1000 second and ASA 12. You can change this timing only by pushing down and turning the setting-shaft gear. If the timing's off, push down and turn the setting-shaft gear to the position shown in Fig. 14. Notice that the dimple on top of the setting-shaft gear aligns with the timing hole in the speed-knob retainer.

Then, start the speed knob over the speed-setting shaft. As with the T model, make sure the section of the speed knob that couples to the film-speed calibration plate faces the front of the camera (about a 3 o'clock position). The coupling's a slot in the T3 speed knob, a lug in the T speed knob.

The speed knob should drop into place. But if the speed knob doesn't seat fully, you know that its hole isn't aligning with the pin atop the cord-control disc. In that case, just turn the speed knob clockwise to set a slower shutter speed. The speed knob will seat fully as soon as its hole reaches the pin.

Continuing with the disassembly, open the camera back by pulling down the back latch. Check for a setscrew on the rewind knob. There's none in the T3, but the early T model does have a setscrew locking the rewind knob to the rewind shaft. Loosen the setscrew if you have one. Then,

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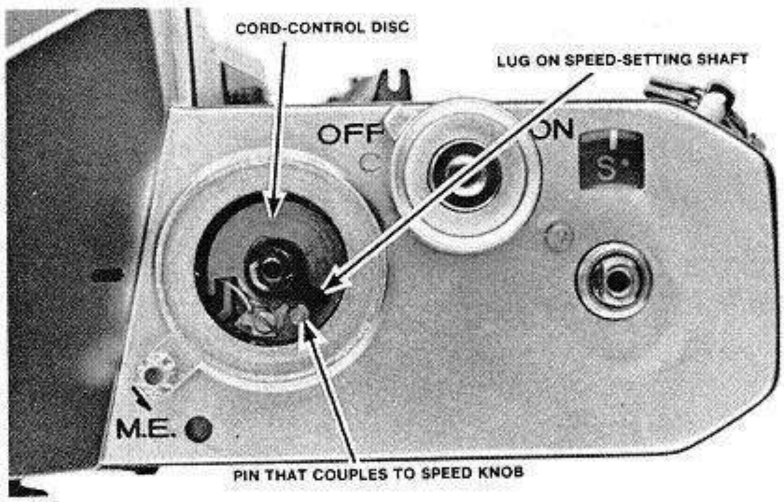


Figure 15

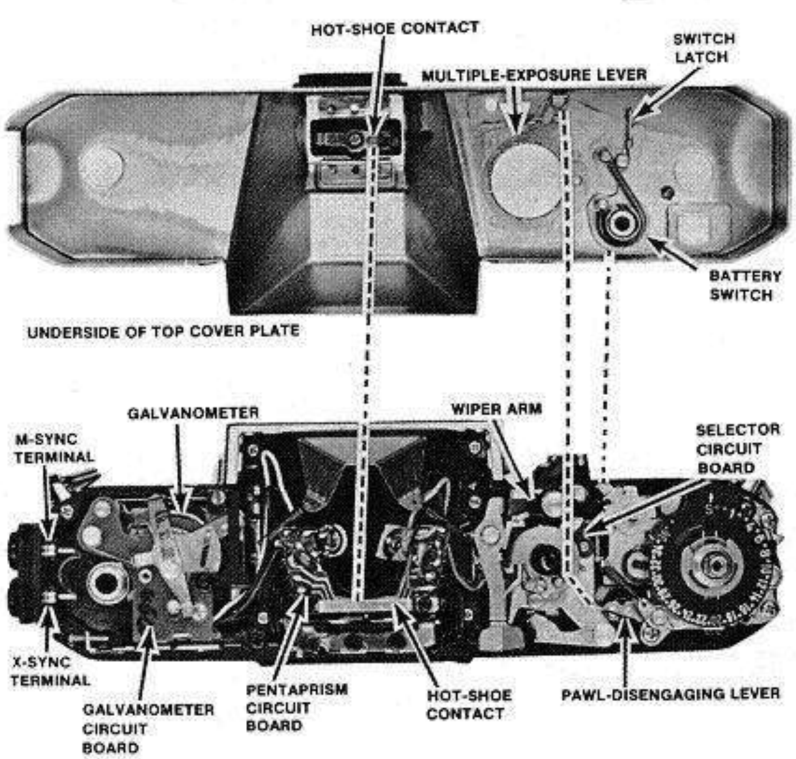


Figure 16

(from page 10) **KONICA**

wedge the rewind shaft and unscrew the rewind knob.

The rewind shaft also drops out. Notice that there's a compression spring around the rewind shaft. And there's a washer on top of the compression spring. On reassembly, seat the spring around the rewind shaft. Then, place the washer on top of the spring and feed the rewind shaft into place from the underside of the supply-spool chamber.

Complete the top-cover-plate disassembly by unscrewing the retaining ring at the rewind side (the ring under the rewind knob you removed). And, with the N-T3, remove the blind-control lever next to the eyelens. Some of the early Autoreflex models have the battery switch on the back of the top cover plate. If that's the case, remove the battery switch. But if your battery switch is around the release button, leave it in place. And lift off the top cover plate.

Alignment of the Top Cover Plate

There's little timing to worry about between the top cover plate and the camera body, Fig. 16. You don't even have to disconnect sync wires — the sync terminals remain in the camera body.

Both the multiple-exposure lever and the battery switch remain with the top cover plate. The tab on the multiple - exposure lever comes against the spring tab on the **pawl-disengaging lever**, Fig. 16. So moving the multiple-exposure lever pushes the tab of the pawl-disengaging lever toward the center of the camera. And that disengages the film-advance pawl from the film-advance gear.

Fig. 16 also shows the mating of the battery switch with the camera body. Notice the **switch latch** which holds the spring-loaded battery switch in the "off" position. In action, the battery-switch pin comes against the tab on the **release-slide blocking lever**. And the release-slide blocking lever controls the **wiper arm**, Fig. 16. We'll describe the operation of the wiper arm when we get into the exposure-meter circuit. The point for now — turn the battery switch to the "on" position before replacing the top cover plate.

Two other parts mate when you replace the top cover plate — the hot-shoe contact at the underside of the accessory shoe and the hot-shoe contact in the camera body. Notice the two blue wires soldered to the camera-body hot-shoe contact. The blue wire on the wind side goes to the x-sync contact in the shutter. The blue wire on the rewind side goes to the x-sync terminal, Fig. 16.

Cord Routing in the Autoreflex Models

From the back of the camera, Fig. 17, you can now see the coupling cord. One end of the cord connects to the cord-control disc. The cord then runs around a series of pulleys at the back of the camera to get to the galvanometer. It's a little tough to see the galvanometer in Fig. 17 — the galvanometer sits underneath the circuit board at the rewind end of the camera.

In earlier Autoreflexes, the cord routing's nearly the same. But there is a difference in how the cord connects. The drawing, Fig. 18, shows the cord routing in the Autoreflex T. Notice that there's a spring connected to the cord. The spring, sitting right under the eyelens, takes up the cord backlash.

It's not uncommon to pull the top cover plate of an Autoreflex T and find that the backlash spring's been badly mauled. Don't be too critical of the last technician who worked on the camera. It's pretty easy to distort the spring as you're replacing the top cover plate. You really have to be careful.

As you can see in the drawing, the cord in the Autoreflex T connects to a gear. The cord turns the cord gear as you change the shutter-speed and film-speed settings.

The cord gear engages a gear segment formed on the galvanometer housing, Fig. 18. So, if you disassemble the exposure-meter system, you have some critical timing to worry about — the timing between the cord gear and the galvanometer gear segment.

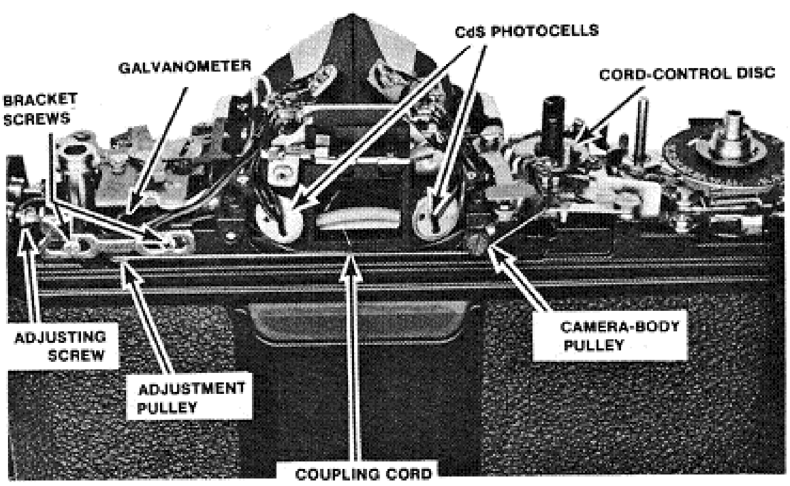


Figure 17

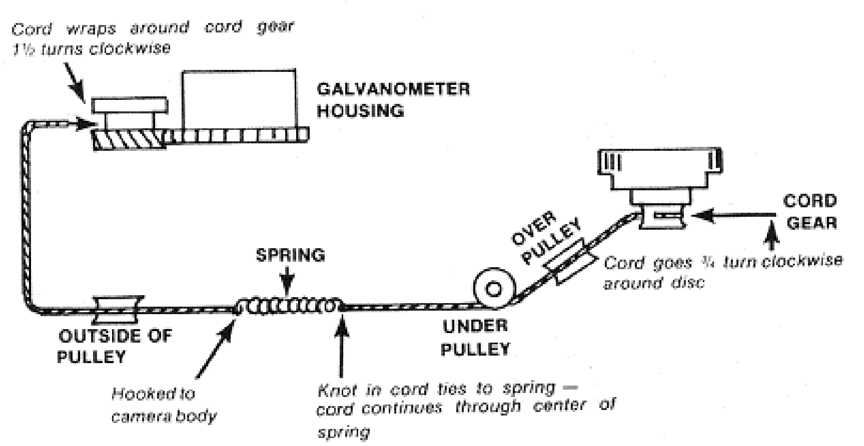


Figure 18

Fig. 19 shows the timing. After routing the coupling cord, turn the galvanometer housing until the last tooth of the gear segment is in line with the stop pin for the needle. That's the proper galvanometer position for the settings of ASA 25 (the slowest film speed in the T) and 1/1000 second with the lens removed.

Fig. 20, from the Konica service manual, shows the cord routing in the N-T3. Incidentally, you can get Konica's parts and service manuals on microfiche from National Camera Parts Department. The drawings are exceptional. They even show the proper assembly sequence in exploded parts views.

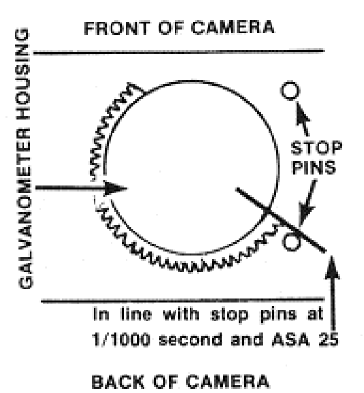


Figure 19

As you can see in Fig. 20, the T3 has no gear timing to be concerned with — the cord connects directly to the galvanometer housing. And there is no spring under the eyelens. Instead, the clamping spring under the cord-control disc takes up cord backlash. So you don't have to worry about crushing a spring as you replace the top cover plate.

It first appears that the T3 has two cords — one to position the galvanometer for shutter-speed and film-speed changes, and another to position the galvanometer according to the maximum aperture of the lens. But in Fig. 20, you're just seeing the two ends of the same cord.

So let's trace the cord's route starting from the cord-control disc. Fig. 21 shows the coupling. Notice that the cord wraps once around the underside of the cord-control disc in a clockwise direction (here, we're at the settings of 1/1000 second and ASA 12). The cord then passes through a cutout to the top of the cord-control disc. There, a screw-held clamp holds the end of the cord, Fig. 22.

Setting a faster film speed turns the cord-control disc clockwise (remember, the pin on the cord-control disc couples to the speed knob). That draws the cord from left to right in Fig. 22. Similarly, setting a slower shutter speed turns the cord-control disc clockwise. Here, the lug on the speed-setting shaft comes against the pin atop the cord-control disc.

From the cord-control disc, the cord passes around a post on the **backlash lever**, Fig. 22. The backlash lever sits underneath the cord-control disc. A tab on the backlash lever passes between the two ends of the clamping spring.

As you turn the cord-control disc clockwise, the clamping spring carries the backlash lever in the same direction. That draws the cord taut to take up any backlash. The backlash lever can only move a short distance before it's stopped by a post on the speed-selector plate.

The cord then passes around the **compensating pulley**, Fig. 22. The compensating-pulley lever pivots on a shoulder screw. So moving the compensating pulley toward the back of the camera draws the cord from left to right.

Yet throughout most of the shutter-speed range, the compensating pulley does nothing more than route the cord. The only time the compensating pulley gets into the action is when you set the shutter to 1/125 second. Then, a cam lug formed on top of the shutter-speed-setting gear, Fig. 22, comes against the downward-projecting tab of the compensating-pulley lever. That pushes the compensating pulley toward the back of the camera. And the compensating pulley draws the cord a slight distance from left to right.

The reason? As you may know, Copal Square S shutters don't really deliver 1/125 second at the 1/125-second setting. Rather, they deliver 1/100 second. That's the fastest full-aperture speed. And a full aperture's necessary for synchronization with electronic flash (X sync).

However, the speed-setting shaft has equal spacing between the detent positions. According to the detents, there should be a full shutter-speed change going from 1/60 second to 1/125 second — or from 1/125 second

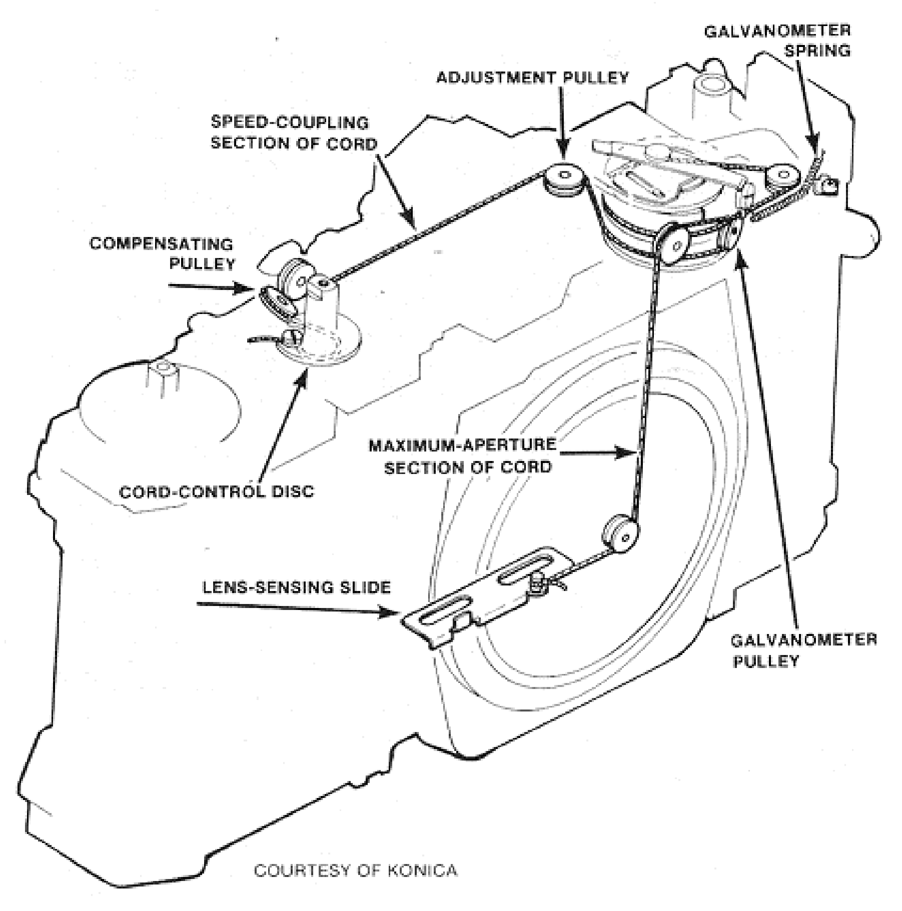


Figure 20

to 1/250 second. But there's not. So the compensating pulley makes the necessary correction in the galvanometer position.

From the compensating pulley, the cord passes under a camera-body pulley. It then proceeds to the rewind side of the camera. Here, it passes around the outside of the **adjustment pulley**, Fig. 17.

The adjustment pulley provides one of several mechanical adjustments in the camera. It controls the rotational position of the galvanometer. By first loosening the two bracket screws, Fig. 17, you can turn the adjusting screw.

Turning the adjusting screw moves the adjustment-pulley bracket. As a result, the galvanometer rotates for a fine adjustment. You can use the adjusting screw for one of your exposure-accuracy adjustments. We'll describe all of the exposure-meter adjustments a little later.

The cord then follows around a groove in the galvanometer housing. And it passes around the **galvanometer pulley**, a pulley attached to the side of the galvanometer's housing, Fig. 23. The galvanometer pulley provides the coupling between the cord and the galvanometer.

Moving either end of the cord changes the amount of cord slack. Increasing the slack in the cord allows the spring-loaded galvanometer to turn counterclockwise. That's the direction the spring pulls the galvanometer housing. Decreasing the slack in the cord pulls the galvanometer housing clockwise — against the spring tension.

Once around the galvanometer pulley, the cord passes through another groove in the galvanometer housing. It then routes around three more fixed pulleys to reach the bottom of the camera. Finally, the cord ties to the lens-sensing slide, Fig. 20.

So one end of the cord hooks to the lens-sensing slide — the other end hooks to the cord-control disc. And, as you've seen, moving either end of the cord rotates the galvanometer housing.

Remember, the lens-sensing slide positions the galvanometer according to the maximum aperture of the lens installed. But it does one more thing — it also positions the metering-limits vane along the focusing screen. The **lens-sensing lever** at the top of the galvanometer circuit board, Fig. 23, relays the information from the lens-sensing slide to the metering-limits vane.

Notice that the cord connects to the lens-sensing lever, Fig. 23. A screw-held clamp at the end of the lens-sensing lever holds the cord. So as the lens-sensing slide pulls the cord, the cord carries the lens-sensing lever.

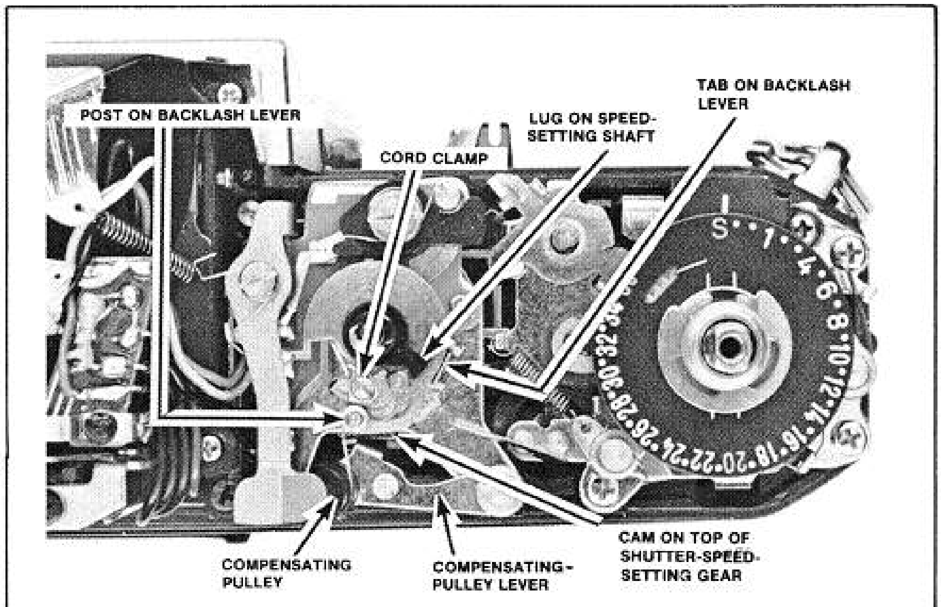
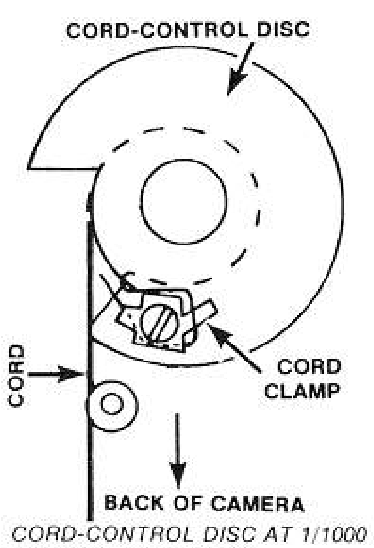


Figure 22



CORD-CONTROL DISC AT 1/1000 SECOND AND ASA 12

Figure 21

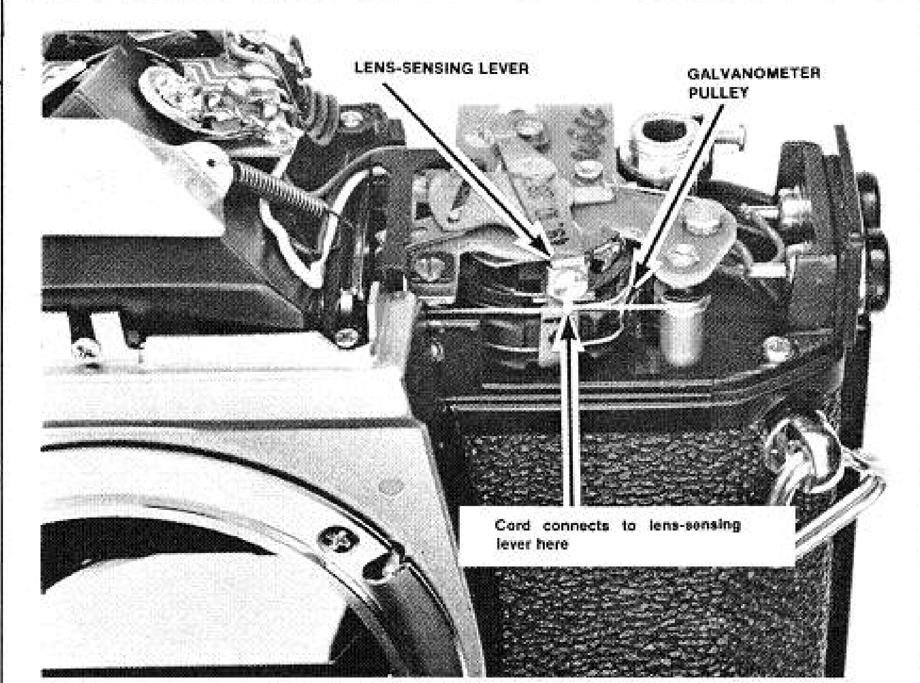


Figure 23

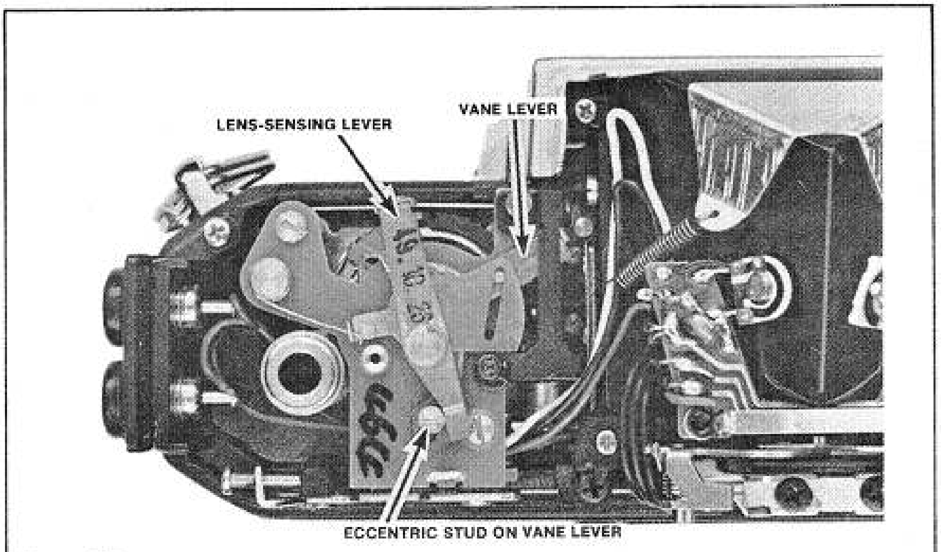


Figure 24

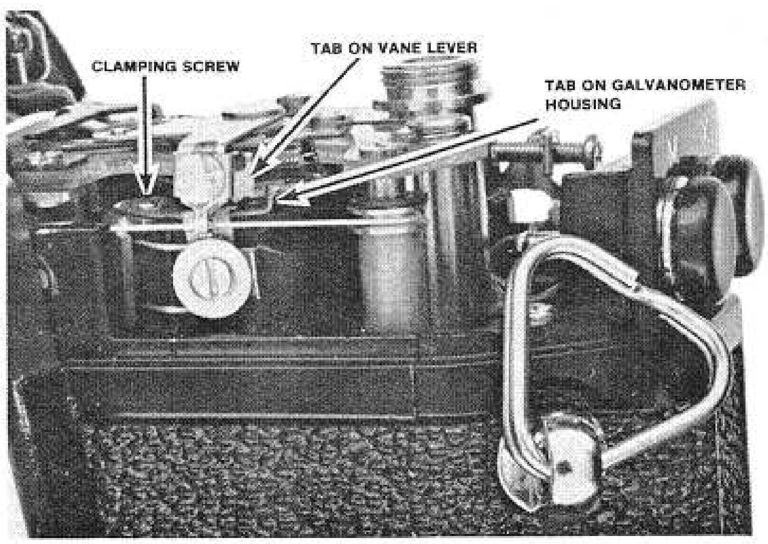


Figure 25

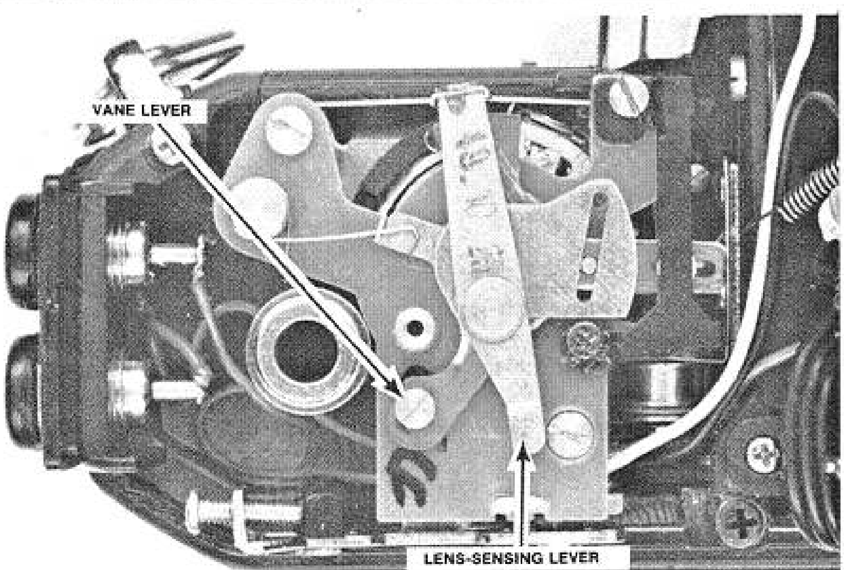


Figure 26

The other end of the lens-sensing lever comes against an eccentric stud on the **vane lever**, Fig. 24. And the vane lever carries the red metering-limits vane. Installing the lens moves the lens-sensing lever a certain amount — how much depends on the width of the lens' maximum-aperture tab, Fig. 3. The lens-sensing lever then moves the vane lever. Now, the metering-limits vane indicates the maximum aperture of the lens.

Another of the mechanical adjustments controls the maximum-aperture indication. Turning the eccentric stud positions the vane lever. With the f/1.7 lens installed, the vane should move to the position shown in Fig. 4. With the f/1.4 lens, the bottom edge of the vane should pass nearly through the center of the match-needle mark — it should just touch the top of the "1" of the "1.4" calibration. And with the f/1.2 lens, the bottom edge of the vane should move slightly below the fixed red indicator at the top of the scale — right at the top of the match-needle mark.

At extreme shutter-speed/film-speed combinations, the metering-limits vane moves below the maximum-aperture indication. It then shows the shortened metering range. Here, another part controls the metering-limits vane — the galvanometer housing. Locate the tab on top of the galvanometer housing, Fig. 25. In the illustration, the tab's about to come against a downward-projecting tab on the vane lever. Turning the galvanometer a little further clockwise brings the galvonometer tab against the vane-lever tab. From there, the galvanometer pushes the vane lever in a clockwise direction.

Fig. 26 shows the maximum movement of the vane lever with no lens installed. We've set the speed knob to ASA 3200 and "B." Notice that the galvanometer now pushes the vane lever away from the lens-sensing lever — the eccentric no longer touches. Now, the metering-limits vane doesn't indicate the maximum aperture of the lens. Instead, it shows the shortened metering range.

If you now look through the finder, you'll discover that the lower edge of the metering-limits vane centers between the "8" and "11" calibrations — right in the middle of the battery-test indicator. At least, that's the correct vane position according to our evaluation camera. Installing the lens moves down the metering-limits vane even further. With the f/1.7 lens, the metering-limits vane should center between the "11" and "16" calibrations, Fig. 4.

The battery-test indicator provides a handy reference for adjusting the position of the metering-limits vane. Check to see that the vane centers on the battery-test indicator at the test settings of ASA 3200 and "B" with no lens installed. The adjustment for the metering-limits vane is the tab on top of the galvanometer housing, Fig. 25. Loosening a clamping screw allows you to slide the tab. That way, you can precisely position the metering-limits vane.

Electrical Operation of the Exposure Meter

Electrically, the circuit's pretty straightforward, Fig. 27. The two CdS cells sit one on either side of the eyelens, Fig. 17. Here, the cells angle in to take a center-weighted reading from the focusing screen. Notice in the schematic that each CdS cell has two resistance paths to improve the linearity of the response.

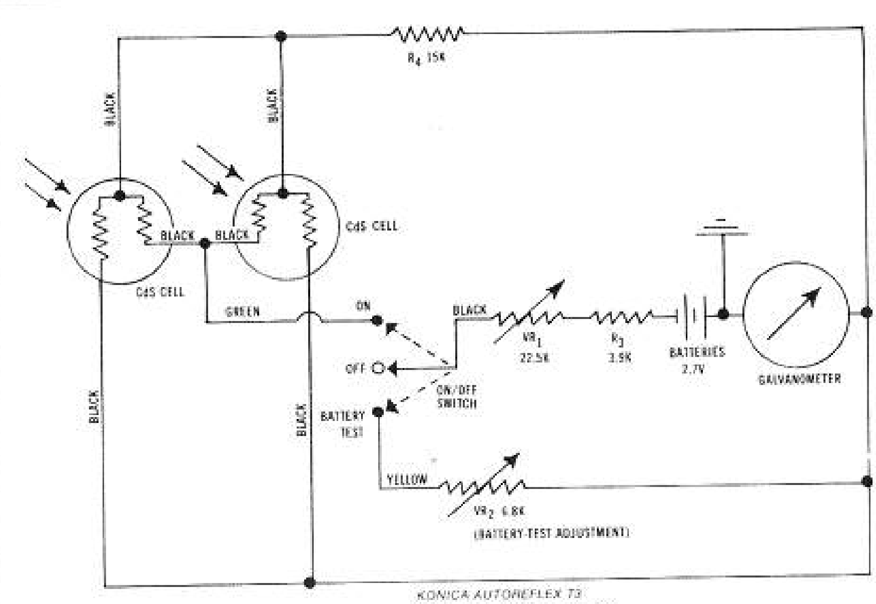
Turning on the battery switch moves the on/off switch to its uppermost position in Fig. 27. Now, battery current flows through R3, through the variable resistor VR1, and through the two CdS cells in parallel. Returning to the positive side of the battery, the current flows through the galvanometer.

VR1 sits on the rewind-knob side of the pentaprism, Fig. 28. As you can see from the current path, VR1 provides your only electrical adjustment for exposure accuracy.

The second variable resistor sits on the wind-lever side of the pentaprism, Fig. 28. This one, VR2, is the battery-test adjustment. At the battery-test function, the on/off switch moves down in Fig. 27. Now, the battery current bypasses the CdS cells. It flows from negative battery, through R3, through VR1, through VR2, through the galvanometer, and back to positive battery.

Both VR1 and VR2 affect the battery-test reading. So you must adjust the exposure-meter accuracy first. Then, adjust the battery-test circuit.

The on/off switch shown in the schematic sits to the front of the selector circuit board, Fig. 29. Removing the top cover plate allows the spring-loaded wiper arm to move to the switch-on position. The wiper



KONICA AUTOREFLEX T3
(Values and color codes from evaluation camera)

Figure 27

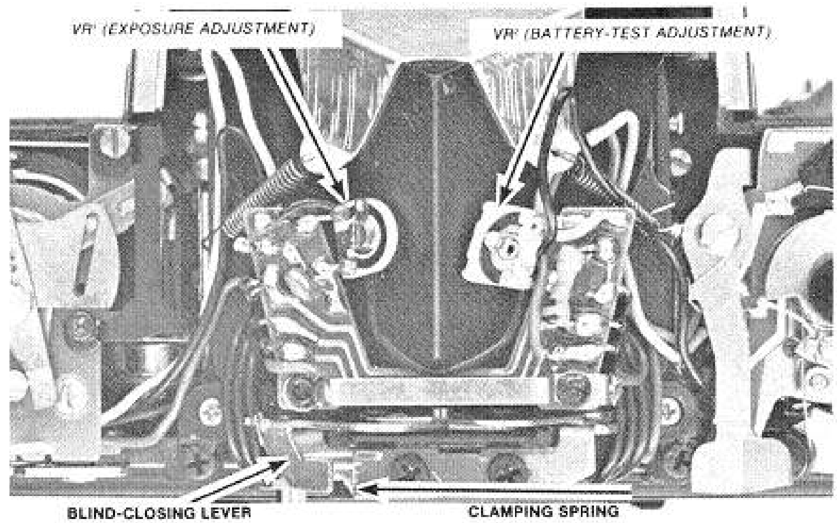


Figure 28

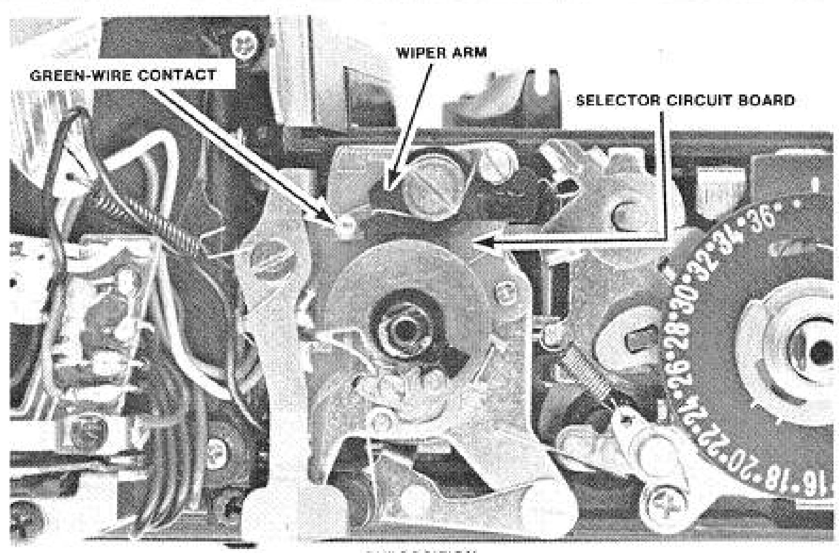
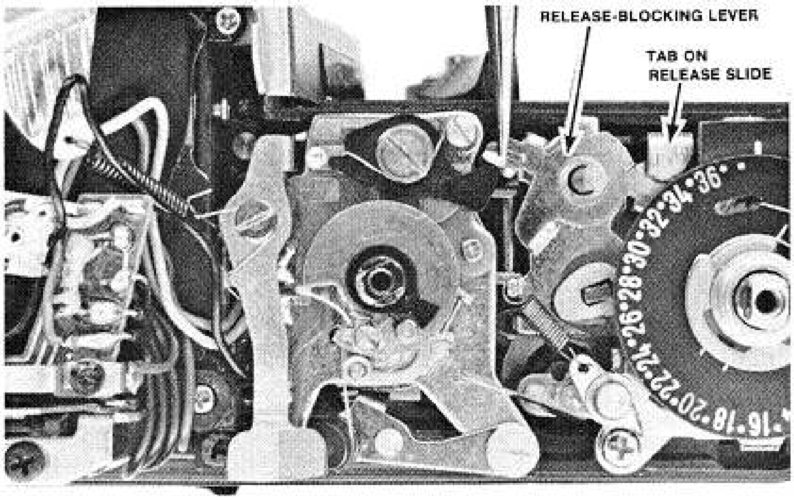
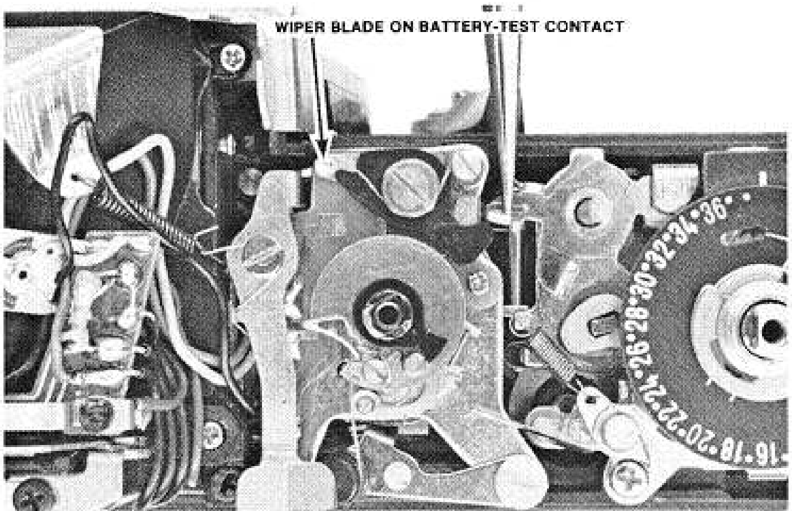


Figure 29



"OFF" POSITION

Figure 30



"BATTERY-TEST" POSITION

Figure 31

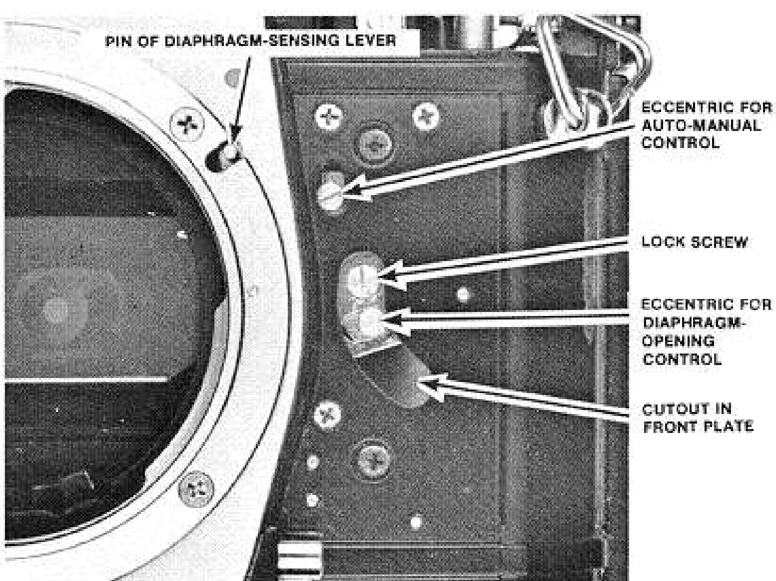


Figure 32

blade now touches the circuit-board contact near the cord-control disc. Tracing this circuit-board path, you'll find that it connects to a green wire (color codings are from our evaluation camera). And the green wire runs to the CdS cells on the pentaprism circuit board.

Fig. 30 shows what happens when you turn off the meter. Notice the wiper-blade position — between two circuit-board contacts. The part that normally holds the wiper arm against its spring tension remains with the top cover plate — the battery switch, Fig. 16. The switch latch, also shown in Fig. 16, holds the battery switch in the "off" position.

Locate the pin extending from the battery switch, Fig. 16. This pin comes against the tab of the release-blocking lever (the same tab that we're holding with tweezers in Fig. 30).

The other end of the release-blocking lever moves under a tab on the release side, Fig. 30. That's why you can't depress the release button until you turn on the switch. In the switch-on position, the release-blocking lever swings away from the release slide, Fig. 29.

At the battery-test position, the battery switch pushes the wiper arm all the way clockwise, Fig. 31. Now, the wiper blade touches the front contact of the circuit board. Tracing this contact strip, you'll find that it connects to a yellow wire. And the yellow wire runs to the variable resistor VR2 on the pentaprism circuit board.

Let's say that you're now ready to adjust the exposure meter. Two adjustments correct the accuracy of the exposure readings — an electrical adjustment with VR1 and a mechanical adjustment with the adjustment pulley. Use the variable resistor VR1 to adjust the accuracy under a high-light condition. And correct the accuracy under a low-light condition with the adjustment pulley.

Working between these two adjustments, you should be able to correct the accuracy throughout the exposure range. So the meter indicates the proper aperture for the light conditions. But that doesn't necessarily mean that the automatic diaphragm-control system is going to deliver the indicated aperture.

You must also check the light transmission through the lens system. Here's where the eyepiece blind comes in handy. Push down the blind-closing lever, Fig. 28, until the lever's held by the clamping spring. That closes the eyepiece blind. You can now use an automatic-camera test system to measure the light coming through the lens. And you don't have to cover the eyelens with your thumb to shut out light.

All you're checking now is the actual diaphragm opening. You can then adjust the trap-needle linkage until the diaphragm stops down to the aperture called out by the exposure meter. The mechanical adjustment's easy to reach — just peel back the rewind-side front leatherette, Fig. 32.

Notice the long cutout in the front plate, Fig. 32. This cutout allows you to reach the lock screw and the eccentric on the ring-control lever. That's the lever connecting the auto-control ring to the step cam. Stopping the movement of the ring-control lever also stops the rotation of the auto-control ring.

The ring-control lever has two sections — one section connects to the auto-control ring and the other section connects to the trap-needle linkage. By shifting these two sections, you can get a different amount of auto-control-ring movement for the same needle position.

Suppose, for example, that your exposure-meter tester's calibrated for f/5.6. And you've adjusted VR1 until the needle reads f/5.6 at that lighting condition. But when you actually measure the light transmission, the diaphragm stops down to f/4. You can then loosen the lock screw and turn the eccentric, Fig. 32, to adjust the actual diaphragm opening.

There's another eccentric visible in Fig. 32. This one's on the linkage that selects between manual and automatic operation. Try pushing down the pin of the diaphragm-sensing lever, Fig. 32. You can then see the end of the diaphragm-sensing lever through the upper front plate cutout. Notice that the diaphragm-sensing lever pushes up the eccentric stud. When the eccentric stud moves up, the exposure-meter system gets the signal to provide automatic operation.

As yet, you can't see what the diaphragm-sensing lever's really doing. So we'll describe the second eccentric adjustment after removing the front plate/mirror-cage assembly.

After adjusting the exposure accuracy, you can make the battery-test adjustment. One trick that helps here is to remove the wiper-arm spring. The wiper arm then stays where you put it. So move the wiper arm to the battery-test position, Fig. 31. Then, remove the lens and set the battery-test settings of ASA 100 and 1/125 second.

You can adjust the battery-test circuit using a variable-voltage power supply. Hook the negative lead from the power supply to the negative battery contact (the contact at the bottom of the battery compartment). And hook the positive power-supply lead to the red-wire contact of the battery compartment (or to any grounded part of the camera body).

A voltage setting of 2.7 volts should move the needle well into the battery-test indicator. But with a minimum acceptable voltage, the needle should just enter the red area, Fig. 33. Our evaluation camera was factory-set to a minimum voltage of 2.59 volts. So set 2.59 volts on the power supply. And adjust VR2 until the needle just enters the battery-test indicator, Fig. 33.

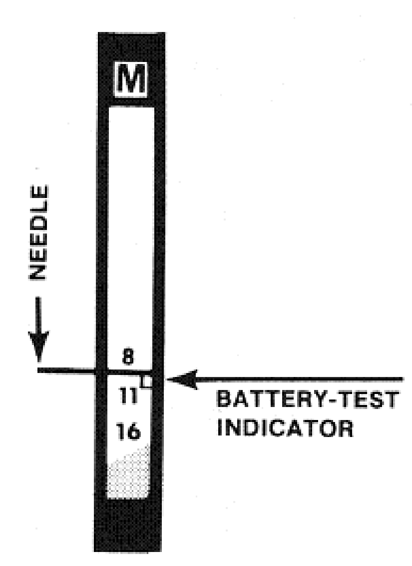


Figure 33

Finally, make the mechanical adjustments for the maximum-aperture indication and for the minimum-metering range. These are adjustments we've already described. Make the maximum-aperture adjustment with the eccentric on the vane lever. Adjust the minimum-metering range by moving the tab on top of the galvanometer housing.

(continued next issue)

Part II

by Lawrence C. Lyells

KONICA AUTOREFLEX T3

Disassembly to Reach the Shutter

Like other cameras using the Copal Square shutter, the T3 comes apart in modules. That really simplifies servicing the camera. The areas that seem to cause technicians the most trouble are in the cord routing and in the mirror-cage/exposure-control system. So we'll concentrate on these areas.

Getting to the shutter requires that you disconnect the coupling cord from the cord-control disc. And that loses the rotational timing of the galvanometer. Yet you won't lose the timing by much. When you disconnect the cord at the speed-knob setting of ASA 12 and 1/1000 second, the galvanometer rotates only a slight distance clockwise. It then comes against a stop — it won't turn any further and it won't damage the needle.

You may wish to scribe the side of the galvanometer housing before disconnecting the cord. Place a corresponding scribe line on the front plate. On reassembly, align your scribe marks as you reconnect the cord at ASA 12 and 1/1000 second. That way, your adjustments should be pretty close when you're ready to adjust the exposure-meter system.

Removing the Speed Selector Assembly

To remove the shutter, we'll just pull five modules — the speed-selector assembly, the eyepiece assembly, the pentaprism, the front-plate/mirror-cage assembly, and the shutter itself. It's possible, though, to shortcut this procedure by leaving the pentaprism and eyepiece assembly in place.

First, disconnect the spring for the shutter-cocked indicator, Fig. 34. Notice that one end of the spring hooks to the pentaprism-retaining spring — that's probably the easier end to disconnect. Then, remove the shutter-cocked indicator by taking out its screw. The spring remains around the screwhead.

The downward-projecting tab of the shutter-cocked indicator hooks against the wind-lever side of the **return link**, Fig. 35. The return link mounts to the inside of the front plate, part of the mirror-operating mechanism. Operating the shutter-cocked indicator is just one of the jobs of the return link. The return link also has a role in returning the mirror to the viewing position, as we'll later describe.

Disconnect the coupling cord at the settings of ASA 12 and 1/1000 second. Just loosen the screw holding the cord clamp to the cord-control disc, Fig. 35. Unwrap the cord and pull it to the rewind end of the camera. You may wish to first disconnect the galvanometer spring. But that's not really necessary. There's very little tension remaining on the spring. And the spring's pretty tough to reach — it attaches to a tab on the side of the galvanometer housing.

Fig. 35 also shows the positions of the three wires — yellow, green, and black — that connect to the selector-circuit board. Unsolder all three wires.

Removing the speed-selector assembly may lose one other timing point — the timing of the shutter-speed indicator assembly. There's a way you can avoid losing this timing. But it's not all that difficult to retime the shutter-speed indicator on reassembly. So first we'll describe the technique for removing the speed-indicator assembly and retiming the indicator. Then, we'll discuss the method for saving the timing.

Take out the compensating-pulley lever by removing its shoulder screw. Also disconnect and remove the spring for the wiper arm. And re-

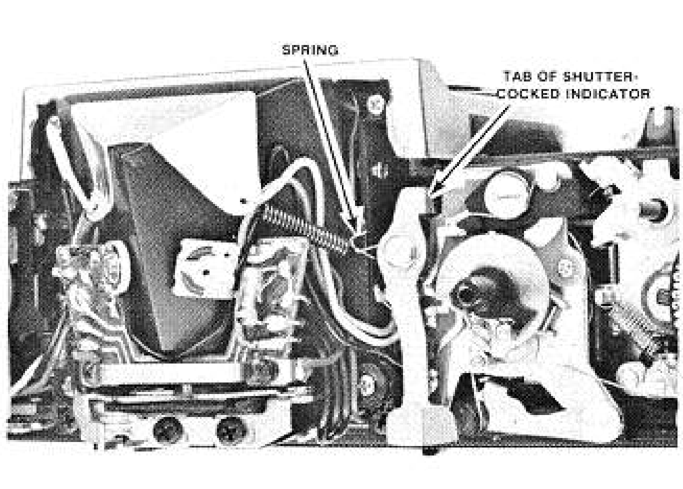


Figure 34

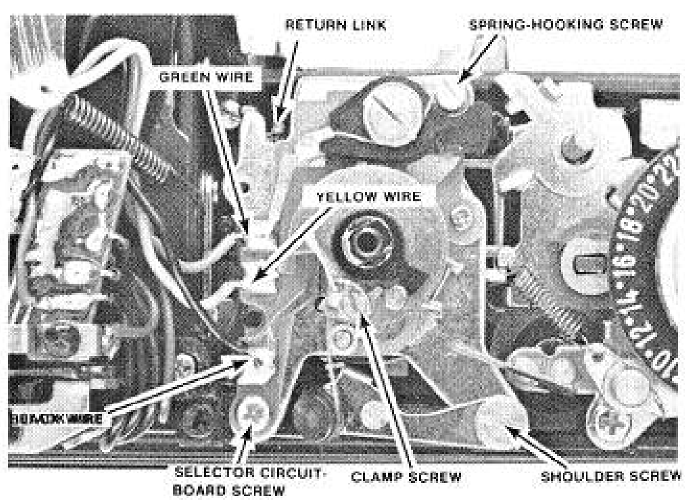


Figure 35

move the spring-hooking screw.

There's one other screw holding the speed-selector assembly. Take out the cross-point screw toward the back of the camera, Fig. 35. Now, lift out the speed-selector assembly.

Looking through the finder, you'll notice that you've lost the timing for the shutter-speed indicator — the indicator moves past the "1000" calibration. The shutter-speed calibrations are on a plastic strip running on the underside of the pentaprism. A cord connects the plastic strip to the **indicator-control gear**, Fig. 36. The other end of the cord hooks to a **spring drum**, just visible on the other side of the pentaprism, Fig. 37.

It's the spring drum that pulls the plastic strip past the "1000" calibration. So on reassembly you must time the indicator-control gear to the speed-selector assembly. Notice that the shutter-speed-setting gear on the underside of the speed-setting shaft, Fig. 38, has two geared sections. One section turns the speed-selector gear of the shutter, Fig. 36. The other section turns the indicator-control gear.

Timing the Indicator-Control Gear

You can time the indicator-control gear after you replace the speed-selector assembly. Before seating the speed-selector assembly, make sure the shutter's set to 1/1000 second. It's easier to find the "B" position — just turn the speed-selector gear, Fig. 36, until you get a bulb exposure. Then, turn the speed-selector gear one click-stop clockwise (as seen from the back of the camera). You're now at 1/1000 second.

Seat the speed-selector assembly in position. But don't as yet replace the screws. You'll have to lift the speed-selector assembly to time the indicator-control gear.

The cord for the indicator-control gear must wrap counterclockwise around the drum under the gear. So lift the speed-selector assembly high enough to disengage the gears. Then, reach under the speed-selector assembly with a fine tool. And turn the indicator-control gear in a counterclockwise direction — against the spring tension.

Keep turning the indicator-control gear until the "1000" calibration centers through the finder. Then, seat the speed-selector assembly and replace the screws.

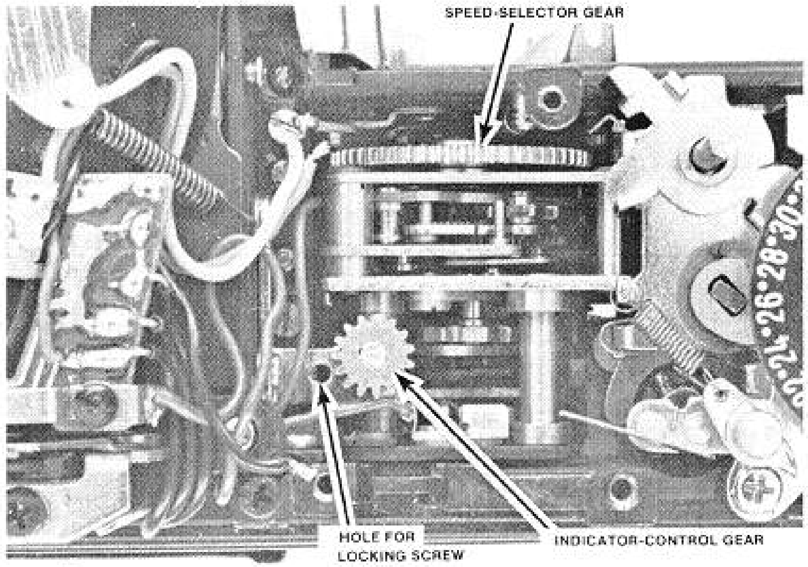


Figure 36

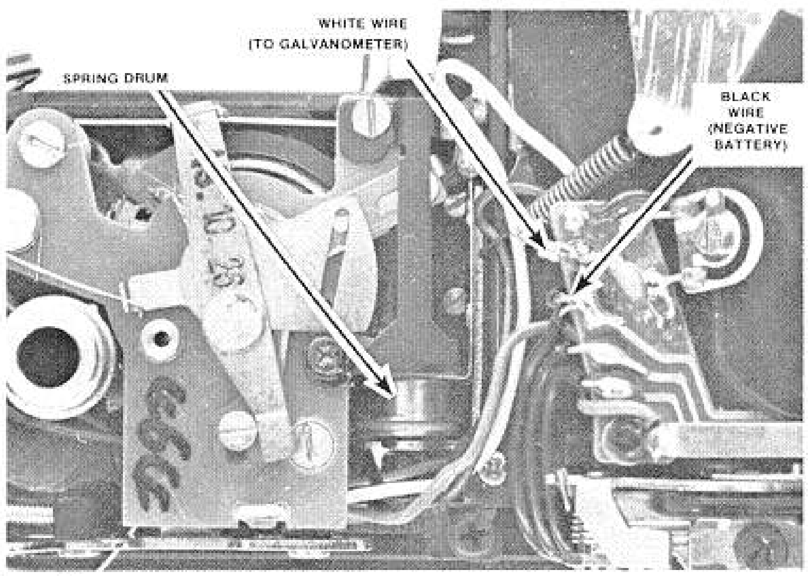


Figure 37

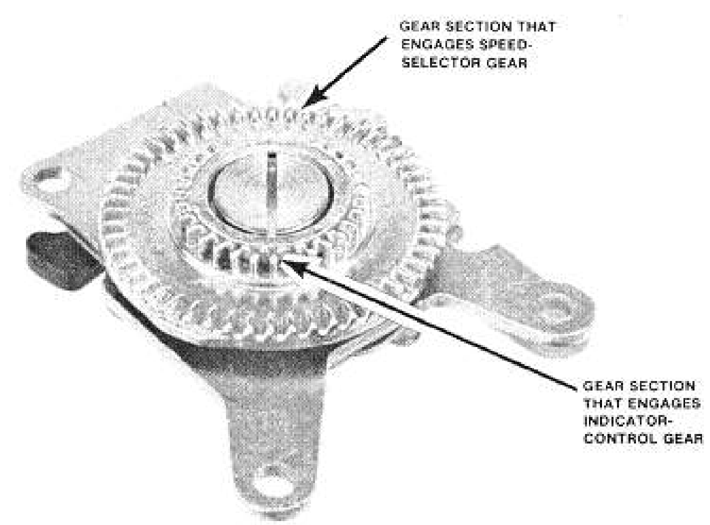


Figure 38

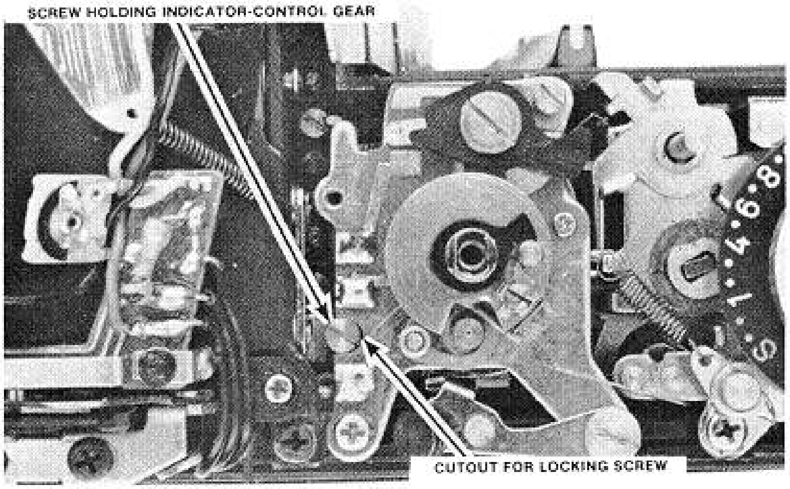


Figure 39

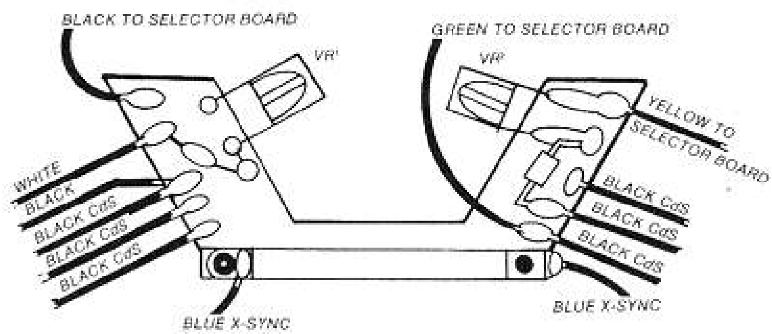


Figure 40

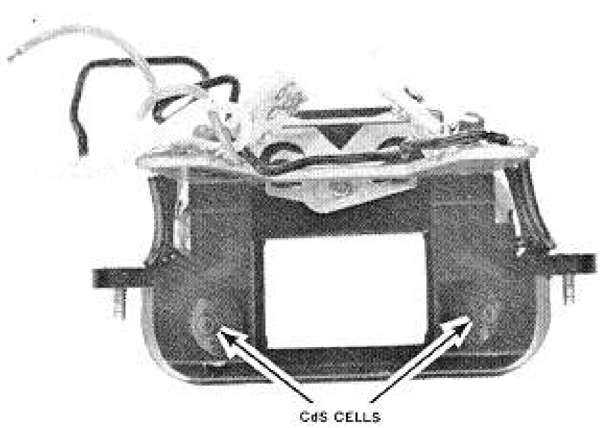


Figure 41

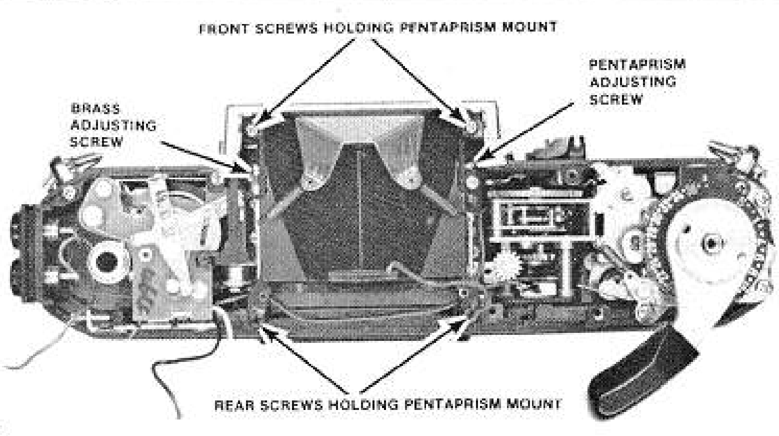


Figure 42

Saving the Timing of the Indicator-Control Gear

As we mentioned, there's a technique you can use to save the speed-indicator timing. Locate the screw hole next to the indicator-control gear in Fig. 36. The screw hole receives a 1.7mm screw. So if you have an extra screw, you can lock the indicator-control gear in position.

Fig. 39 shows the technique. Here, we've set the shutter to bulb (again, the easiest speed to find — you could also use 1/1000 second). The "B" calibration on the shutter-speed indicator now centers in the finder. And we've locked the indicator-control gear with a screw.

When you now remove the speed-selector assembly, the indicator-control gear stays in position — the screw holds the indicator-control gear against the tension on the spring drum. Notice that Konica even provides a handy clearance cutout in the speed-selector assembly. That cutout lets you get to the screw hole.

Removing the Pentaprism Circuit Board and Eyepiece Assembly

The pentaprism circuit board and the eyelens/photocell unit come out as an assembly. Unsolder the blue X-sync wires from each side of the hot-shoe contact. Also unsolder the black negative-battery wire from the pentaprism circuit board (there's a black photocell wire connected to the same circuit-board contact), Fig. 37. And unsolder the white galvanometer wire, also pointed out in Fig. 37. Fig. 40 shows the positions of all the wires connected to the pentaprism circuit board.

Note the routings of the wires you've disconnected. The blue X-sync wire connected to the shutter's X-sync contacts passes through the gap between the mirror cage and the camera-body lug. The blue X-sync wire connected to the X-sync terminal goes to the front of the black photocell wires. It then curls under the black wires and proceeds to the pentaprism circuit board.

Also notice how the green wire, the yellow wire, and the black wire on the wind-lever side all pass under the pentaprism-retaining spring. The routing's similar on the other side of the pentaprism. Here, the white wire and the black wire pass under the rewind-side pentaprism-retaining spring.

Now, remove the two screws holding the eyepiece assembly. Lift out the complete eyepiece assembly with the CdS cells and the pentaprism circuit board, Fig. 41. Such modular construction really helps in making disassembly fast and easy. But, as is typical, it does present a problem when you have to replace a part — like a photocell. Replacement parts come as an assembly, the complete module shown in Fig. 41.

Removing the Pentaprism

Take out the four screws holding the pentaprism mount, Fig. 42. If you locked the indicator-control gear in position, you can now lift the pentaprism assembly straight up and out of the camera. But if you didn't lock the indicator-control gear, be careful — the shutter-speed-indicator scale extends to the left of the pentaprism assembly in Fig. 42.

So lift the pentaprism slightly up and to the right in Fig. 42. Avoid catching the shutter-speed indicator scale on the exposure-meter assembly. Otherwise, you might damage the plastic scale.

From the bottom of the pentaprism, you can see the shutter-speed indicator system, Fig. 43. The plastic scale runs in a track at the back of the pentaprism mount. One end of the cord passing through the scale connects to the screw in the center of the indicator-control gear. The other end of the cord hooks to a slot in the spring drum.

Notice that we haven't locked the indicator-control gear in Fig. 43. So the spring drum pulls the indicator scale as far as it can from left to right. The cord's connection to the indicator-control gear holds the initial tension on the spring drum.

Turning the speed-setting shaft drives the indicator-control gear clockwise (as seen from the bottom in Fig. 43). The cord then wraps clockwise around the drum at the bottom of the indicator-control gear. So the indicator-control gear pulls the scale from right to left.

Normally, you don't have to disassemble the pentaprism assembly any further — unless you have to replace the pentaprism or part of the indicator assembly. In that case, notice the two screws at the sides of the pentaprism mount, Fig. 42. These two screws provide a shifting adjustment for the pentaprism. By loosening one screw and tightening the other, you can shift the pentaprism in its mount. Fortunately, you can remove the pentaprism without disturbing the adjustment.

To remove the pentaprism, first disconnect the two pentaprism-retaining springs from the pentaprism mount. Remove the pentaprism retainer with the two springs still attached. The two adjusting screws still hold the pentaprism.

The adjusting screws also hold the pentaprism cover, Fig. 42. So remove one of the screws. But don't turn the other adjusting screw. That way, you can save the pentaprism adjustment. Lift out the pentaprism cover and the pentaprism.

As yet, you haven't disturbed any part of the indicator assembly. It remains intact on the pentaprism mount, Fig. 44. If you now disconnect the cord from the indicator-control gear, the spring tension may wrap the plastic scale around the spring drum. And that could damage scale.

So we'll describe one procedure you can use to remove and replace the scale. First, notice the timing from our evaluation camera, Fig. 44. The spring-hooking slot in the spring drum is now pointing up — toward you in the illustration. And the "2" calibration is right over the slot.

One way to disassemble the mechanism is to first turn the indicator-control gear clockwise. That draws the scale to the left in Fig. 45. You can then

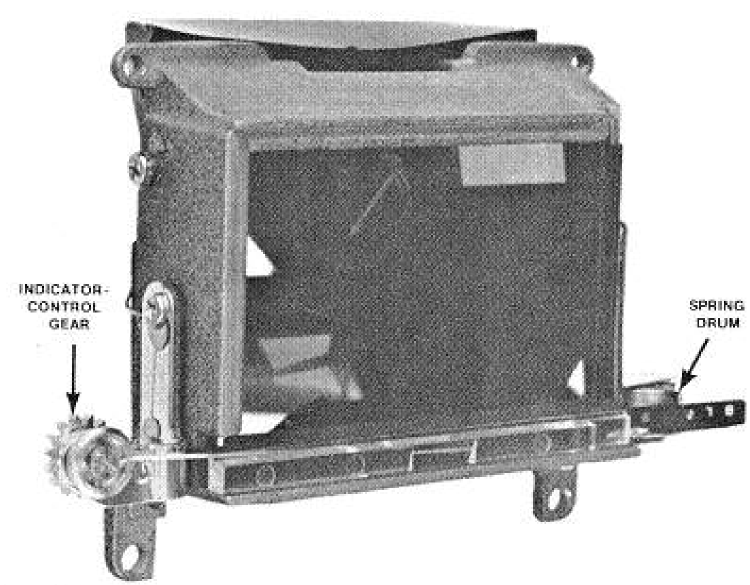


Figure 43

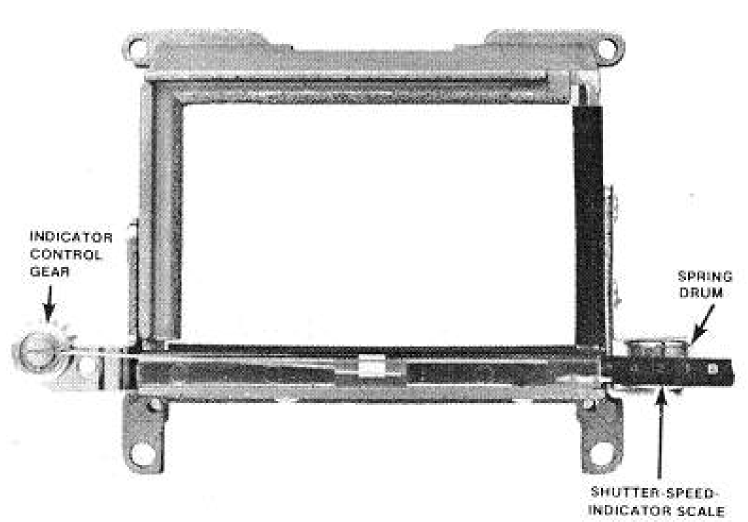


Figure 44

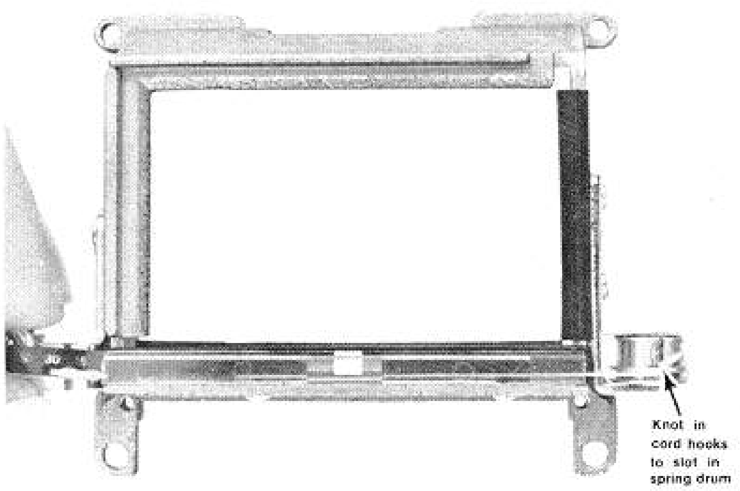


Figure 45

Scale and cord assembly

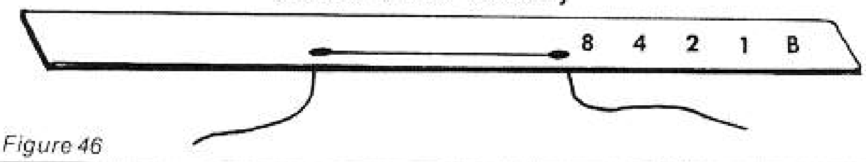


Figure 46

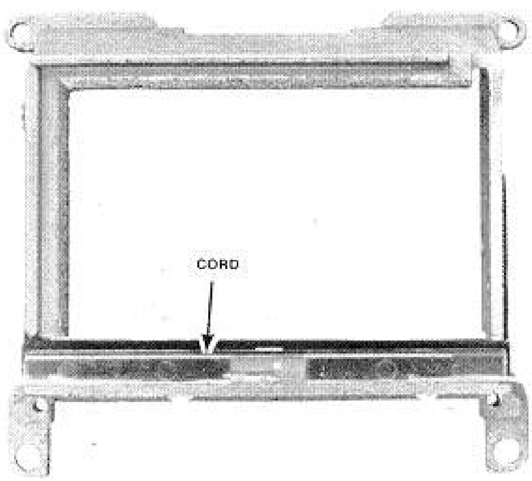


Figure 47

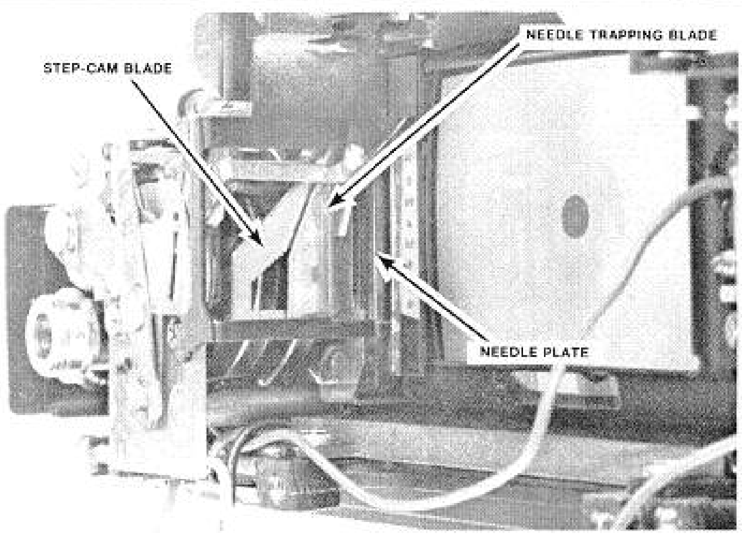


Figure 48

see where the cord hooks in the spring-drum slot. Disconnect the knotted end of the cord from the slot that lets off the initial tension. Then, loosen the screw holding the other end of the cord to the indicator-control gear.

A new scale — or a new cord — comes as shown in Fig. 46. The cord's already attached to the scale. So all you have to do is install the scale and hook the ends of the cord.

Fig. 47 shows the new scale in position. Here, we've removed the indicator-control gear and the spring drum (screws hold both assemblies to the pentaprism mount). Check the scale to make sure it slides freely in its track.

Now, replace the indicator-control gear and the spring drum. Turn the spring drum three complete turns in a clockwise direction — that applies the initial tension. The spring-hooking slot should now be facing you, Fig. 45.

The cord-hooking slot aligns with the spring-hooking slot. Hook the knotted end of the cord in the cord-hooking slot as shown in Fig. 45. Be sure to hold the other end of the cord. If you let go, the spring tension will pull the scale out of its track — and possibly damage the scale.

While holding the cord, apply a dab of rubber-base cement (such as Pliobond) to the knotted end. The cement helps secure the cord to the spring drum.

Next, allow the spring drum to slowly pull the scale from left to right — to the position shown in Fig. 44. You can now wrap the free end of the cord around the screw in the indicator-control gear. Tighten the screw to hold the cord. And again use a little rubber-base cement to assure the cord's security.

If you wish, you can now turn the indicator-control gear until "B" calibration centers in the window. And, while holding the indicator-control gear, install the locking screw.

Needle-Trapping System

Removing the pentaprism gives you a better look at the trap-needle system, Fig. 48. Here, you can see the two blades above the exposure-meter needle — the needle-trapping blade and the step-cam blade.

Cock the shutter and partially depress the release slide. Notice that depressing the release slide allows the needle-trapping blade to move down — against the needle. That locks the needle in position. Then, complete the release stroke. You should see the step-cam blade move down to engage the needle.

The position of the needle determines how far down the step-cam blade can move. The further the needle deflects (toward the back of the camera), the further down the step-cam blade moves. And the further the diaphragm closes. The step-cam blade remains against the needle until the mirror returns to the viewing position.

Earlier, we mentioned the adjusting screw at the bottom of the camera, Fig. 10. The adjusting screw controls the movement of the needletrapping blade. Try pushing down the release rod slowly. And note when the needle-trapping blade presses the needle against the needle plate, Fig. 48. In our evaluation camera, moving down the release slide a distance of 1.5mm trapped the needle.

You can check the action by watching the lug on the release slide, Fig. 49. The lug moves down with the release slide. When the top surface of the lug is even with the top surface of the release-blocking lever, the needle-trapping blade should clamp the needle. Moving down the release slide an additional 2.1mm — until the top surface of the lug is even with the bottom surface of the release-locking lever — should release the mirror.

The adjustment point for the needle-trapping blade is the one we've mentioned — the screw at the bottom of the camera. Turning in the adjusting screw means it takes less release-slide movement to trap the needle.

There's another release-stroke adjustment under the wind-side leatherette, Fig. 50. A clearance cutout in the front plate provides access to the mirror-release adjustment — how far down the release slide has to travel before the mirror releases. Looking through the cutout, locate the lug on the release slide that engages a forked tab on the **mirror-release lever**. Spread or compress the forked tab to change the mirror-release point.

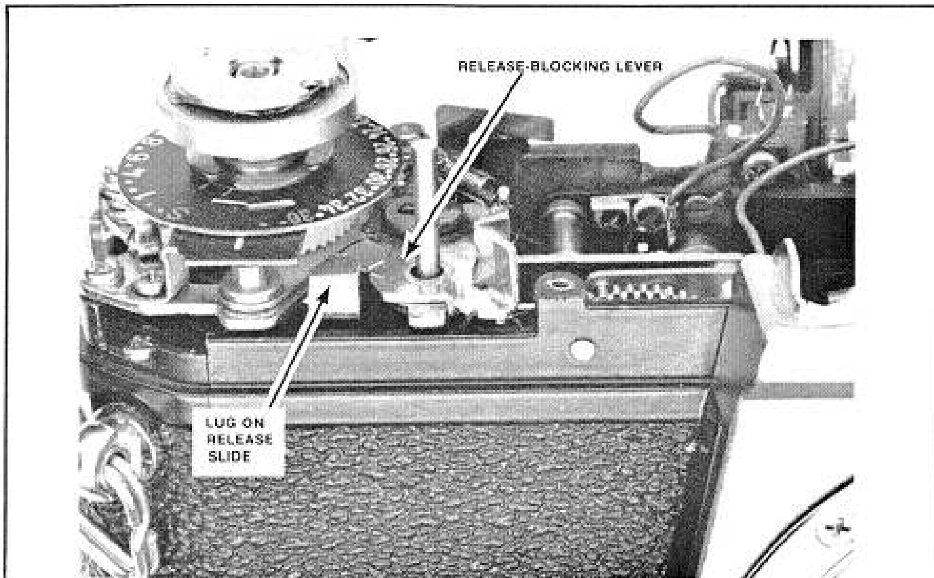


Figure 49

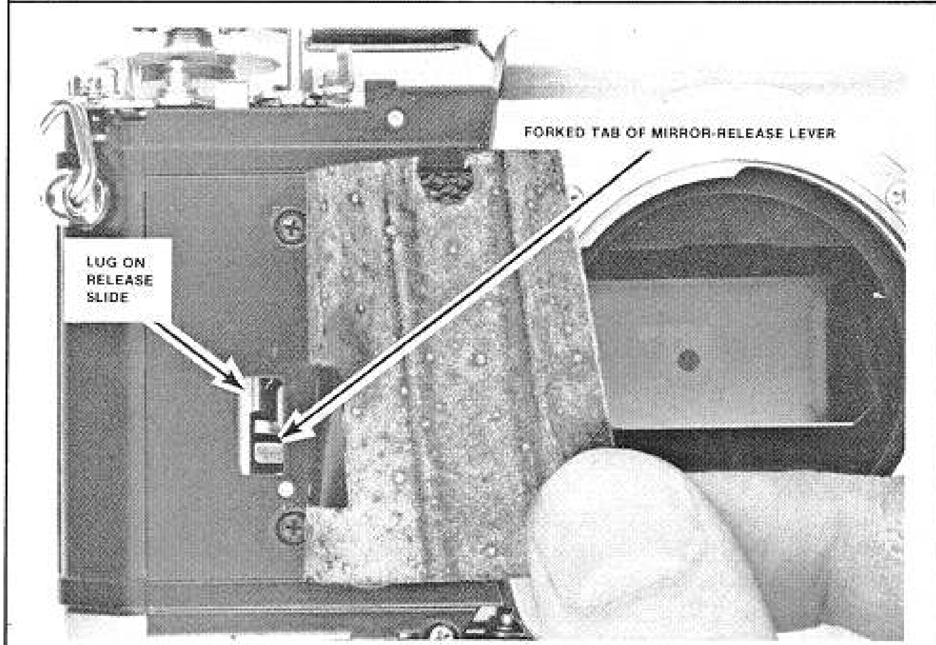


Figure 50

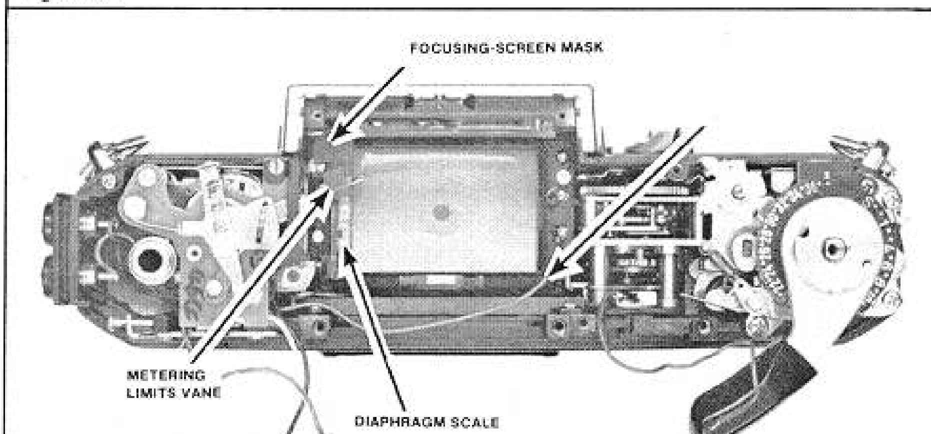


Figure 51

Focusing-Screen Adjustments

You can reach the focusing-screen adjustments without removing the pentaprism. But it's a little tough to point out the adjustments with the pentaprism installed. Even with the pentaprism removed, the focusing-screen mask and the metering-limits vane hide one of the adjusting screws, Fig. 51.

So in Fig. 52 we've installed the lens. And we've set the diaphragm-setting ring to the "AE" setting. That moves the focusing-screen mask (the

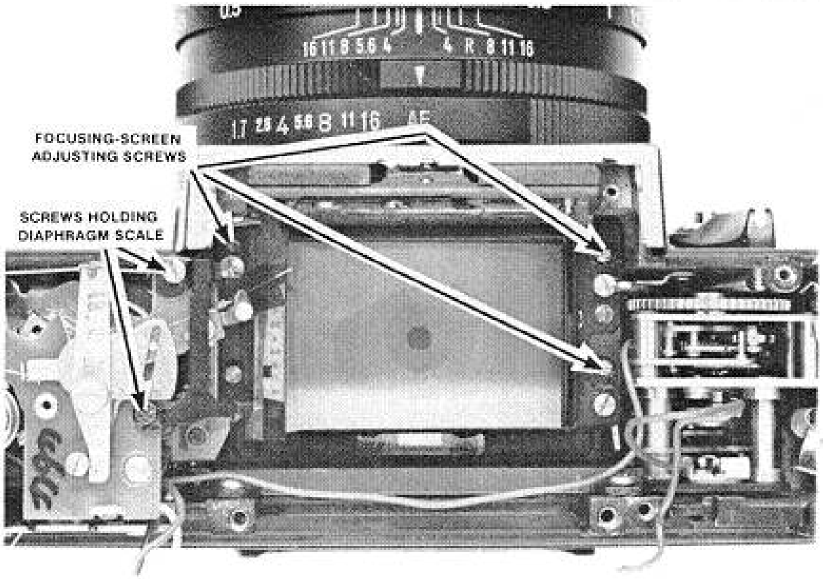


Figure 52

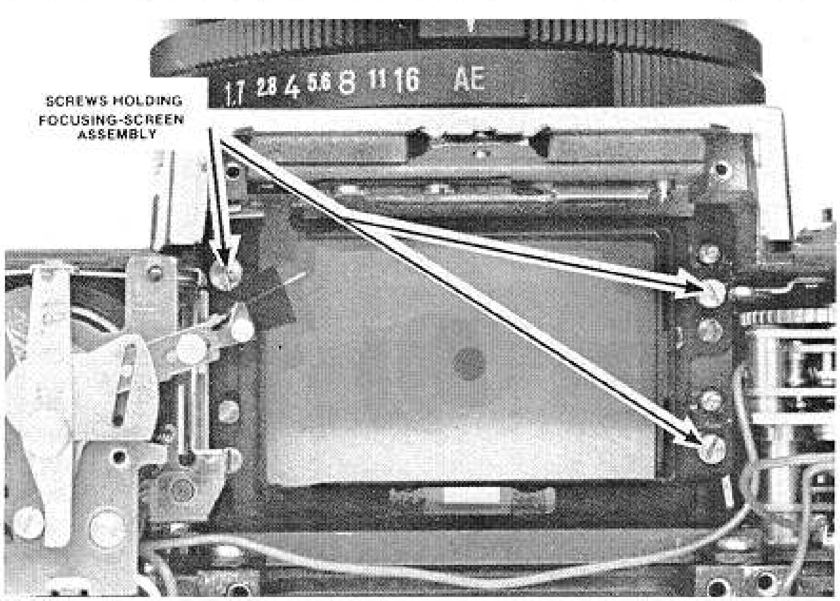


Figure 53

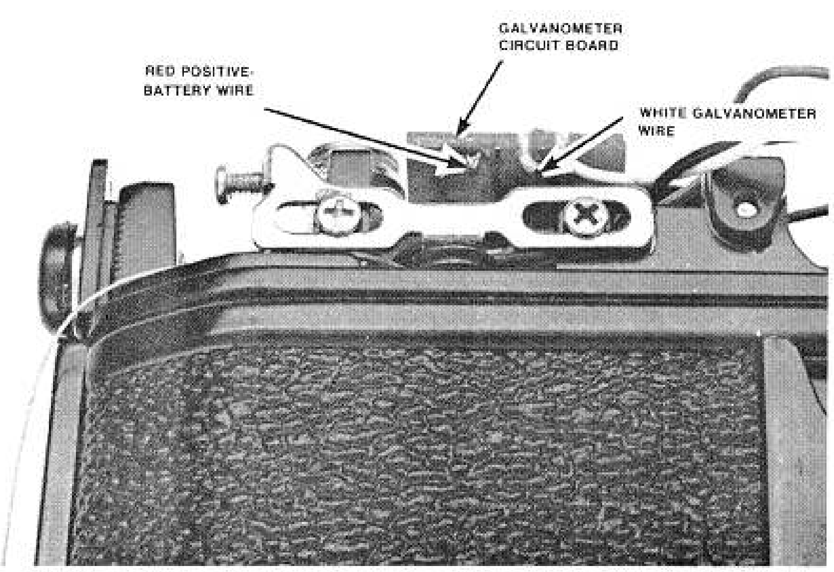


Figure 54

one that covers the "M") and the metering-limits vane away from the third adjusting screw. The three adjusting screws pointed out in Fig. 52 allow you to adjust the focus in all four corners (as well as at the center) of the focusing screen.

Replacing the Fresnel Lens

We mentioned earlier that the T3 comes with the standard microprism Fresnel lens. But your customer may want you to install the split-image Fresnel lens (part #529-05261).

The modification requires that you remove the complete focusing-screen assembly. And, as you can see in Fig. 52, removing the focusing screen presents a problem. The diaphragm scale's in the way.

So first remove the diaphragm scale (scribe the scale's position — it has a sliding adjustment). Be careful to avoid damaging the exposure-meter needle and the metering-limits vane. Even with the diaphragm scale removed, taking out the focusing screen can be risky — the metering-limits vane, the exposure-meter needle, and the focusing-screen mask are still in the way.

Remove the three screws shown in Fig. 53. (Notice that we've installed the lens to uncover the brass screw in the upper left-hand corner.) Then, lift the right-hand edge of the focusing screen. And carefully lift out the focusing screen, toward the wind-lever end of the camera.

An easier time to remove the focusing screen is after you've taken out the complete galvanometer/exposure-control unit. But that involves quite a bit more disassembly. So you can use the shortcut procedure when all your customer wants is the focusing-screen modification. You can then disassemble the focusing-screen assembly to install the split-image Fresnel lens.

Removing the Front-Plate/ Mirror-Cage Assembly

The front plate, mirror cage, and exposure-control assemblies all come out as one unit. There's only one more wire to disconnect. Locate the two wires — a red wire and a white wire — on the underside of the galvanometer circuit board, Fig. 54. You've already unsoldered the other end of the white galvanometer wire. The red wire goes to the positive

(continued page 27)

(from page 10) **KONICA**

battery contact in the battery compartment.

Unsolder the red wire from the galvanometer circuit board. Then, peel off both front sections of leatherette. You don't have to remove the delayed-action cocking lever to pull off the wind-side leatherette.

We've already pointed out most of the cutouts in the front plate. Each cutout provides clearance for an adjustment. Not only does the T3 provide plenty of adjustments, it gives you easy access to each one.

One adjustment we haven't mentioned is a special bonus. Locate the three clearance holes on the wind side of the front plate, Fig. 55. These holes allow you to reach an eccentric and two locking screws on the shutter's speed-cam gear.

The adjustment comes in pretty handy on reassembly. Both the speed cam of the shutter and the speed-selector assembly (the assembly you removed) have click-stop speed settings. On reassembly, you may find that the two detented parts don't match precisely. One detent may not engage at exactly the same time as the other. So you get detents in between the speed settings — two distinct click-stops as you change shutter speeds.

You can then use the eccentric on the speed-cam gear to match the two detent actions. After you've replaced the speed-selector assembly, check to see if you have detent stops between shutter-speed settings. If you do, first set the shutter to 1/1000 second — that's the only setting at which you can reach both locking screws and the eccentric. Then, reach through the two locking-screw clearance holes (the holes near the lens opening) with a screwdriver. And loosen the locking screws.

But you'll find that part of the depth-of-field-preview linkage (behind the front plate) now covers the third clearance hole — the hole for the eccentric. So push the delayed-action cocking lever toward the lens mount. That moves the depth-of-field-preview linkage away from the clearance hole. You can then reach through the clearance hole to turn the speed-cam-gear eccentric.

Complete the front-plate disassembly by taking out the five front-plate screws. There're two black screws on each side. And there's a silver-colored screw toward the bottom of the wind side. With the five screws removed, lift out the complete front-plate/mirror-cage assembly.

Replacing the Front-Plate/ Mirror-Cage Assembly

On reassembly, you have to help one part into the proper position. That part's the **mirror-return lever** on the side of the mirror cage, Fig. 56.

Pushing the end of the mirror-return lever against the mirror cage returns the mirror to the viewing position. The part that drives the mirror-return lever against the mirror cage is the shutter's **mirror-return striker**, Fig. 57.

To see how the mirror-return striker does its job, first cock the shutter. Then, release the shutter by pushing up the release pawl, Fig. 58. Notice the movement of the mirror-

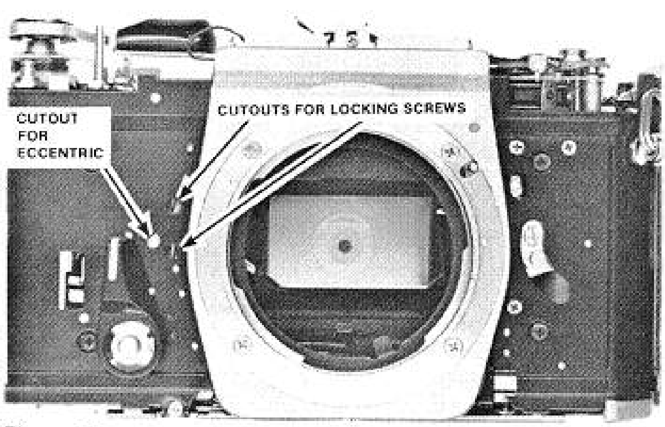


Figure 55

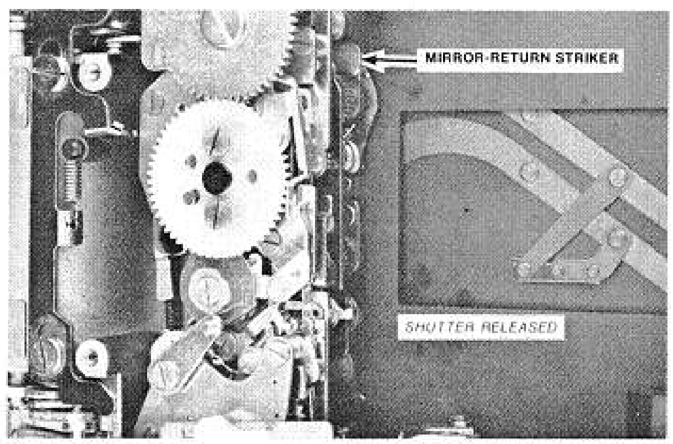


Figure 57

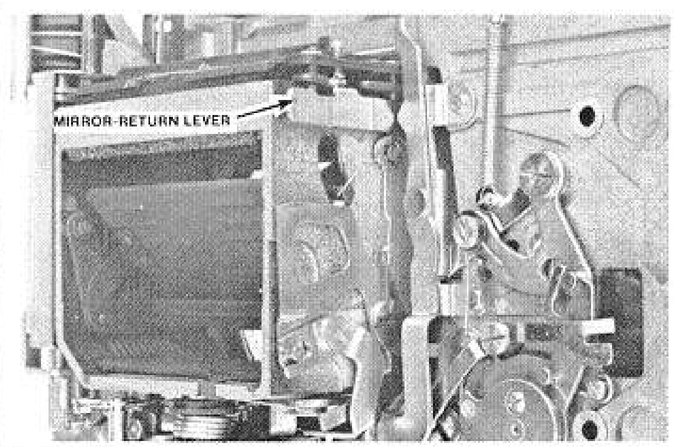


Figure 56

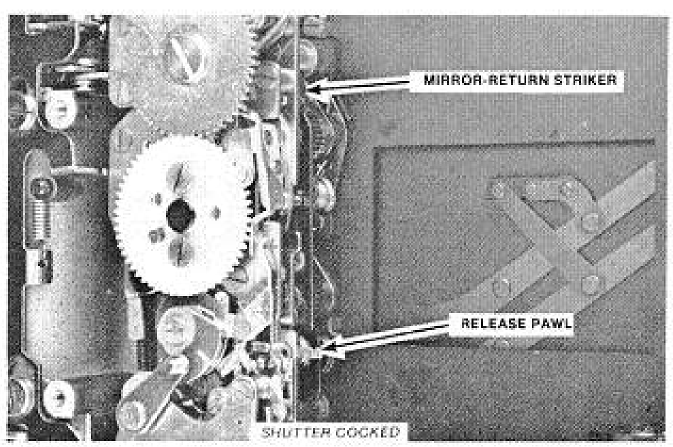


Figure 58

return striker. After the exposure, the closing-blade assembly drives the mirror-return striker toward the center of the camera, Fig. 57. The mirror-return striker then drives the mirror-return lever against the mirror cage.

So the trick on reassembly is to get the mirror-return lever on the proper side of the mirror-return striker. Fig. 59 shows what happens when you replace the front-plate/mirror-cage assembly (assemble the parts with the mirror cage and the shutter in the released positions). Notice that the end of the mirror-return lever comes against the front surface of the mirror-return striker. And the front - plate / mirror - cage assembly can't seat fully.

All you have to do is reach through the opening with your tweezers. And push the mirror-return lever against the mirror cage — until the mirror-return lever seats against the end of the mirror-return striker, Fig. 60. Check the operation before replacing the screws. Just cock and release the shutter while holding the front-plate/mirror-cage assembly in position.

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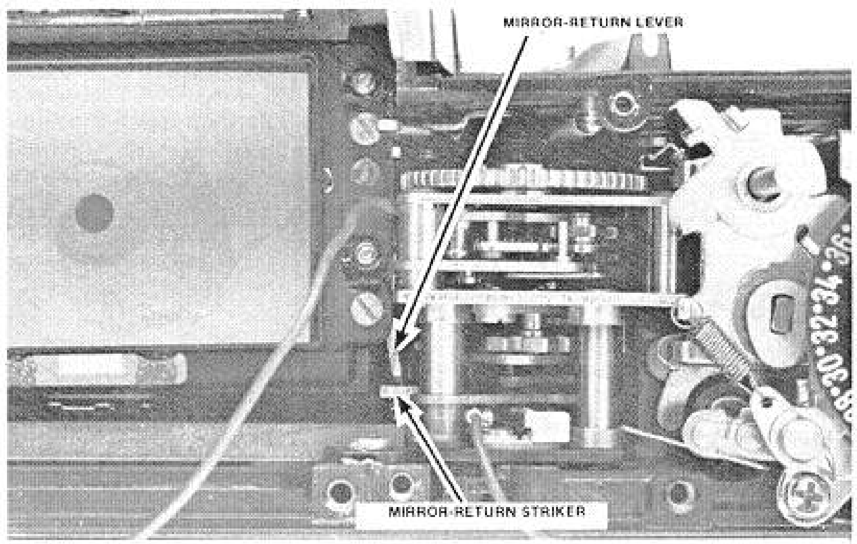


Figure 59

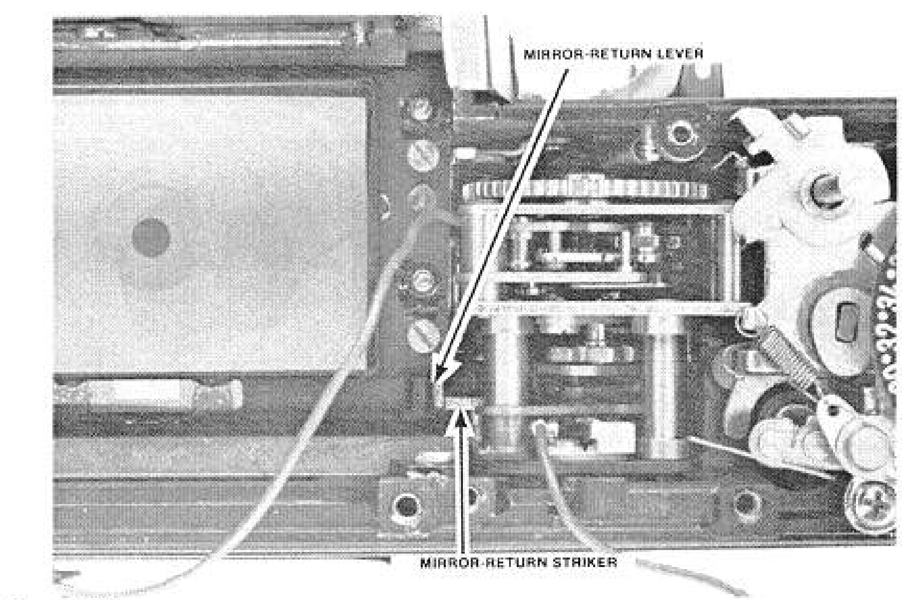


Figure 60

by Lawrence C. Lyells

KONICA AUTOREFLEX T3

Part III

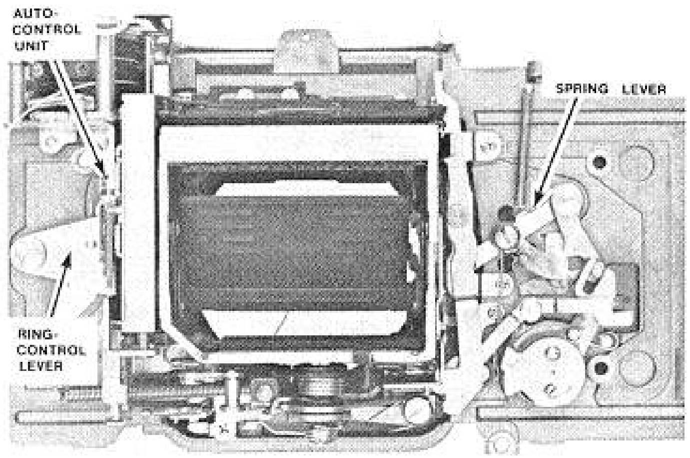


Figure 61

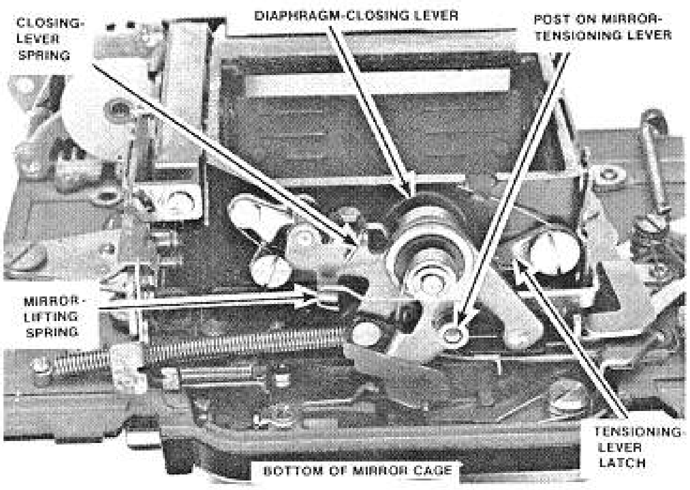


Figure 62

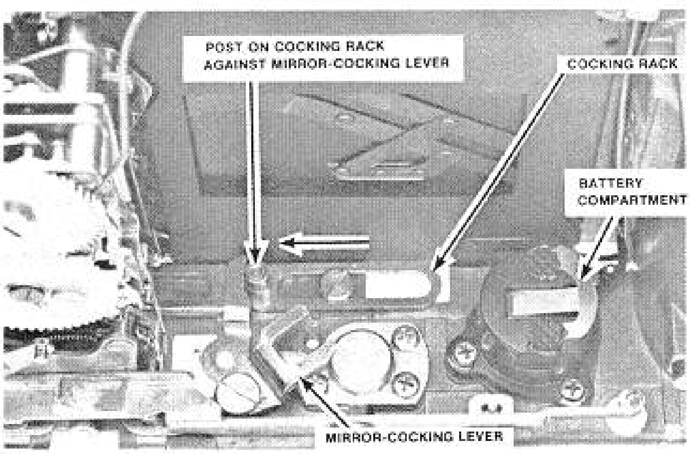


Figure 63

Conclusion

Mirror and Diaphragm-Control Operation

Fig. 61 shows the back of the front-plate / mirror - cage assembly. The **ring-control lever** and the **spring lever** are the parts that couple to the auto-control ring. Posts on the back of the auto-control ring feed through forked ends of these two levers.

The mechanism that controls the movement of the auto-control ring is a complete module mounted to the left-hand side of the mirror cage, Fig. 61. The **auto-control unit** contains the trap-needle mechanism and the galvanometer. Those hefty springs at the bottom of the mirror cage provide the power for the diaphragm-closing system and for the mirror-driving system.

Consider for a moment that the front - plate / mirror - cage assembly's mounted on the camera body. The post on the **mirror-tensioning lever**, Fig. 62, then fits through the U-shaped cutout in the **mirror-cocking lever**, Fig. 63.

Advancing the wind lever moves the cocking rack from left to right, Fig. 63. That brings the post on the cocking rack against the mirror-cocking lever. So the cocking rack drives the mirror-cocking lever in a counterclockwise direction. And the mirror-cocking lever carries the mirror-tensioning lever in the same direction.

At the end of the cocking cycle, the **tensioning-lever latch**, Fig. 62, engages the mirror-tensioning lever. The tensioning-lever latch then holds the mirror-tensioning lever against the tension of two springs — the **mirror-lifting spring** and the **tensioning-lever return spring**, Fig. 64. Notice that one end of the mirror-lifting spring hooks to the mirror-tensioning lever. The other end hooks to the lever underneath the mirror-tensioning lever — the **mirror-drive lever**.

Now, the tensioned mirror-lifting spring tries to pull the mirror-drive lever in a counterclockwise direction. But it can't as yet do so. The **drive-**

lever latch, Fig. 64, holds the mirror-drive lever.

Pushing the release button brings a lug on the release slide against the mirror-release lever. Remember, you can see the forked end of the mirror-release lever through the front-plate clearance cutout. The mirror-release lever then pushes the drive-lever latch out of engagement with the mirror-drive lever.

So the mirror-drive lever swings in a counterclockwise direction. And the post on the mirror-drive lever comes against the tab on the **lifting-lever link**, Fig. 64. That drives the lower end of the lifting-lever link toward the back of the mirror cage.

As you can see in Fig. 65, the other end of the lifting-lever link straddles a pin on the **mirror-lifting lever**. Consequently, the mirror-lifting lever moves toward the front of the mirror cage. The sloped edge of the mirror-lifting lever then comes against a post on the mirror bracket, driving the mirror to the taking position.

Simultaneously, the diaphragm-closing lever swings from right to left (as seen from the front of the lens opening). In Fig. 62, you can just see the diaphragm-closing lever under the mirror-drive lever. Also locate the closing-lever spring, Fig. 62. One end of the closing-lever spring hooks to a tab on the mirror-drive lever — the other end hooks to the side of the diaphragm-closing lever.

Consider that the mirror-drive lever is now moving to raise the mirror. The closing-lever spring carries the diaphragm-closing lever in the same direction. You've already seen how the diaphragm-closing lever releases the auto-control ring — we described that operation while looking at the front of the lens opening. During the mirror-lifting cycle, the diaphragm-closing lever swings away from the auto-control-ring post. And the auto-control ring spins clockwise (as seen from the front).

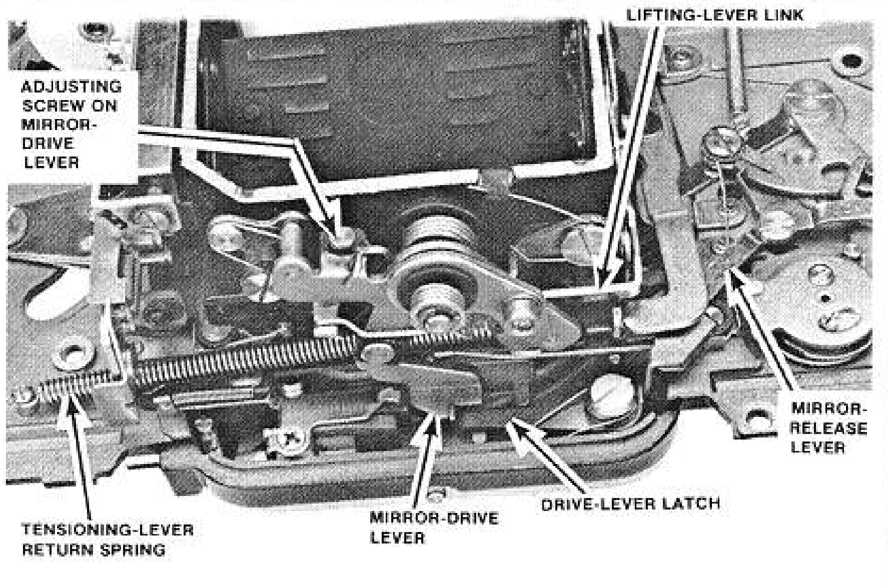
Now, the diaphragm closes to the proper f/stop. As the mirror nears the taking position, an extension of the mirror-lifting lever, Fig. 65, strikes the shutter's release pawl, Fig. 58. So the shutter releases after the auto-control system has selected the diaphragm opening.

The mirror remains in the taking position as long as the tensioning-lever latch holds the mirror-tensioning lever. It's up to the closing blade of the shutter to disengage the mirror-tensioning lever at the end of the exposure. You've already seen how the closing-blade assembly drives the mirror-return striker, Fig. 57, toward the center of the camera. And the mirror-return striker pushes the mirror-return lever, Fig. 65, against the mirror cage.

The other end of the mirror-return lever drives the upper end of the return link from left to right in Fig. 65. And the lower end of the return link disengages the tensioning-lever latch. As you'll recall, the upper end of the return link simultaneously operates the shutter-cocked indicator.

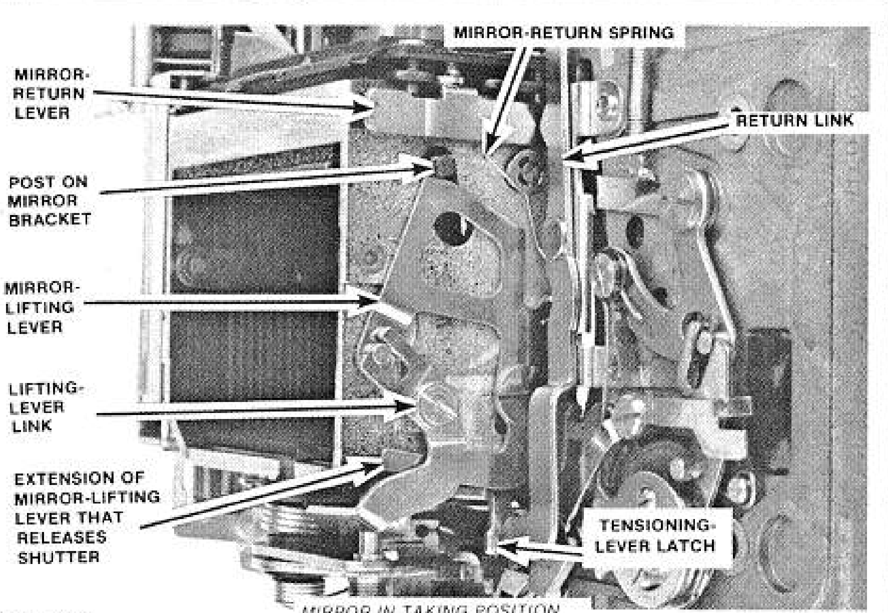
Disengaging the tensioning-lever latch allows the tensioning-lever return spring to pull the mirror-tensioning lever clockwise — back to its rest position. The downward-projecting tab on the mirror-tensioning lever carries the mirror-drive lever in the same direction. Now, the post of the mirror-drive lever moves away from the lifting-lever link. And the mirror-return spring, Fig. 65, returns the mirror to the viewing position.

The diaphragm-closing lever also returns, pulled by the closing-lever spring. The strong closing-lever spring overpowers the spring tension on the auto-control ring and on the diaphragm. So the diaphragm-closing lever drives the auto-control ring back to the starting position. And the



MIRROR CAGE TENSIONED

Figure 64



MIRROR IN TAKING POSITION

Figure 65

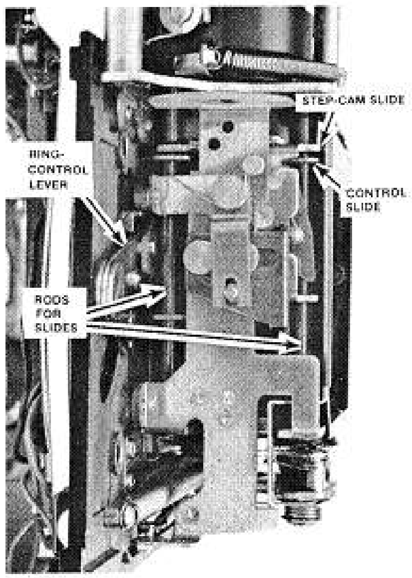


Figure 66

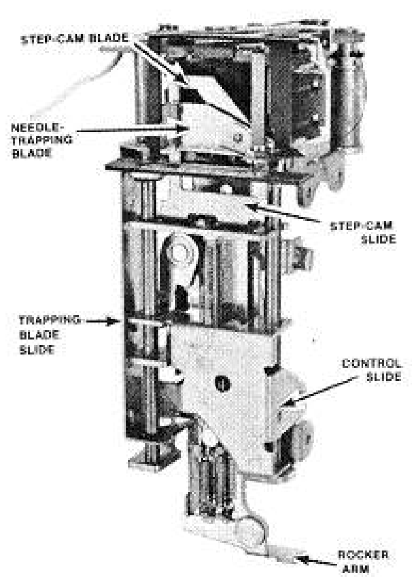


Figure 67

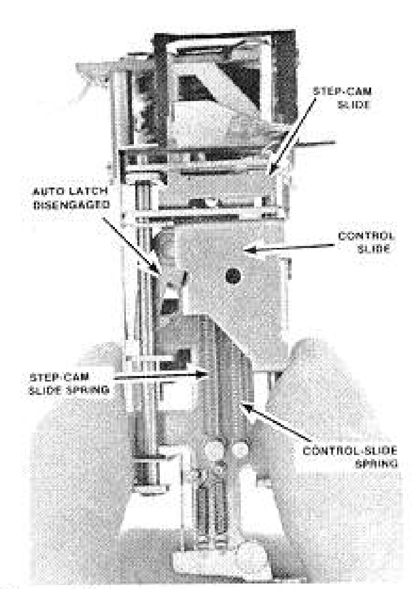


Figure 68

diaphragm leaves open to the largest aperture.

Notice the hex-head adjusting screw in Fig. 64 — that's what determines how far the diaphragm-closing lever can return. The diaphragm-closing lever returns until it strikes the end of the adjusting screw. So the adjusting screw controls the starting position of the diaphragm-closing lever — and thereby the starting position of the auto-control ring, as shown in Fig. 8.

All this action simultaneously drives the auto-control unit. As we mentioned, the auto-control ring couples to the ring-control lever, Fig. 61. And the ring-control lever couples to the auto-control unit, Fig. 66.

If you look closely at the auto-control unit, you can see two brass slides. Both slides travel vertically within the auto-control unit. The **step-cam slide** on top has the step cam formed on its upper end. The **control slide**, closer to the mirror cage, couples to the ring-control lever. Two rods in the auto-control unit, Fig. 66, guide the slides.

You can see the two slides more clearly in Fig. 67. Here, we've removed the complete auto-control unit (we'll describe the procedure a little later). And we're showing the slide of the auto-control unit that normally faces the side of the mirror cage.

In Fig. 67, the control slide has moved down — away from the step-cam slide. That's because we've disconnected the control slide from the ring-control lever. Normally, the ring-control lever holds the control slide toward the top of the auto-control unit. And the control slide pushes up the step-cam slide, Fig. 68. Pushing up the step-cam slide frees the exposure-meter needle.

Notice that each slide has its own spring. The springs try to pull the slides toward the bottom of the mirror cage. But the ring-control lever holds the slides as shown in Fig. 68. Both springs are now tensioned.

That's the situation in Fig. 66. The diaphragm-closing lever holds the auto-control ring all the way counterclockwise (as seen from the front of the lens opening). And the auto-control ring holds the ring-control lever toward the top of the front plate.

Both slides go into action when the diaphragm-closing lever moves from right to left (again, as seen from the front). Now, the auto-control ring is free to turn. Rotating clockwise, the auto-control ring drives the ring-control lever toward the bottom of the front plate. The control slide, coupled to the ring-control lever, also moves down.

Once the control slide starts to move down, the step-cam slide can follow. So the step-cam slide, pulled by its spring, comes against the exposure-meter needle, Fig. 67. Right now, you'll probably find that the step-cam slide only moves a short distance. That's because the exposure-meter needle's at the largest f/stop position. So the needle quickly stops the downward travel of the step-cam slide.

Yet the control slide moves down all the way. And the auto-control ring turns its maximum distance. Even though the needle stops the step-cam slide, there's as yet nothing to arrest the control slide. That means there's no automatic diaphragm control.

What you're seeing here is the action at a manual f/stop setting. At a manual setting, the auto-control ring always turns its maximum distance. The two slides now move independently. So the step-cam slide has nothing to say about the movement of the control slide.

For automatic diaphragm control, it's necessary to couple the two slides. Then, the step-cam slide can stop the movement of the control slide. Stopping the downward travel of the control slide also stops the movement of the ring-control lever. And the ring-control lever arrests the auto-control ring.

You can see what happens on automatic operation if you first replace the lens. Then, turn the diaphragm-setting ring back and forth between the f/16 setting (manual) and the "AE" setting (automatic). As you turn the diaphragm-setting ring, watch the movement of the **auto latch**, Fig. 69.

The auto latch attaches to the step-cam slide. At the automatic setting, Fig. 70, the auto latch moves into engagement with the control slide. Now, the auto latch couples the control slide to the step-cam slide — stopping the step-cam slide also stops the control slide. But at a manual f/stop setting, Fig. 69, the auto latch disengages the control slide. So the two slides move independently.

Again, it's difficult to see exactly what's happening unless you remove the auto-control unit. We've done so in Fig. 71 to show how the auto latch engages the control slide. Remember, the auto latch is a part of the step-cam slide. So moving the auto latch into engagement with the control slide couples the two slides together.

What moves the auto latch? At the "AE" setting, you'll recall, a lug on the diaphragm-setting ring pulls down the pin of the diaphragm-sensing lever. The other end of the diaphragm-sensing lever then moves up — against the eccentric stud of the **latch-control lever**, Fig. 70.

Now, the latch-control lever pulls the **latch-positioning slide** toward the front of the mirror cage. So the latch-positioning slide moves away from the pin on the auto latch. The spring-loaded auto latch then drops into engagement with the control slide, Fig. 70.

At a manual f/stop setting, the spring - loaded latch - control lever swings counterclockwise, Fig. 69. The latch-control lever then moves the latch-positioning slide against the pin of the auto latch. That pushes the auto latch out of engagement with the control slide.

The eccentric on the latch-control lever adjusts the engagement of the auto latch (this is the eccentric you can reach through a cutout in the front plate). At "AE," the latch-positioning slide should move completely clear of the auto-latch pin, Fig. 70. There should be at least 0.3mm clearance between the auto-latch pin and the latch-positioning slide. The auto latch can then fully engage the control slide.

At a manual setting, the latch-positioning slide must push the auto latch completely out of engagement with the control slide. The auto latch should clear the control slide by at least 0.4mm, Fig. 68.

There's one more slide on the auto-control unit. The **trapping-blade slide**, Fig. 72 and Fig. 67, has the needle-trapping blade formed on its top end. Try pushing up the rocker arm, Fig. 72. That allows the spring-loaded trapping blade to move down. And the needle-trapping blade comes against the needle.

The part that normally controls the rocker arm is the **trapping-blade control lever** at the bottom of the camera, Fig. 73. Depressing the release button brings the lower end of the release slide against the trapping-blade control lever. The adjusting-screw end of the trapping-blade control lever then moves toward the top of the camera. That brings the adjusting screw against the rocker arm.

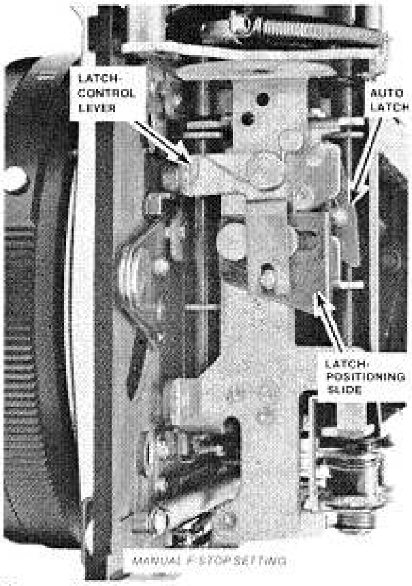


Figure 69

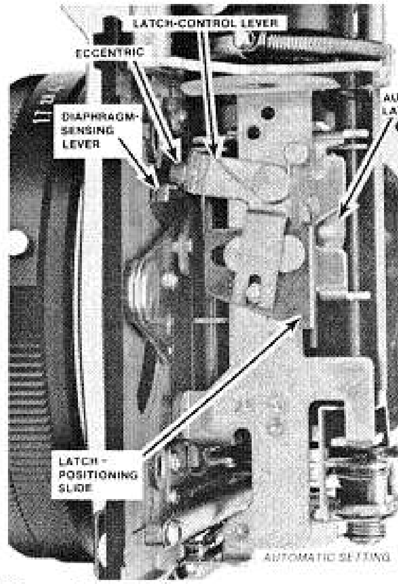


Figure 70

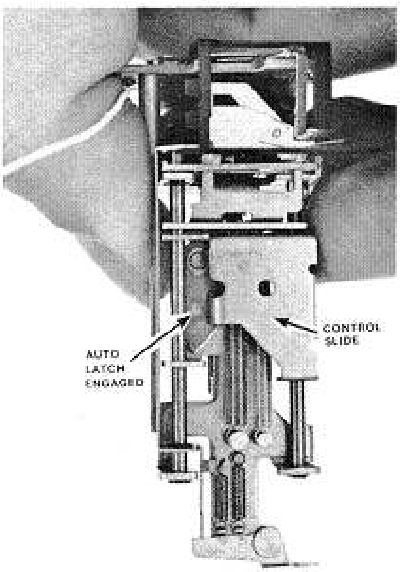


Figure 71

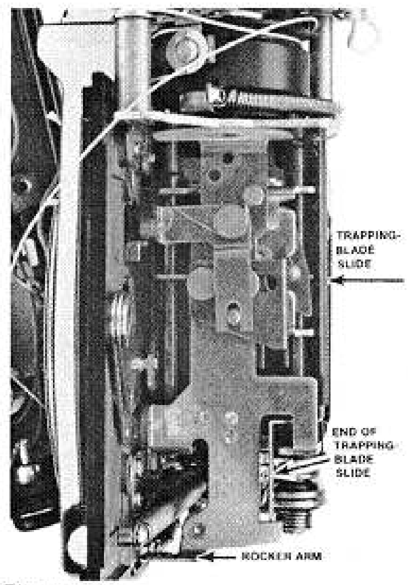


Figure 72

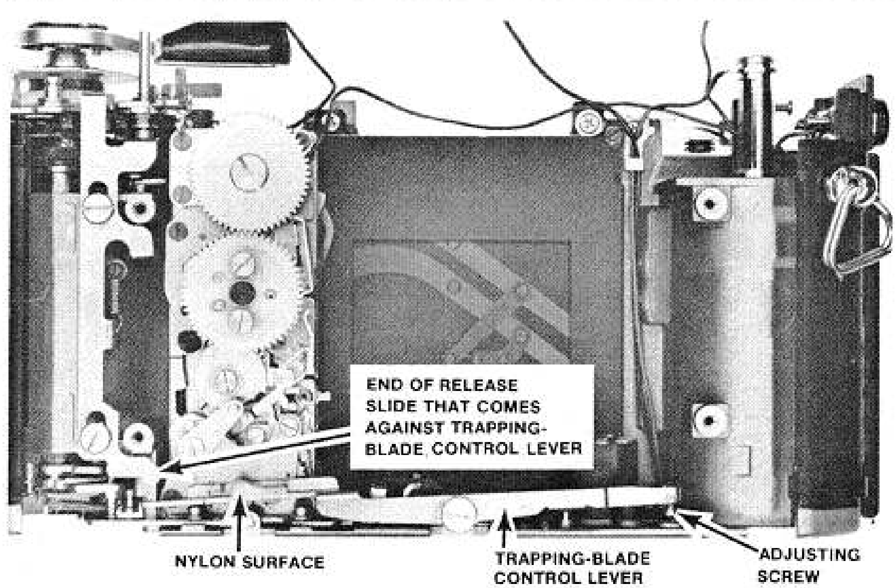


Figure 73

For the depth-of-field preview, there's another part that operates the trapping-blade control lever. Notice that the trapping-blade control lever has a nylon surface, Fig. 73. When you use the depth-of-field preview, the delayed-action cocking cam, Fig. 74, turns counterclockwise. A projection on the delayed-action cocking cam then comes against the nylon surface of the trapping-blade control lever. So once again the trapping-blade control lever pivots in seesaw fashion. And the adjusting screw pushes up the rocker arm to free the trapping-blade slide.

Fig. 74 also shows how the diaphragm stops down for the depth-of-field preview. Pushing the delayed-action cocking lever toward the lens moves the U-shaped end of the **preview lever** toward the mirror cage. The preview lever than moves the **manual-closing lever** in a clockwise direction.

Notice the steel cord hooked to the top of the manual-closing lever. The other end of the steel cord hooks to the **manual-closing slide**, Fig. 75. You can barely see the manual-closing slide in Fig. 75 — other parts are in the way. But the steel cord pulls the manual-closing slide from left to right in Fig. 75.

The manual-closing slide then pushes the diaphragm-closing lever from right to left (as seen from the front of the lens opening). So the auto-control ring rotates clockwise to free the control slide. At a manual f/stop setting, the diaphragm stops down to the aperture you've selected. And at the automatic setting, the diaphragm stops down until the step cam engages the exposure-meter needle.

Removing the Shutter

From the front of the shutter, you now have a better view of the eccentric adjustment we mentioned earlier. Notice that the eccentric's on the nylon speed-cam gear, Fig. 76. Turning the eccentric shifts the speed-cam gear in position.

Right now, you won't get any results by turning the eccentric. The speed-selector assembly must be installed. But, as we noted, the eccentric provides a detent-matching adjustment between the speed-selector assembly and the speed-cam gear.

To remove the shutter, first unsolder the brown M-sync wire from the M-sync terminal. Then, remove the two cross-point screws at the top of the shutter-blade assembly. There is one more screw holding the shutter. In typical Copal Square fashion, the third screw's at the back of the focal-plane aperture. Notice that the third screw threads into a nut near the bottom of the camera.

Take out the screw and the nut. Then, lift out the complete shutter assembly.

Replace the shutter in the shutter-released position. Make sure that you've first turned the cocking-gear segment, Fig. 77, all the way counterclockwise (as seen from the back). That's as far as you can move the cocking-gear segment without turning the wind-gear sector. When you then install the shutter, you'll have the proper timing between the cocking-gear segment and the cocking rack.

Adjusting the Copal Square Shutter Speeds

There're several reasons we're especially fond of cameras using the Copal Square shutter. For one thing, the camera disassembly is typically fast and convenient — all that modular design. And for another, shutter-speed adjustments are usually a breeze. In most cases, the shutter speeds come into close tolerance with little or no effort — even 1/1000 second.

We won't go through the shutter disassembly in this article. Many of you are already familiar with the Copal Square S. Also, disassembly and timing information is available — the National Camera Workbook covers the step-by-step sequence (available from National Camera Supply). One thing that isn't mentioned in the Workbook, though, is the adjustment technique for timing the shutter speeds.

If you're going to disassemble the shutter, first scribe the position of the drive-spring ratchet. The ratchet controls the tension on the main-

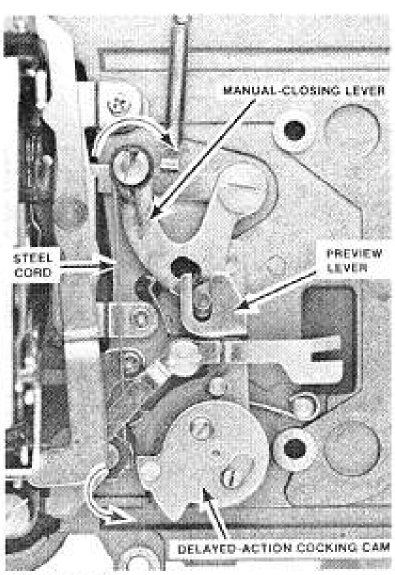


Figure 74

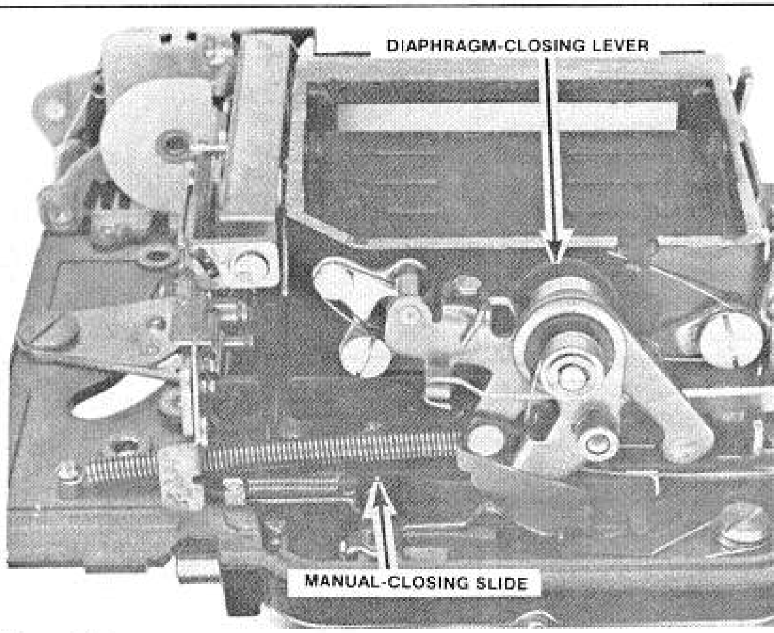


Figure 75

drive spring. This spring tension is one of the main factors governing the shutter-speed accuracy.

The main-drive spring usually has around ¾ turn tension. On reassembly, just turn the drive-spring ratchet counterclockwise (adding tension) until your scribe marks align. You may then find that your shutter speeds check out properly without further adjustment. That's the beauty of the Copal Square S.

But if your speeds are too fast or too slow, you can change the tension of the main-drive spring. Increase the spring tension by turning the drive-spring ratchet counterclockwise (as seen from the back of the shutter). That speeds up the entire range. It's a little tougher if you have to slow down the speeds. Then, you must disengage the ratchet pawl to let off tension.

Usually, that's all you have to do in adjusting the shutter speeds — change the main-drive spring tension. But what about the exceptions? Suppose, for example, that by changing the main-drive-spring tension you can adjust the slow speeds — or the fast speeds. But not both. You've then encountered the drawback to the Copal Square S. There's no convenient linearity adjustment.

You may then have to resort to a last-resort technique — actually reforming parts. But first, make sure your blade tensions are correct. The blade-travel time of the Copal Square S should be 7.2 - 7.5 milliseconds from the top edge to the bottom edge (6 - 6.5ms using the National Camera Travel-Time Masks). Adjust the blade-tensioning ratchets, Fig. 57, to bring in the travel times.

The standard procedure is to adjust the opening-blade travel time by setting the opening-blade tension. Then, set a fast shutter speed. And adjust the closing-blade tension until the exposure at the top of the focal-plane aperture matches the exposure at the bottom.

If you still have a linearity problem, here's one procedure you can follow. Use the drive-spring ratchet to adjust the 1-second exposure. Then, set the shutter to 1/1000 second. And adjust the 1/1000 second exposure by reforming the closing-blade latch, Fig. 77.

Bending the closing-blade latch away from the closing-blade tensioning lever decreases the length of engagement. So the closing-blade latch releases the closing blade sooner — a faster shutter speed. An adjustment on the closing-blade latch has the greatest effect at the fastest shutter speed.

But the adjustment also affects the other slit-width speeds. If you adjust the closing-blade latch for a faster 1/1000 second, you may find that your 1/500 second and 1/250 second are too fast. In that case, you can reform the opening-blade latch. Bend the opening-blade latch to increase its depth of engagement with the opening-blade tensioning lever, Fig. 77.

As always, bending is a last-resort adjustment. Fortunately, it's rarely necessary. Remember that a Copal Square S set to 1/125 second should really deliver a 1/100 - second exposure. The important thing here is that you get a full aperture. Also, when checking shutter speeds, make sure the cocking-gear segment returns to its starting position after you cock the shutter. Otherwise, the wind-gear sector, Fig. 77, has to carry the cocking-gear segment with it. And that could give you a slower exposure.

Removing the Auto-Control Unit

You'll have to remove the auto-control unit to replace the coupling cord. Fortunately, removing the auto-control unit isn't a problem. The complete unit comes out as one assembly.

The problem enters if you have to replace a part in the auto-control unit. That's because the auto-control unit is designed for modular replacement. You can't get individual replacement parts. To replace a defective part, including the galvanometer, you replace the entire auto-control unit.

First, remove the screw that holds the cord clamp on the lens-sensing lever. Disconnecting the cord from the lens-sensing lever loses the maximum-aperture adjustment. So you'll have to readjust the maximum-aperture indication on reassembly.

Now, disconnect the cord from the

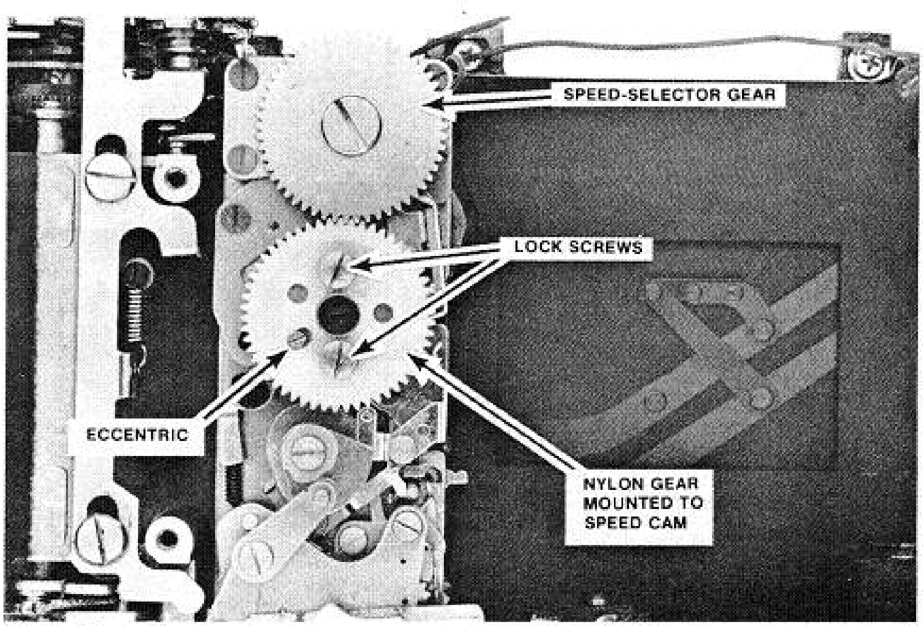


Figure 76

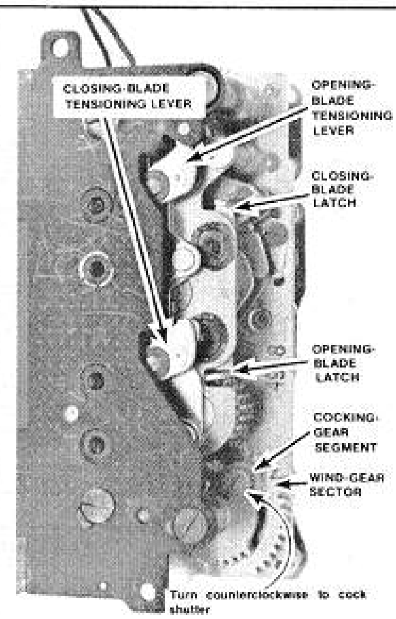


Figure 77

galvanometer pulley. And, starting at the top of the groove, pull the cord completely loose from the galvanometer. On reassembly, we'll illustrate a step-by-step procedure for routing the cord.

Three screws passing through the front plate, Fig. 78, hold the auto-control unit. Remove the three screws. Then, lift out the complete auto-control unit.

The ring-control lever remains with the front plate, Fig. 79. A post on the ring-control lever normally passes through the slot in the control slide, Fig. 80. So, now that you've disconnected the control slide from the ring-control lever, both slides move down. And the step-cam slide clamps the needle.

That's as far as you have to go in replacing the cord. Notice in Fig. 79 that the cord ties to a post on the lens-sensing slide. The cord then passes around two pulleys mounted to the front plate.

Replacing the Auto-Control Unit

As you replace the auto-control unit, hold up the control slide (against its spring tension). Make sure the slot in the control slide passes over the ring-control-lever post. You'll also have to push up the latch-control lever as you seat the auto-control unit. The eccentric stud of the latch-control lever, Fig. 80, must sit on top of the diaphragm-sensing-lever tab, Fig. 79.

You can then replace the three screws and reroute the cord. Figures 81 through 86 show the routing of the cord around the galvanometer housing.

Removing the Galvanometer

We mentioned that the galvanometer comes as part of the complete auto-control unit. But you may nonetheless have occasion to remove the galvanometer — such as for cleaning the contacts or for removing foreign particles from the magnet.

It's easier to remove the galvanometer if you leave the auto-control unit mounted to the mirror cage. Just disconnect the cord from the lens-sensing lever. And unwrap the cord from the galvanometer housing.

Then, take out the diaphragm scale (remember to scribe the scale's position). One of the diaphragm-scale screws helps secure the galvanometer circuit board. Two other screws hold the galvanometer circuit board to support posts. Remove both screws and carefully lift off the galvanometer circuit board.

You can now see the wiper contact on top of the galvanometer housing. The wiper rides against a printed circuit path on the underside of the galvanometer circuit board — that's the contact to negative battery. Positive battery contact is through ground. The support posts make the ground connection from the galvanometer circuit board to the galvanometer pivots.

Be very careful as you lift out the galvanometer housing — it's easy to catch and bend the long needle. Here is where leaving the auto-control unit mounted to the mirror cage is an advantage. The coupling parts then hold the step-cam slide clear of the needle.

What if the auto-control unit isn't mounted to the mirror cage? Then, the step-cam slide clamps the needle. So you must push up the control slide, Fig. 71, as you remove the galvanometer.

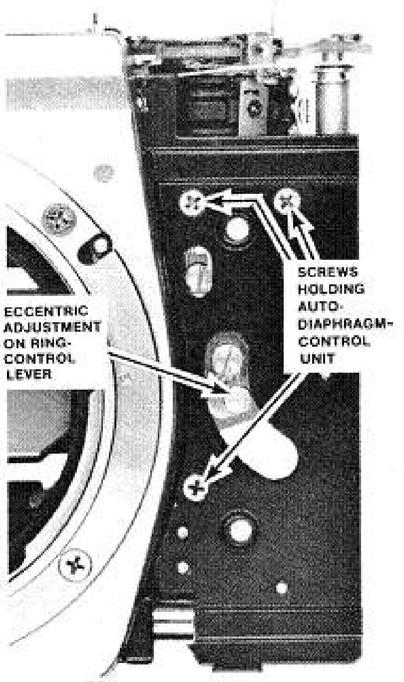


Figure 78

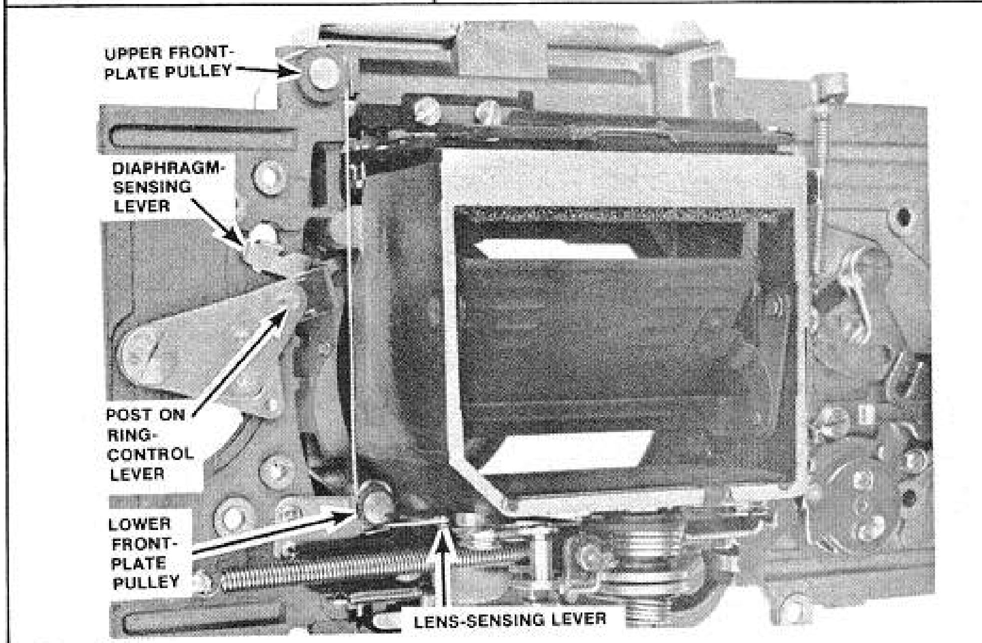


Figure 79

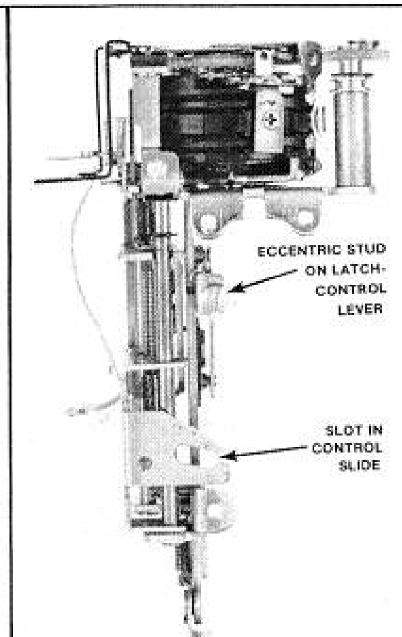


Figure 80

Cord is passing over top of upper front-plate pulley, ready to be threaded around galvanometer housing.

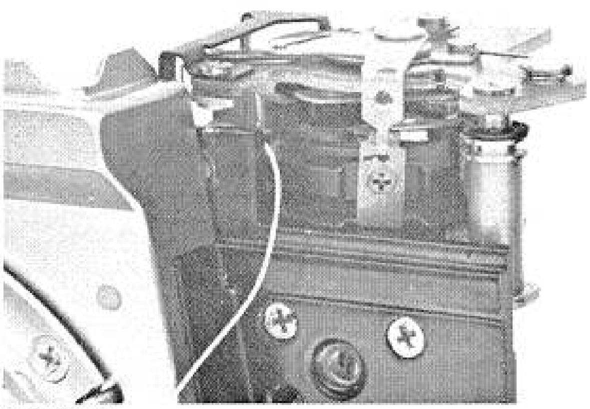


Figure 81

Pass cord over top of lens sensing lever and around pulley.

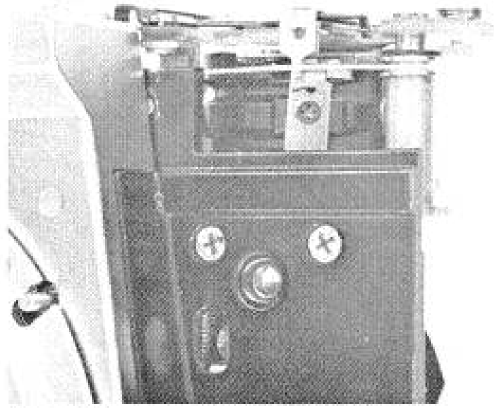


Figure 82

Route cord around back of galvanometer, in upper groove. Following the upper groove, bring cord to front of galvanometer. Notice that we've disconnected the galvanometer spring — that makes it easier to position the galvanometer housing.

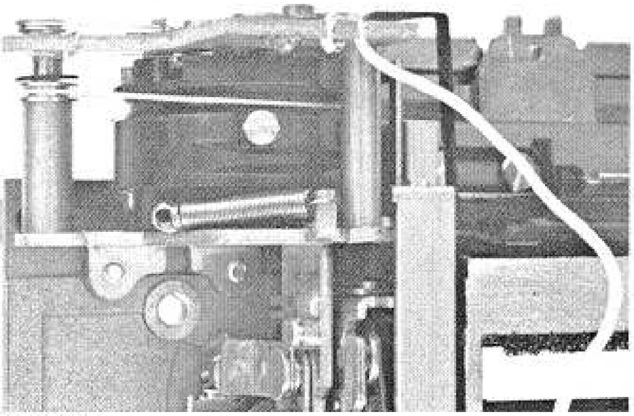


Figure 83

Pass cord under plate attached to side of galvanometer housing, still in upper groove.

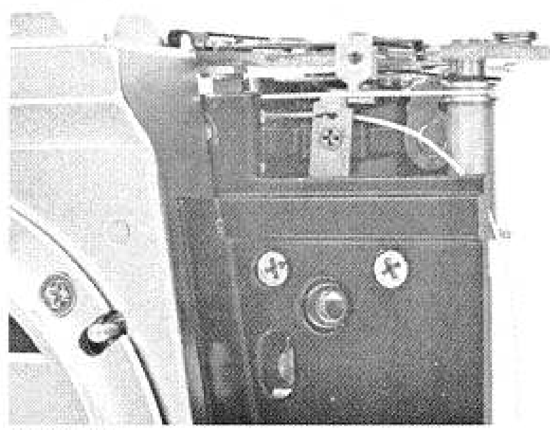
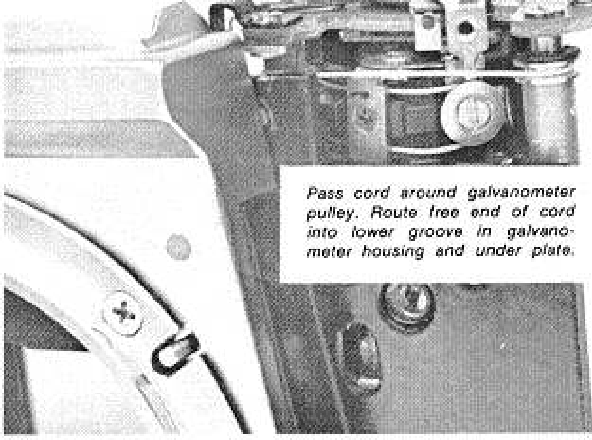


Figure 84



Pass cord around galvanometer pulley. Route free end of cord into lower groove in galvanometer housing and under plate.

Figure 85

Route cord through lower groove at back of galvanometer. Front plate is now ready for installation on camera body. Before replacing the cord clamp, turn the lens-sensing lever until it's against the eccentric on the vane lever.

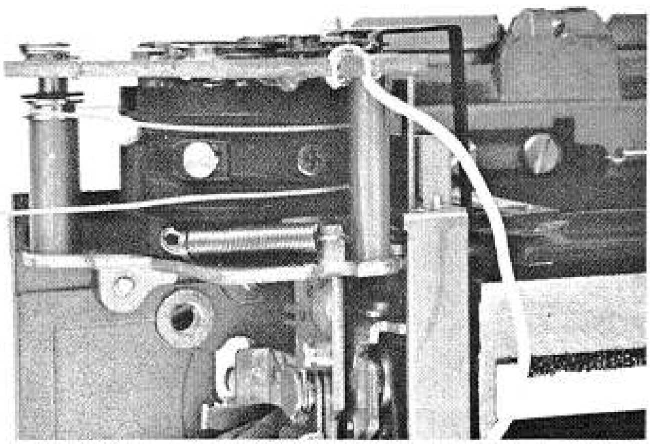


Figure 86

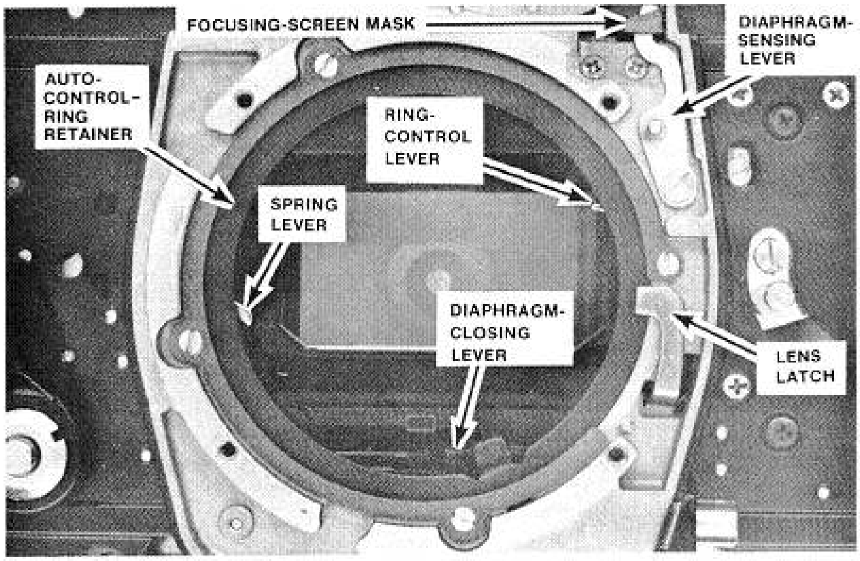


Figure 87

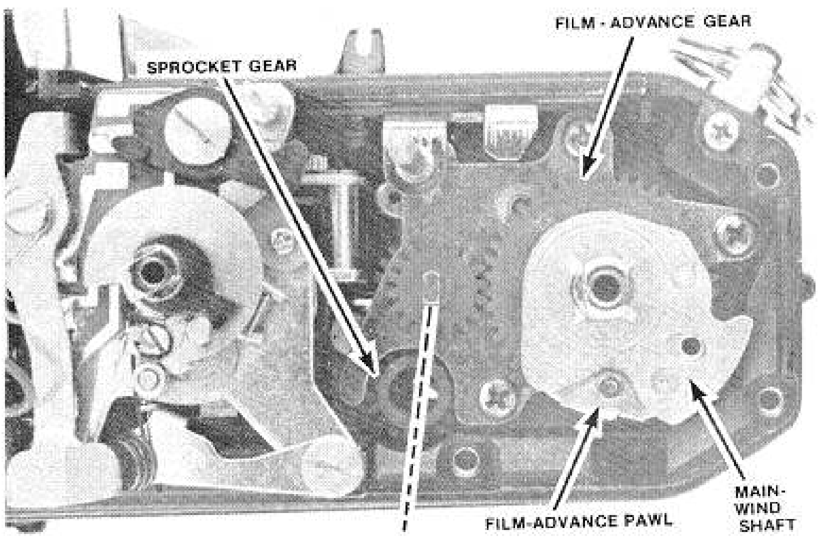


Figure 88

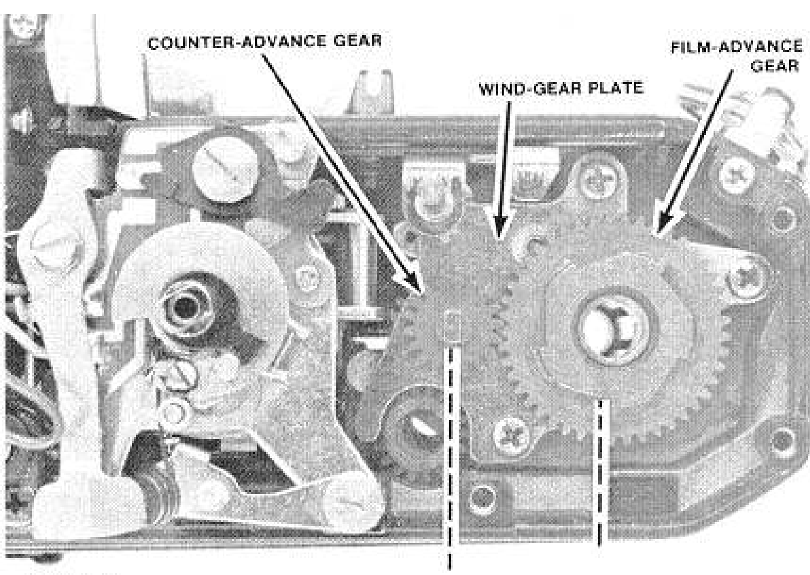


Figure 89

Removing the Auto-Control Ring

If you're getting improper diaphragm operation — but the diaphragm in the lens moves freely — the problem could be a sticking auto-control ring. You can remove the auto-control ring with the front-plate/mirror-cage assembly still installed.

First, remove the lens-mounting ring (watch for the washers that control the flange-focal distance). It's not necessary to remove the front-decorator plate. But we've done so in Fig. 87 to show the diaphragm-sensing lever and the lens latch.

Notice the coupling between the diaphragm-sensing lever and the focusing-screen mask in Fig. 87. You may have occasion to make an adjustment in this area. Suppose, for example, that the focusing-screen mask doesn't completely uncover the "M" at a manual setting — or doesn't completely cover the "M" at the automatic setting. You can then reform the end of the focusing-screen mask, the end shown in Fig. 87.

Also notice the three posts on the back of the auto-control ring. One post is on the tab that couples to the lens — this post sits to the right-hand side of the diaphragm-closing lever. The other two posts slip through the forked ends of the spring lever and of the ring-control lever.

The post that couples to the ring-control lever has a slot. So the auto-control ring won't lift straight up and out of the camera. To remove the auto-control ring, first take out the auto-control-ring retainer (held by four screws, Fig. 87). Then, lift the spring-lever side of the auto-control ring. That disengages the spring lever from one of the auto-control ring posts.

Now, slide the auto-control ring toward the wind-lever end of the camera. Once the slotted post clears the ring-control lever, you can lift out the auto-control ring.

On reassembly, slip the slotted post into the fork of the ring-control lever. Make sure that the auto-control ring sits all the way counterclockwise — its long post must hook to the right of the diaphragm-closing lever. Then, slightly lift the left-hand side of the auto-control ring. And simultaneously pull down the spring lever, against the spring tension. That way, you can sneak the forked end of the spring lever under the post on the auto-control ring.

Precautions in Further Disassembly

Normally, you wouldn't disassemble the mirror cage any further — unless, of course, you have to replace a part. If it's necessary to remove individual parts, you shouldn't have any problems. The disassembly's pretty straightforward.

One thing that's tricky, though, is rehooking the closing-lever spring on reassembly. The lower end of the closing-lever spring hooks to a notch in the side of the diaphragm-closing lever. The upper end hooks against the adjustment-screw tab of the mirror-drive lever.

A standard reassembly technique is to first seat the closing-lever spring on the diaphragm-closing lever. Then hook a loop of wire to the upper end of the spring. After replacing the mirror-drive lever, you can use the wire to pull the upper spring end in a clockwise direction — under the mirror-drive lever and around the tab.

At first glance, it appears that replacing the steel cord for the depth-of-field preview could be a problem. However, the manual-closing slide and the steel cord come as one assembly.

The procedures for removing the sprocket and take-up spool are also pretty straightforward — thanks largely to the modular construction. You can remove and replace both parts with the front-plate/mirror-cage assembly still installed.

To remove the sprocket, first take out the counter assembly. The complete counter assembly comes out as one unit. Just remove the three screws holding the module.

Then, take out the rewind latch at the bottom of the camera. Also, remove the E-ring and the compression spring from the bottom of the sprocket shaft. Notice that there's a washer on each side of the compression spring.

A screw still couples the sprocket to the sprocket shaft. Looking from the back of the camera, locate the two slots at the top of the sprocket. Push up the sprocket shaft until you can reach the coupling screw through one of these slots (you may have to rotate the sprocket to find the right slot). Remove the coupling screw. Then, lift out the sprocket shaft. And remove the sprocket from the back of the camera.

With the sprocket shaft removed, it's possible to lose the timing of the sprocket gear, Fig. 88. Check the timing by the position of the slot in the top of the sprocket gear — this slot receives the pin running through the upper end of the sprocket shaft. The timing of the sprocket gear determines the position of the sprocket. One pair of sprocket teeth — a tooth at the top of the sprocket and a tooth at the bottom — should point directly to the back of the camera.

Fig. 88 also shows the top end of the main-wind shaft. The film-advance pawl on the main-wind shaft engages the teeth of the film-advance gear (under the main-wind shaft). Using the double-exposure feature disengages the film-advance pawl. Then, the pawl-disengaging lever (remaining with the film-counter assembly) pushes the film-advance pawl away from the film-advance gear.

You must remove the main-wind shaft to replace the sprocket. And that requires removing the cocking cam at the bottom of the camera. The main difficulty here is that several screws are cemented in position. Also, watch for two left-hand screws — the screw that holds the cocking-rack link to the cocking cam and the screw that holds the cocking cam.

But the toughest part of the whole procedure may be rehooking the wind-shaft spring on reassembly. The wind-shaft spring sits underneath the cocking cam. One end of the spring hooks against the side of the cocking-cam lug. The other end hooks to a screw on the camera body.

After removing the cocking cam, you can lift out the main-wind shaft. Then, note the timing of the film-advance gear, Fig. 89. The side of one tooth points directly to the back of the camera.

Lift off the film-advance gear. Now, remove the three screws holding the wind-gear plate. Since the counter-advance gear comes off with the wind-gear plate, check its timing in Fig. 89. The shaft on top of the counter-advance gear has two flat sides which fit through a slot in the counter-advance cam (remaining with the counter assembly).

Remove the wind-gear plate and the sprocket gear. One gear remains in the camera body — the take-up-spool gear. A shaft on the underside of this gear passes through the top end of the take-up spool.

Lift out the take-up-spool gear. And notice the slot in the gear shaft. This slot fits over the end of the clutch spring remaining inside the take-up spool.

Finally, unscrew the lower take-up-spool bearing at the bottom of the camera. Thanks to a generous helping of locking agent, the bearing can be tough to unscrew. But it has a normal right-hand thread. You can now lift out the two-piece take-up spool from the back of the camera.

Conclusions on the Konica Autoreflex N-T3

As far as Craftsman articles are concerned, the Konica Autoreflexes rank in the most-often-requested category. Not that the cameras are tough to service. But there're a lot of them in the field.

From a service viewpoint, the Konica N-T3 deserves top marks in modular design — even compared to other cameras using the Copal Square shutter. The modular disassembly really speeds up repairs. But it means replacement parts can be expensive.

The N-T3 also rates high on the adjustments provided. Adjustments are plentiful and easy to reach. Plus, the red lacquer helps keep people out of dangerous areas.

A lot of features and a head start in automation may explain Konica's enduring popularity. The camera's not inexpensive. With the f/1.7 lens, the N-T3 lists for just under $500.