CAMERA REPAIR

by

EDWARD H. ROMNEY

New 1977 edition with photos. For A through M4. Simplified approach, use hand tools. Leicas cost $100 to $200 to get repaired but most only need to be stripped and cleaned which we show you how to do in half an hour. Elaborate explanation of shutter, all other components, shows the collector how to detect fakes. Leicas are actually easier to fix than lesser cameras.

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PUBLISHERS OF TEXTS ON PHOTOGRAPHY & CAMERA REPAIR

SIMPLE LANGUAGE AND CLEAR PICTURES TO EDUCATE, INFORM AND MOTIVATE . . .

A Romney Text!

HOME REPAIR AND RESTORATION OF LEICA CAMERAS

New improved edition!

by Edward H. Romney
Box 5247
Spartanburg, SC 29304

Revised 1977 edition!

Confidential

There is more interest in Leica than any other 35mm camera. Over a million cameras exist. Like the Model A Ford or the DC3 airplane, parts will be made to keep them going forever. If Leitz stops manufacturing parts, others will make them as with cars. These are extraordinarily good cameras. Excellent service is available from Leitz, but is expensive. Overhauls cost $100+. People want to work on them as a hobby. They restore many cameras to operation that it would not pay to have repaired. It is no harder than making jewelry or fixing transistor radios.

The Leica is a valued collectors' item to thousands of collectors. But, you've missed half the fun if you have never had one apart. The Leica is beautifully made inside, too. Its design is unique, for example: shutter release rod goes through the film sprocket.

You can damage irreplaceable cameras if the screwdriver slips, or you use pliers on bezels and rings. KEEP YOUR TOOLS SHARP.

It is valuable to know how to take a Leica apart so you can see if the serial number inside the body (near the speed dial on SM) agrees with the one on the outside. With 10X magnifier you can spot wear and signs of previous repair to appraise a camera. And you can detect fakes...

In this text, we take the position that it is best to clean with compressed air and solvents removing as few parts as possible. Any mechanism taken completely to pieces and put back together will never work quite as well. We believe too, that people are going to fix Leicas at home regardless, that more will succeed because of our text, and that it will help serious collectors detect fakes.

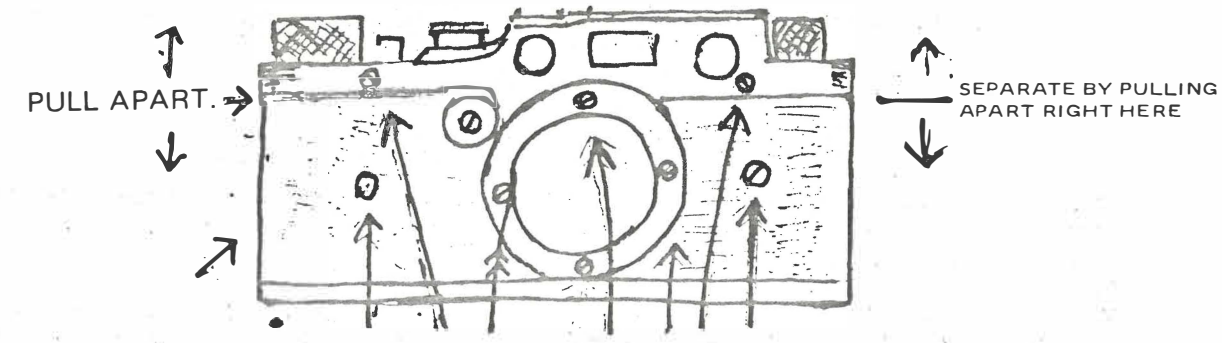
Leicas of any age are competitive with any modern camera, if in good repair. Leica cameras are in two families, screw mount, the earlier cameras, A to IIIG or I to III. The later M series has bayonet mount lens. This text is not padded with exterior information you can get in other catalogs and books for Leica owners and collectors; it is on the insides of Leica, THE REPAIR of Leica. So familiarize yourself with these other Leica books, too, if you are a newcomer.

GOOD NEWS: THE MOST FREQUENT REPAIRS ARE THE EASIEST. Leicas usually stop because somehow in loading, a piece of film broke off, and stuck the shutter. Sometimes you can pull it out with thin jewelers' tweezers, but more often, you have to take the body off. Then you can clean and lubricate the inside. Detailed instructions follow. We'll write all about screw mount cameras first.

You need a few hand tools. Buy jewelers' screwdrivers, tweezers, tiny files, needle nose pliers and a jewelers hand drill from B Jadow, 53 W. 23rd St., NYC 10010, a watchmakers supply place. Order a lens spanner, other tools, epoxies, from Edmunds, 300 Edscorp Bld., Barrington, NJ.

The Leica is so well made and fitted it is actually easier to work on than lesser cameras. It all fits perfectly; you do not have to force and bend parts or make new screw holes.

THE SCREW MOUNT LEICAS COME APART BY REMOVING THE LENS RING held by 4 screws. Then take out the chrome screws around the rim of the top front and back. Take out the two black screws in the leather-like material in front (actually rubber). There are 4 screws in front in the very early cameras, IIIA and before.



REMOVING LEICA CHASSIS FROM BODY SHELL...

If your slow speed dial has a big screw in the center of it, unscrew it too and remove slow speed dial.

This drawing is not to scale, is instructional only, like the drawings I make on the blackboard in classes. Study the specific picture section later to KNOW your Leica, and so you will remember how to put it back together. After removing the screws, now simply lift the chassis right out of the camera. The slow speed dial lens ring and everything else comes up along with it on recent Leicas leaving the body shell behind. Use a spray can of air or air hose, brush, and ether carefully to clean all the dirt and dust out of the body and chassis. NEVER use ether indoors or smoke around it. Then snap the shutter at all speeds. Look at the focal plane shutter slit to be sure it is even width all its travel. Most likely it will be OK. Put it back together. Be sure you have not forgotten any shims in the lens Mount or rotated the threaded ring, or all your lenses will fit sidewise. They will not focus sharp at infinity if shims are misplaced.

Note: Early Leicas have a screw in the center of the slow speed knob. It, and the knob, must be removed first. Be sure you get it back in the same position. You will also see the early cameras have much less sheet metal baffling; curtain rollers are visible.

On the early cameras the top is in two pieces. If you are afraid to damage a Leica at first try, begin on a **Fed** or other cheaper Leica copy. Once you know Leica, you can fix many similar cameras including the beautiful Canons.

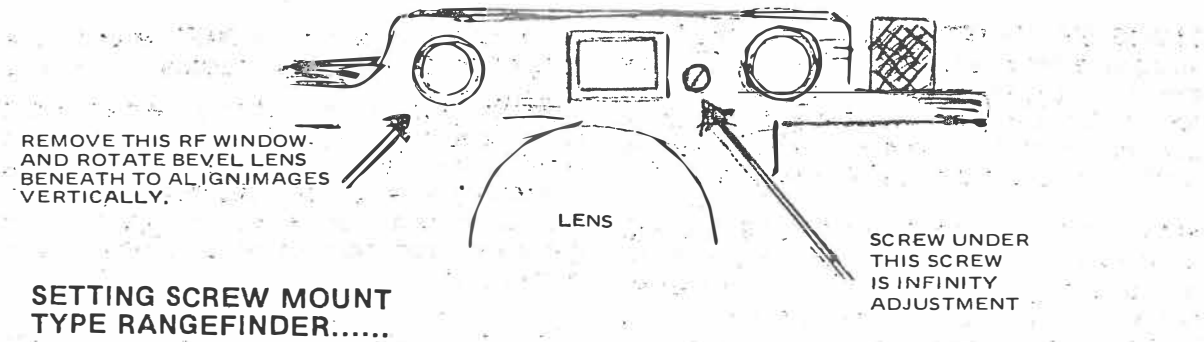
GETTING A LEICA SHARP: Leicas made before IIIf can be squeezed tight enough by the fast working photographer so the back is actually bent in. They were rather thin metal. IIIf, IIIG are tougher. Then, when you set focus to 10 feet, for example, since the film is closer than it should be, the camera will actually focus to 12 or 15 feet. If you have a depth gauge or a T-shaped thing with a sliding rod, you can improvise; you can measure a good camera, and bend the back

on yours or put shims on the lens mount until the distance to the film is the same. If you remove pressure plate, be sure to put it back with the bent-up part down so film will load easily. I test Leicas by photographing a line on grass at ten feet. If the blades of grass are sharper in front or behind the line, something is bent or missing. Then I bend or move lens with shims. Read my TRADE SECRETS OF CAMERA REPAIR for a more complete description of setting focus and adjusting rangefinders.

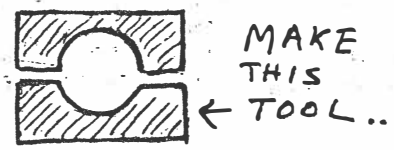
SETTING INF on RF: Set lens to infinity and lock. Be sure you know it is sharp there. Then unscrew the little screw between the square and the round window. It is just a cover for the infinity setting screw beneath:

Now turn the screw beneath so the images line up on a target 300 feet or further away. A distant TV antenna is good to sight on. The Leica rangefinder, like all others, has an adjustment to make the 2 images line up vertically. You'd never guess how to do it without this text. Look at the front of the camera. Unscrew the ring around the left rangefinder window. Make up a gripper with soft jaws to fit it, a block with a hole in it cut in two parts, etc:

Inside you'll find that what looks like a lens is actually a prism with a slight slant which you can rotate to bend the light so the RF will line up vertically. Then you will have to do the infinity setting all over. If you have the rangefinder set OK at Inf, it will be right at all other distances, too.



SETTING SCREW MOUNT TYPE RANGEFINDER.....



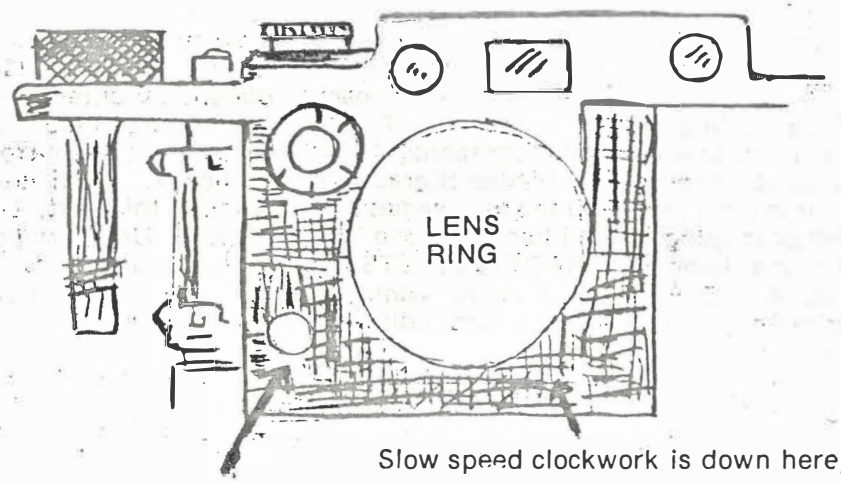
BEVEL RF LENS

CLEANING AND LUBRICATING CHEMICALS... Ether, benzine or Chloroethylene for cleaning, poison and inflammable. Silicone, WD 30, Teflon Spray, Watch oil, from Jadow, to lube. Grease for big parts.

Cleaning the slow speeds: The slow speed timer in all III series is in the bottom of the camera. With the chassis lifted out you will see a hole in the square back plate. This hole is at the lower left of lens ring looking at front. (See picture): Squirt it full of ether, and slosh it around. Usually the slow speeds recover. Then spray a bit of silicone in the hole.

You can't do any more now to the slow speeds. To get this front plate off, first you must remove the chrome top of the camera, knobs, etc. I have found often it is better to try to clean a part in place than disassemble completely. It usually works and there is less risk of cosmetic damage. We'll describe further disassembly later. In the IIIA you remove timer through lens hole to clean.

CLEANING WITH SLOW SPEED TIMER IN PLACE



Inject benzine, ether or chloroethylene here.

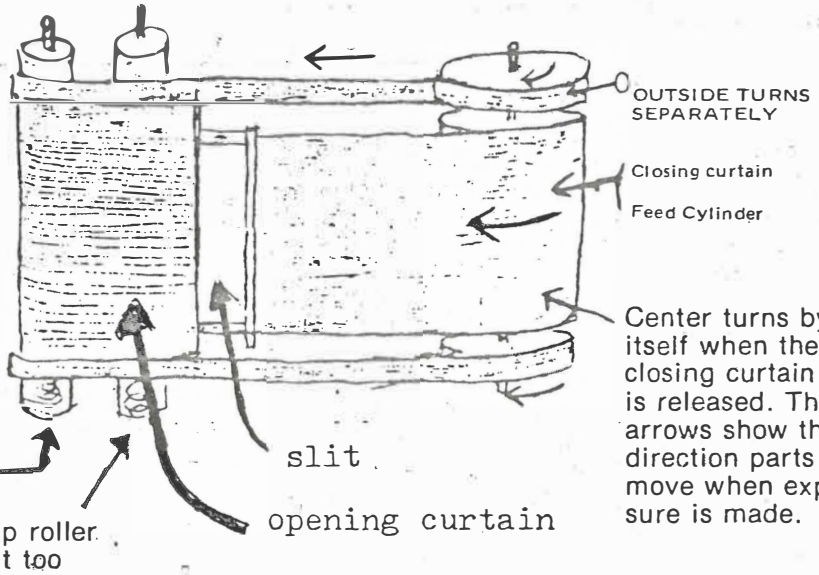
SLUGGISH SHUTTERS: If all speeds are sluggish after cleaning, or if the slow speeds are still sluggish, you may need to increase spring tension on the focal plane shutter springs. Here first, is a review of how the focal plane shutter of Leica type works.

HOW FOCAL PLANE SHUTTERS WORK: Most have two curtains, an opening curtain, and a closing curtain. They wind together, but when released the opening curtain starts first and the closing curtain follows later so as to leave a slit or space between them. Both curtains have straps. They are pulled by two rollers with powerful coil springs inside much like window shade rollers. A timer releases them in sequence to make a traveling slit.

Note carefully, spring is **NOT** wound to a greater tension for high speeds. All Leicas work on the principle that only the curtain slit is changed by the speed dial. But the spring tension for each roller may be adjusted separately by set screws. If the shutter is left wound up for a year or two, the springs may get weak, and have to be adjusted to give more tension.

The Leica shutter works on the same principle as those described previously, but it is constructed slightly differently. The two feed rollers are the same shaft looking like a barrel. The opening curtain has only its straps running on the top outside parts. The closing curtain is in the center of the cylinder which revolves separately from the outside.

HOW THE LEICA SHUTTER WORKS (schematic)



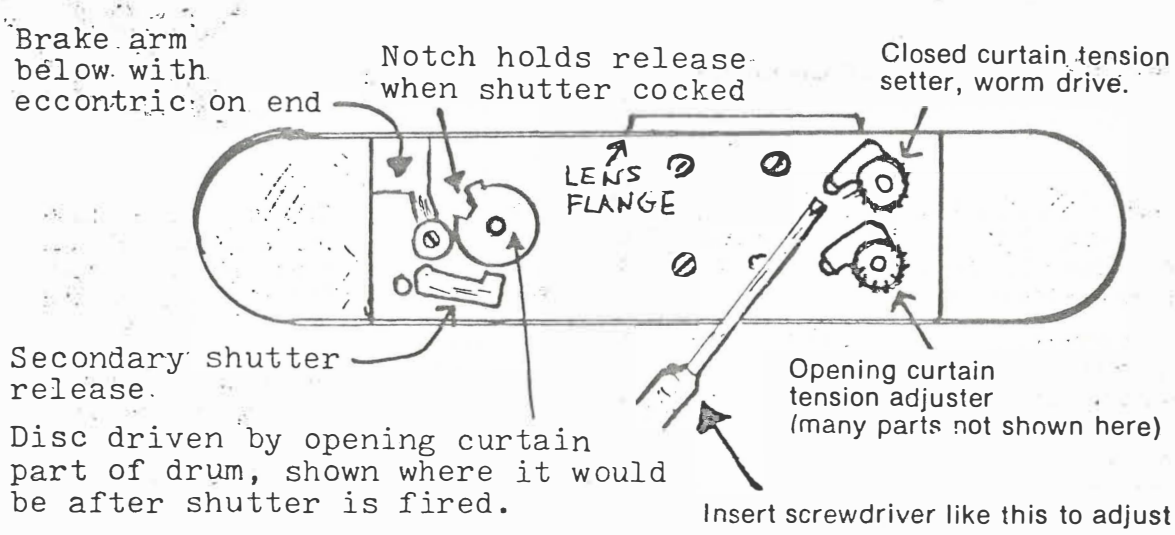
Leica has two take-up rollers with springs. The one for the closing curtain is nearest the front of the camera. You get at these adjustments by removing the bottom of the camera, and then taking off the plate that has a picture of the film loading on it. Just remove the screws holding it, and lift it off. Inside, you will see that the tension setting adjustment is driven by worm gears so they may be set very precisely. Hold your screwdriver at an angle, and turn them. It's easy. One way to get a beginning adjustment on flash synch models of Leica is to set shutter to the fastest speed that will work with strobe, hold strobe in front, or look closely, and be sure entire film aperture is open. If entire aperture is open at high speeds, too, you need more tension. Also, you can examine the slit at 1/1000 sec. to be sure it is even all along its travel. Home camera repairmen time shutters by taking pictures on old film, and comparing density with those taken on a known good shutter, Compur, for example. There are some good low priced shutter testers. Bogen is one make. You can test Leica with film, but you have to put it together each time you try it out. If you are only increasing the tension on the take-up rollers, this does not require stripping the whole camera; just take off that bottom plate with the diagram on it. For a camera that has set wound and un-used, a slight increase in tension of each worm gear tension setter is needed.

One of the best shutter speed testers is a TV set screen. Focus close so you can show each line. There are 15750 per sec. so if you see 157½ lines, you have 1/100 sec. etc. A frame has 525 lines and a gap, so shoot several times.

Remember, if you give the closing curtain too much tension, it will overtake the opening curtain, and the last part of your picture will be blank. If the opening curtain has too much tension, the last half of your picture will be overexposed — too dark in negative. Or the curtain can reach the end with such a slam that it bounces back. This leaves a line on the film.

Those Leicas with ball bearings, later models, are given a friction brake to slow down the opening curtain at the end of travel. A disc in the bottom of the camera revolves counterclockwise when the shutter is tripped. It is connected to the opening curtain drum, and the wheel with holes and the pin. As it reaches the end, it expands like a cam, and moves a little lever that works on actual brake shoe inside like a car brake. You can set this brake by loosening and rotating an off-center or eccentric wheel that bears on this disc. Do so, if there is no braking action, and the opening curtain bounces.

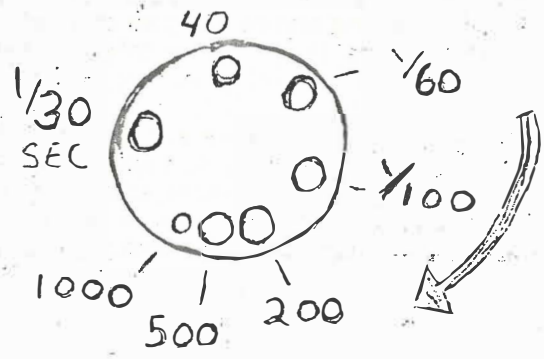
Older Leicas lack this brake and disc. Note too, in late screw mount Leica, a notch in this round disc, and a catch, serve as a backup shutter release. The main release is inside the camera, a rod through the film sprocket.



IIIf, IIIG LEICA BOTTOM AS SEEN WITH SHEET METAL PLATE REMOVED.

To get at the main speed timer, a pin and hole device, that sets the slit width, and other parts you have to remove camera top. First, we assume you have chassis out of shell. Remove wind knob held by a set screw and exposure counter dial. Unscrew rewind lever. Remove speed dial held by set screws. Remove screws on accessory shoe, ring around shutter release, and rewind knob, also held with a set screw. Remove slotted ring beneath, and if rangefinder is present, remove its round windows by unscrewing. Remove the viewfinder and RF eyepieces in back. Take off the little screw cover to the infinity adjustment. Then lift off the top of the camera, and see the insides. They are beautifully made.

You can put the wind knob back on to work the camera with the top on. Shutter is a classic pin and hole device. Film wind also winds both curtains and the sprocket together. When released the pin and hole thing turns **clockwise.** Remember this. Say "clockwise" to yourself again. It has holes in it like this:

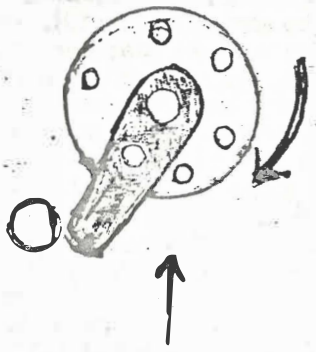


PIN AND HOLE TIMER ON LEICA

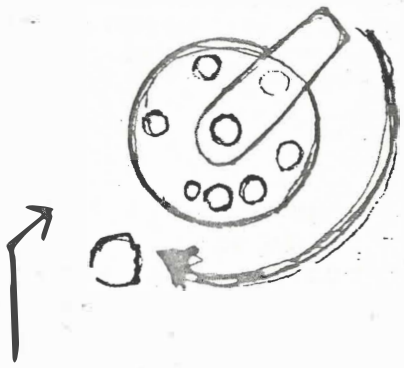
A lever with a pin fits in the holes. You have to lift the knob to set it from one speed to the next. This lifts the pin out of the hole and moves the lever.

If this arm is set in the 1/1000 sec. hole, this ring only has to move a very short distance before it releases the second curtain— so you get a very narrow slit and high shutter speeds.

Older Leicas have 1/20 too... The late IIIf and IIIg has 30, 60, 125, or sometimes 1/25.



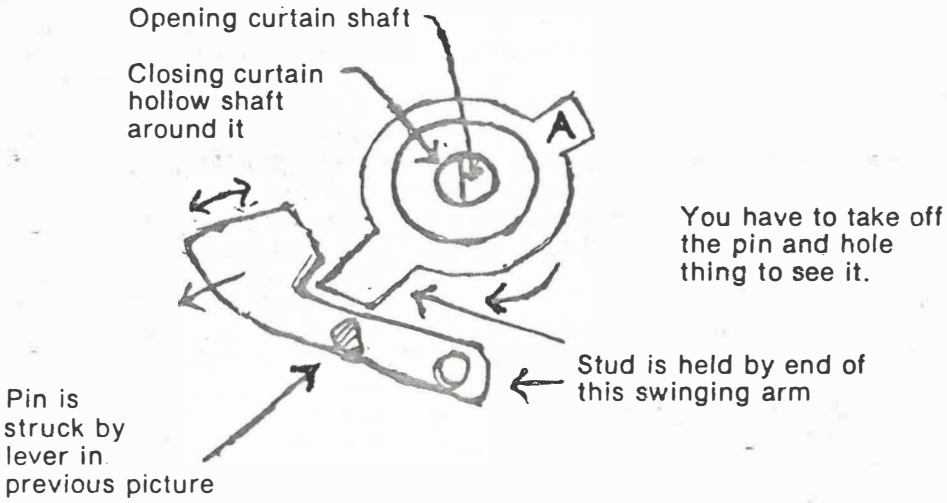
Set at 1/1000 sec. See what a tiny distance the arm has to move before it trips the second curtain! A narrow slit!



Shutter in this drawing is set at 1/60 sec. Now see how much further the arm must move and the first curtain travel before the closing curtain is tripped...**a wide slit!**

Here is a very important point, worth the price of the book in itself. There is no more wear leaving your Leica on 1/1000 sec. or **using** it at 1/1000 sec. than using a slower speed since the spring tension is no greater; only the slit is narrower...

Note: knob, arm, and disc with holes are pulled by the first or opening curtain. This is the two outer rings of the drum carrying the straps. The center portion of the drum, and the closing curtain are below the pin and hole thing. That part looks like this:



You probably wonder how the very slow speeds and the front dial work. In Leica cameras that have slow speeds the part of the closing curtain lever called **A** hits a lever that turns a rod that runs all the way down to the bottom of the camera, and works the slow speed clockwork. It buzzes for awhile, and then lets the lever move away and the shutter close. Thus you get speeds below 1/30 sec. down to 1 sec.

Leica Is and IIs have no slow speeds. Late versions that have 1/25 sec. have a pendulum that swings in the bottom hitched in the same way with a long rod to make that 1/25 sec. accurate. Leica II is more trouble-free than a III because it is simpler, worth more, too. Is and IIs have a block that blocks the closing curtain for **Bulb.**

The slow speed timer in the bottom has its speeds controlled by a lever running down from the slow speed dial to it. The top part of this lever rubs against the slow speed dial inside, and the bottom part limits the travel of the slow speed gearing. For the very slowest speeds, more gearing is switched in so the timer will tick slower. You can get to the slow speed timer by first removing the front plate with slow speed dial attached. Remove all the screws that hold it, including those around the inner lens ring, and lift off the front plate. Then you can lift out the shield that covers the timer. The timer is held in place by two screws you will see in the bottom of the camera next to the focal plane shutter spring tension setters in the drawing. Parts are available from Leitz, and sometimes from a badly damaged camera. There are many slight changes from one Leica to another, washers and spacers to adjust close tolerances, etc. The cameras are practically hand-fitted as you will find in your repair. Be careful nothing binds when you reassemble it. You're a precision craftsman now.

SHORT RANGEFINDER SCREW TOWARD BACK OF CAMERA.

REPLACING A CURTAIN: This is really quite hard. Few people attempt it. The easiest way is to peel off the old curtains, being very careful not to rip them. Also mark just where they are fitted. Make new curtains exactly the same size, or order from E. Leitz. Use Scotch Super Strength cement, and make the new curtains and straps up EXACTLY where the old ones were, and the slit PARALLEL. Then when dry, apply tension to the two tension rollers until speeds are correct. There is danger in dropping out the ball bearings if you have to take the bottom chassis off to remove the rollers. It is not advised.

Even the film sprocket has ball bearings in later cameras. Lubricate with light oil or WD 30. Keep oil off curtains and off the brake.

WIND PROBLEMS are often caused by the wind roller slip clutch which is either too tight or too loose. The wind spool has to turn faster when it has little film on it than at the end of the roll, you understand. So it must have a slip clutch, or sprocket holes will tear. Clean it if it is jammed.

All wind systems are explained in my comprehensive text. There is a little ratchet in the film take-up chamber that keeps the wind from turning backwards. It sometimes jams, or the spring breaks. Rewind lever pulls this ratchet free and blocks the closing curtain release, so both curtains cannot separate even if the shutter is snapped. Shutter release, a rod through film sprocket, disconnects gear above from sprocket. Its end can be seen pushing the long flat spring at the bottom of the camera if you turn it upside down. This is a very rugged release. Wind counter is tough, too. A gear is angled along one tooth at a time, each time the film is wound all the way.

FLASH SYNCH on IIIf is a set of contacts under the speed dial reached by removing it. Clean them or bend the spring as needed for good contact. Test with a strobe. The PC socket may have to be replaced, or the switch that opens when the shutter is wound to prevent accidental firing may be bad. In the "red dial" models, you can set the synch contacts position inside the speed control in addition to the outside setting. Better leave it alone. If someone else has moved it, I suggest trial and error, an AC strobe and sunlight POP printing paper to see the timing. It turns dark without developing. Order from a Kodak or GAF dealer. Leica IIIG synch is simpler, more trouble-free.

Consider buying a SYNCH MODULE from the National Camera people who run the school at Englewood, Colorado. It is an electronic timer that will fire two strobes with adjustable delay. With film in camera it can time synch, the travel time of curtains, study many mechanical motions.

Leica Rangefinders seldom need attention either. A broken rangefinder may be replaced. Take off the arm and remove screws holding it that are inside the body. You can remove a top plate to clean the rangefinder inside, if needed. The above applies mostly to a camera that was dropped.

SETTING LEICA SHUTTER SPEEDS: Usually shutter curtain tension setters are all that need attention. You can set the slow speeds separately by loosening the slow speed dial and turning it. In the old cameras it is held by a center screw. In later Leicas it is held by set screws which must be removed first. Then it unscrews. Inside the slow speed dial is a slotted ring you turn to get a good accurate one second. A screw in the center of the ring must be loosened so you can turn it. But usually cleaning only will restore the slow speeds to accuracy. After much use the pin that fits in the holes to set the fast speed may wear. You could have the parts plated to build them up, or get new ones. Remember that the arm swings around, and hits a lever that releases the second curtain. That lever has a screwed-in pin on top for the 1/500 sec. and (actually) another pin just for the 1/1000 sec. for extra precision. You can turn them with a sharp screwdriver and thereby adjust the slit width. Do this only if wear is present, seen with your ten times magnifier. The common mistake is trying to speed up a dirty shutter by turning all the adjustments.

Dirt in the brake on IIIf and IIIg makes it erratic. This problem is often not understood.

APPEARANCE RESTORATION AND MAKING PARTS: Collectors disagree how much restoration should be done. Maybe slightly worn original finish is better than a spotless acrylic black repaint. It is legitimate to replate worn working parts to make them larger, but the replating of outside parts must be carefully done, if at all. Never substitute chrome for nickel. Remember, that buffing to remove either old chrome or old plating will tend to wear down the sharp contours, engraving, etc. Be careful. Jewelers have all the enameling and plating techniques needed for Leica. Study their books, and buy their equipment. Leica leather is not leather at all, but a type of moulded rubber. It is virtually impossible to replace it. A body shell from a junk camera is the common solution to bad "leather".

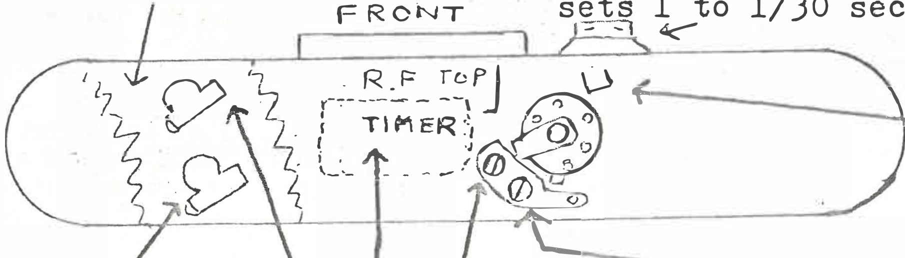
People have repainted brassy spots with automobile aluminum paint. It is a questionable procedure; decide for yourself.

A L L   S H U T T E R   A D J U S T M E N T S

Top view of IIIf, lens up, cut-away to show bottom too

These parts in bottom.

Slow speed knob, ring inside it sets 1 to 1/30 sec speeds.



Slow speed block might be moved. Seldom needed.

Adjustment for opening curtain spring tension.

1/1000 sec slit width adjustment

1/500 to 1/30 sec. slit width

Closing curtain spring tension adjustment. Adjustment for brake in bottom not shown. See previous pictures.

Timer in bottom has oval screw slot, may be moved.

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L E I C A   R E P A I R   I N   P I C T U R E S

A special new supplement to sharpen your repair skills and get you started. We used a wide angle lens. Leica IIIA was the subject. Note differences.

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PLATE ONE   (Plates are separate)

Figure 1 at top left shows Leica stripped to clean. Note IIIA has four screw-holes in the black imitation leather body. Top housing comes off separately. Note cracks in very brittle imitation leather which we later epoxied. See pressure plate, below; lens ring you take off first. To remove top on early Leica you remove speed dial held by set screw, accessory shoe, rings that hold windows, left RF window, RF set screw...and simply lift it off. The camera stripped looks like Figures 2 and 3.

Figure 2 shows screwholes at #1. Closing curtain take-up roller with strong spring inside is at #2. At #3 you see one of two tapes or ribbons that pull closing curtain closed to make back half of slit. #4 is a housing held by screws below. Film chips may stick behind it and stop shutter. If you put it back crooked, it will catch the curtain. #5 is the rangefinder roller on the end of the RF arm. As the lens rotates to focus close it moves out. Then this lever moves forward turning one of the RF mirrors up top to make the two images converge more. Arm may be removed by screw in center to remove RF.

Figure 3 is the camera chassis. #1 is the shutter speed control shown complete in Plate 2. #2 is RF. #3 is wind knob, threaded on and held by set screw you loosen to remove it. #4 is counter. It rotates one division less than a full turn each exposure to count in early Leica. In later models it is lever actuated by a tooth thing inside it. #5 is a fork worked by a bright arm you see better in top picture. This fork operated by the mechanism at # one works the slow speed timer seen at #6 to give speeds below 1/20. Below 1/30 on later cameras. The clockwork

often gets dirty or sticks giving sluggish slow speeds or a completely stuck camera. If careful, you can remove it through the front of the lens opening without taking the Leica apart at all. It is held by two screws in the bottom. In postwar Leica where there is lots of shielding, you have to strip camera to clean slow speed clockwork.

Figure 4 shows this beautifully made slow speed timer...greatly enlarged. See postage stamp. Dull housing has been taken off. #1 at bottom left is pin that must fit in fork. #2 is the gear that works #3 the star gear. It wiggles #4 very rapidly which gives the buzzing and delays closing of the second closing shutter curtain. #5 is one of the two threaded studs which hold this assembly in place. Clean carefully and blow out dirt. Lubricate very slightly if at all with watch oil. Smaller flat spring (bottom) returns it.

Figure 5 is cast body housing. Note added synch. We unsoldered wire. Pressure plate fits in recess machined in back, no screws or rivets. Carrying strap holders often show wear, are pressed in, about impossible to replace.

Figure 6 is the wind. #1 is the rewind lever which disconnects the sprocket from the spool at left through parts seen better in Figure 7. #2 is the set of gears that drive the sprocket and wind the shutter when the wind is turned. #3 is a slip thing so the wind sprocket can turn at different speed from the sprocket. Inside it is an anti-backwards spring to keep film tight. In late Leica there is a pawl and a ratchet up near #2. ...#4 is film sprocket. It has the shutter release rod running through the center of it. Spring, flat spring you see at very bottom of photo holds shutter release knob up. The release knob turns with the sprocket so you can see camera is winding OK. See why classic LEICA IS THE GREATEST !!!!!!!!!

Figure 7 shows in detail the shutter release. #1 is sprocket. #2 is flat spring that holds shutter release rod. Release rod separates #3 from #1 so the drum and curtain can spin around and the slit can make the picture. Later IIIf has another release in bottom; see text for drawing.

LEICA REPAIR IN PICTURES PLATE TWO

Figure One shows my fingers removing slow speed timer to clean it. #1 is the drum that feeds out the curtain. #2 is the timer for slower speeds described previously. #3 is RF roller also seen in Figures 1, 2 and 3 to orient you. #4 is the closing curtain take-up roller with that strong spring to pull the shutter, inside it. See the bottom shutter tape leading to #1 at bottom. #5 gives a good view of the forked foot that works the slow speed timer when shutter is fired. Bottom part of drum shutter carrying closing curtain tape or ribbon is nearby. You are learning now...THIS IS FUN !!!

Figure 2, (Plate 2) shows the tension setting screws on early SM Leica. Late models have worm shown in drawings. #1 is the setter for opening curtain. #2 is setter of closing curtain spring. Springs are inside rollers up above. They are star-shaped and lock screws hold them. Sluggish springs result if Leicas are left wound, easily adjusted.

Figure 3 is a sideview from back of camera of pin and hole slit-width speed timer. Here it is set to 1/1000. See how arm is raised to hit 1000 stud which it has just hit. Shutter is in fired position here. Study these pix so you can put it together OK.

Figure 4 is another view of the speed setter. #1 is the arm that when struck releases closing curtain. #2 is 1/1000 speed stud. #3 is the retaining pin. #4 is the arm that swings around with opening curtain part of drum and then trips lever #1 to release the closing curtain. **READ THIS MANY TIMES.** #5 has holes in it to set the different speeds and slit width. You lift the shutter dial and set pin under lever #4 in a particular hole. #6 is worked by rewind lever so shutter will not open its slit. #7 is a block that blocks the shutter open so the closing curtain cannot work when you have set it to time or to the slow speeds. #8 is a tiny arm on the closing curtain which is released when lever #1 lets it go. #9 is end of RF.

Figure 5 is a different view so you can see the holes #4 fits into. Note 1000 sec. hole is tiny. Shutter is set to 1/100 sec. Also see another view of Arm #8. Arrows show direction of rotation when shutter is fired.

Figure 6 is a view of the shutter mechanism almost 4X life size. #1 is very strong holder of top and accessory show. Spring attached to it goes to #2, the lever also seen in previous pix. #3 is 1000 stud, non-adjustable on IIIa Leica. #4 is arm, again #5 is wheel with holes for pin in #4. #6 is the rewind thing. #7 is slow speed block that lever #8 pushes out of the way slowly working slow speed timer. #9 is edge of exposure counter to orient. #10 is shutter release button with collar removed. It rotates.,

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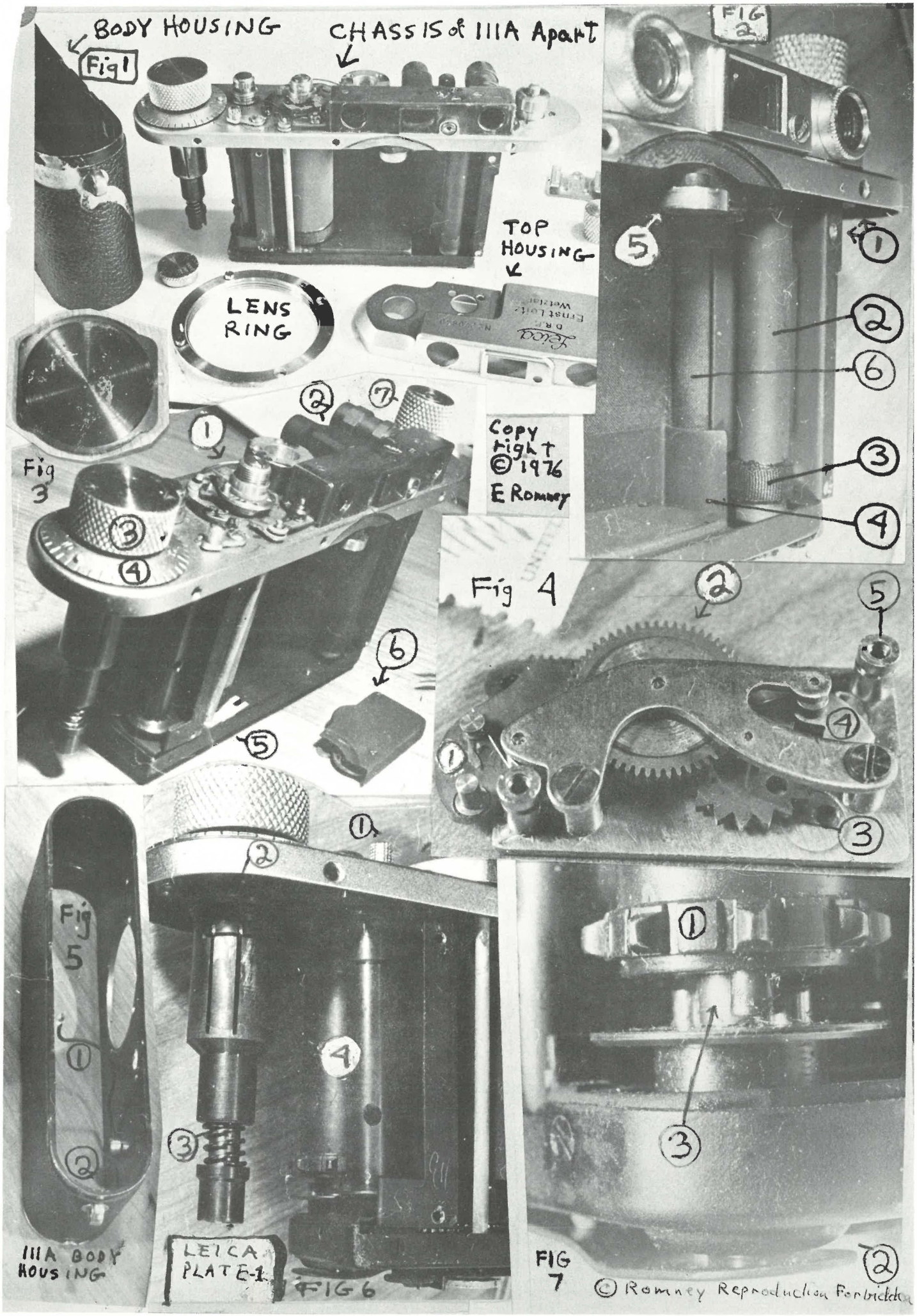
BODY HOUSING
Fig 1
CHASSIS of IIIA Apart
TOP HOUSING
LENS RING
Fig 2
Fig 3
Fig 4
Fig 5
IIIA BODY HOUSING
LEICA PLATE-1
FIG 6
FIG 7
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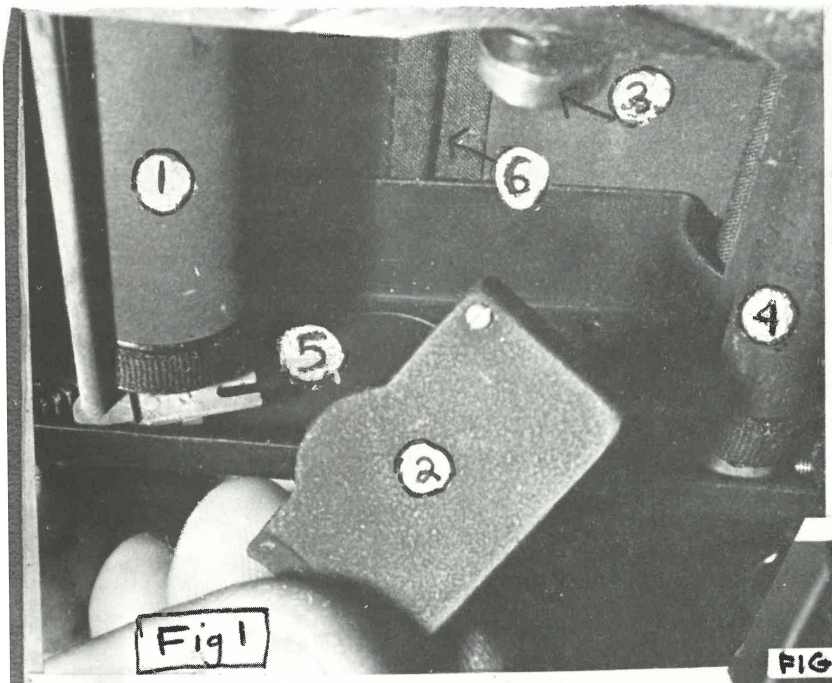
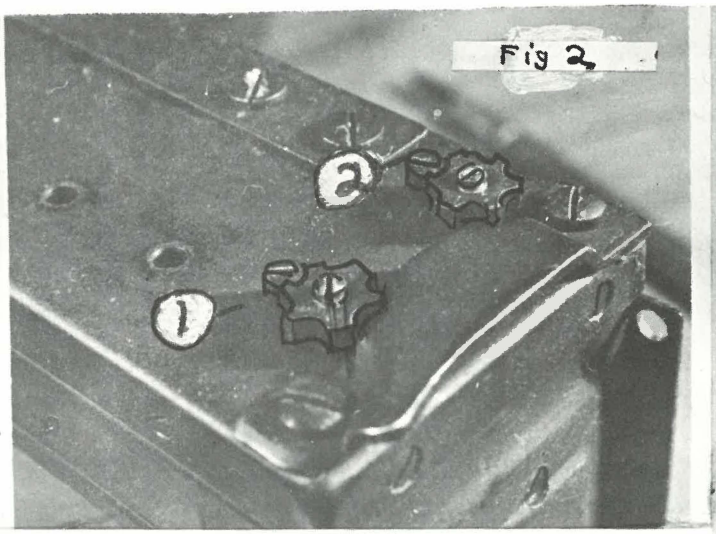
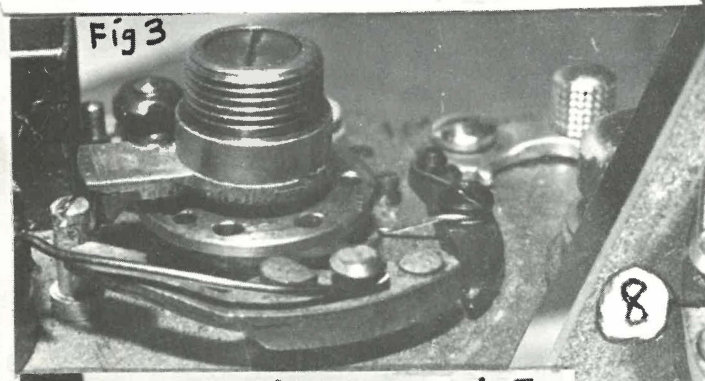
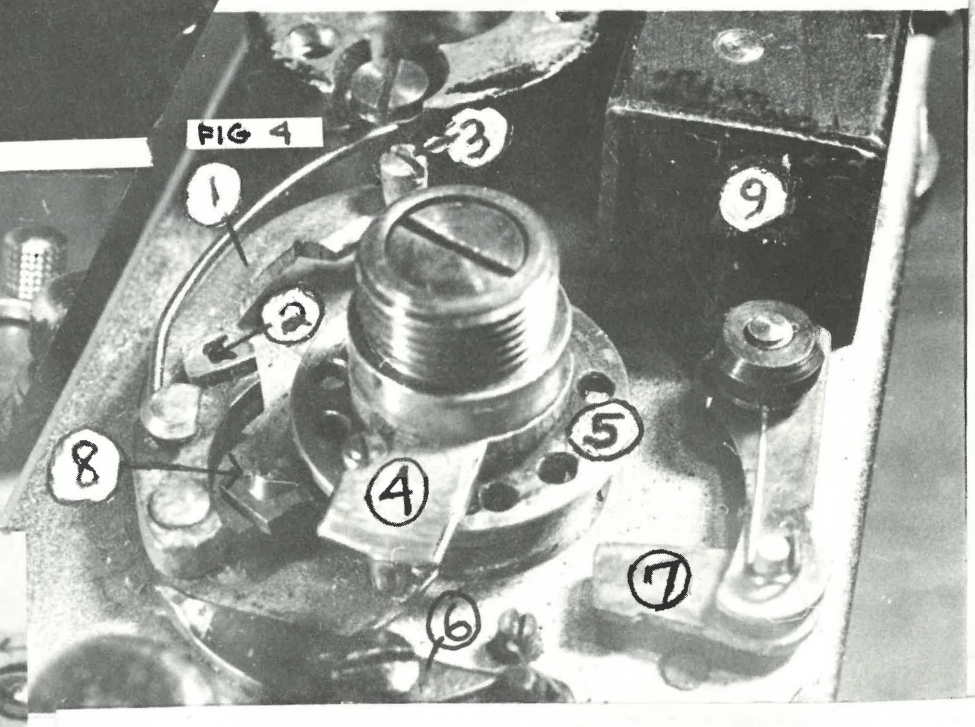
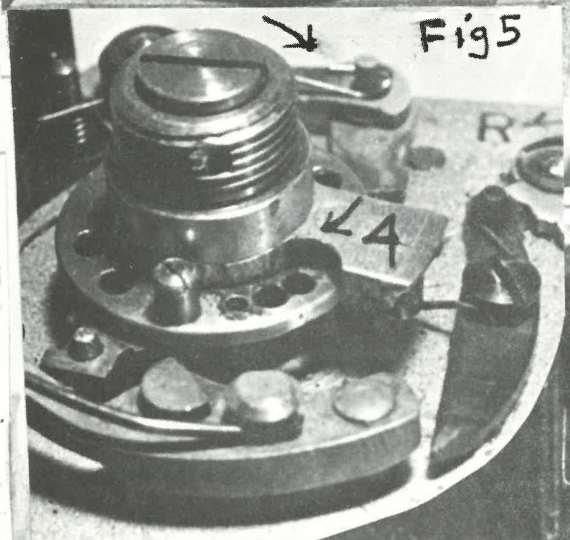


Fig 1





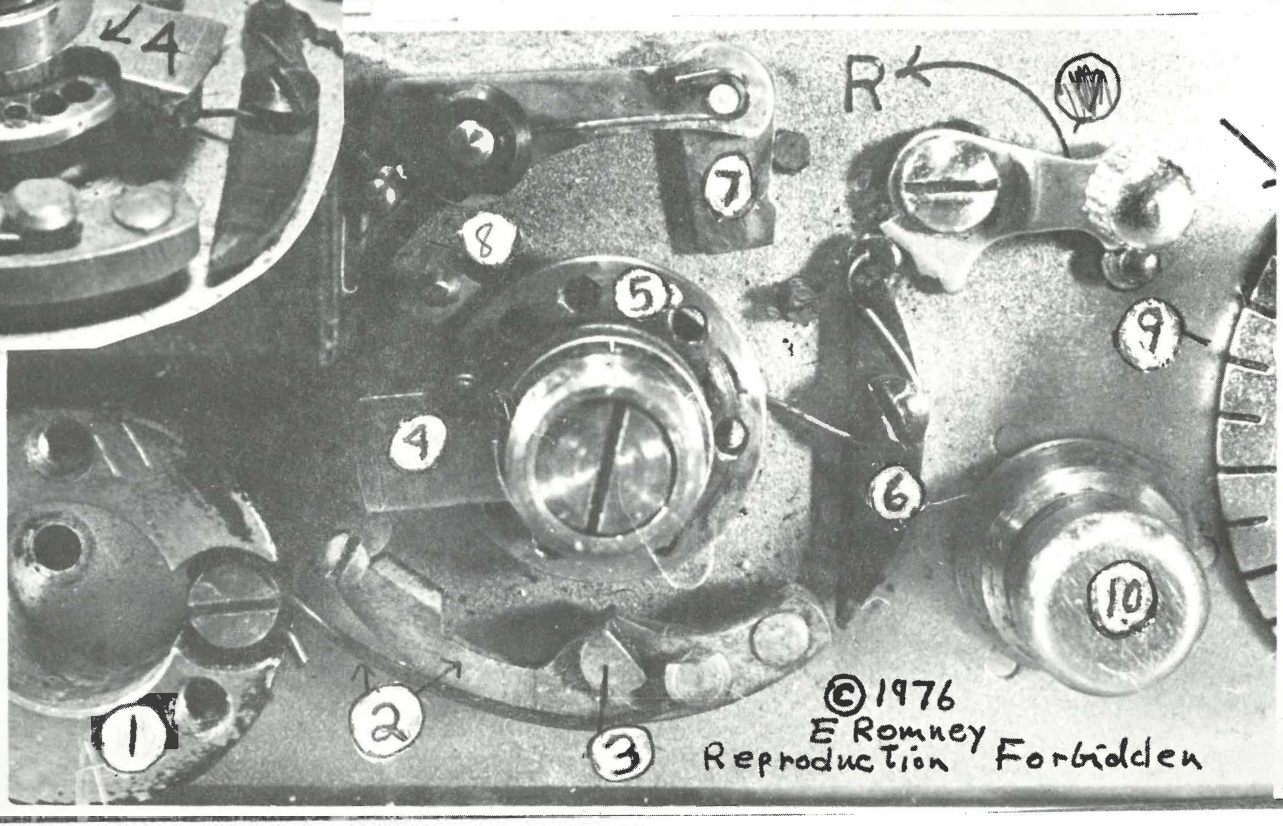




TIMER AT 1/100 SEC

LEICA PLATE II

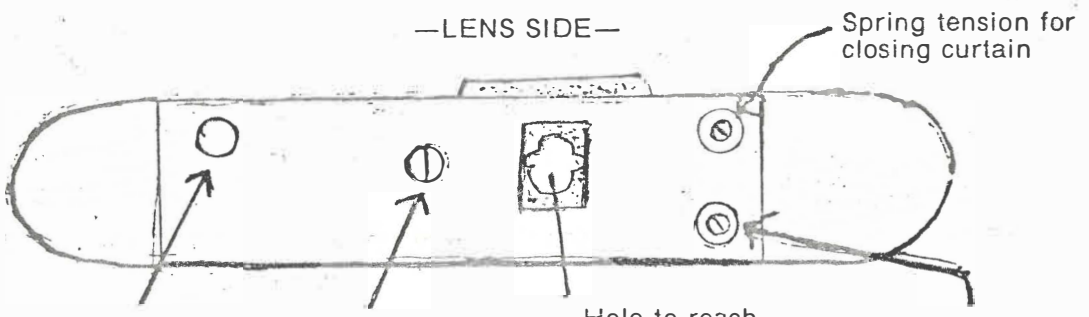
Fig 6 →



LEICA BAYONET — MOUNT CAMERAS

LEICA M SERIES — BAYONET MOUNT:
Leitz coats the screw at the top of the M lens ring with black cement so they can tell if a camera has been taken apart. To take off top remove the same parts you remove on the screw mount Leica. The wind lever is simply held on by a threaded ring at the top. Flash contacts have to be unscrewed but rangefinder windows in front may be left on. Only unscrew the back one. Then lift off the top. In these cameras both the slow and the higher speed timers are in the top. The slow speed timer is under the rangefinder NOT in the camera bottom. It is fairly easy to blow dust and dirt out of the gears, clean them with ether, lubricate with silicone, WD 30 or light oil, and reassemble. There is no pin and hole timer in this camera. All the different time delays between opening and closing curtains are obtained by clockwork at all speeds. On most recent 35mm cameras this is the case.* The Leica M speed setting knob turns a cam that determines how long the clockwork buzzes, and another cam above that switches from slow to fast clockwork gearing. The clockwork just spins or buzzes, keeping the closing curtain from releasing instantly, and setting slit width. At the top back of the camera just to the right of the flesh socket is a nut you can turn to set the fast speeds. The speed cam is slotted to set the other speeds on most cameras. Spread the slots with a tiny screwdriver to compensate for wear. The clockwork has a screw to adjust its speed, too. However, the more commonly needed adjustments are in the bottom under the sheet metal plate with the loading diagram on it just as on older screw mount Leicas.

The bottom cover plate (M Leica) is held by three little screws. Underneath you will see ↘



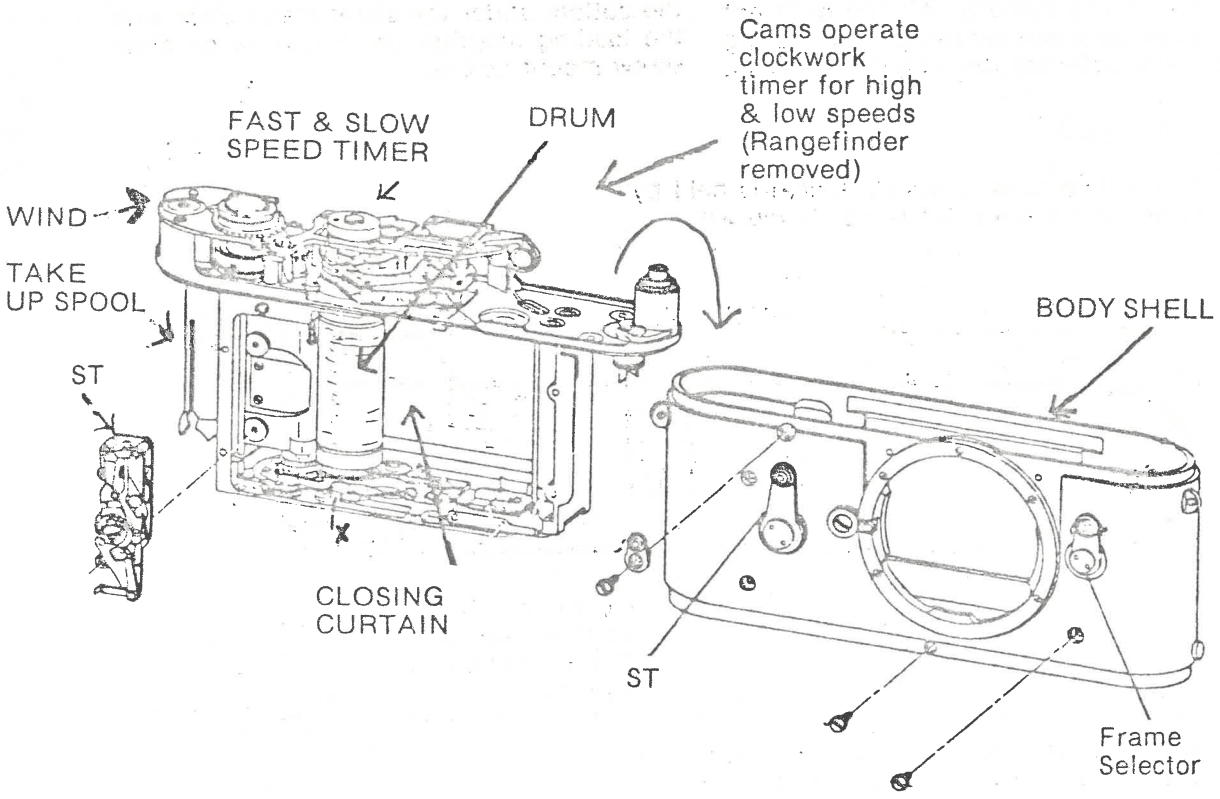
Make adjustments exactly as on older Leicas. No worm gears to curtain springs, merely press down on lock rings around the screws to turn them.

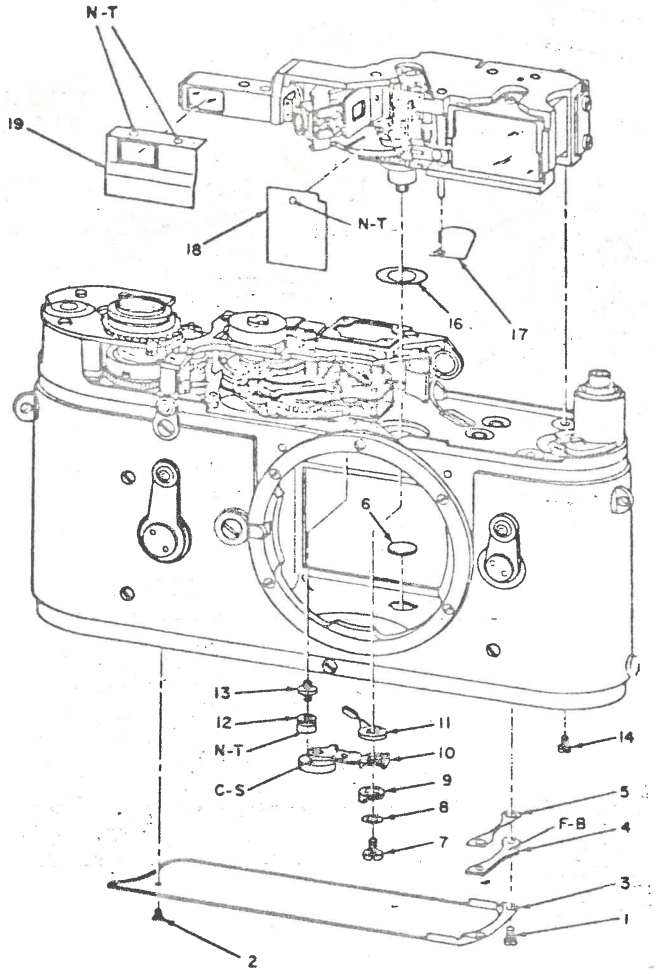
*(Note: See TRADE SECRETS OF CAMERA REPAIR for details of other SLR and RF cameras).

ADJUSTING M SERIES RANGEFINDER: Lay camera bottom up, lens away from you. Look in square hole in bottom. You see a cap you can take off, so you can stick a long screwdriver up inside the camera all the way to the rangefinder arm at the top. The screw on the ring on the rangefinder that bears against the lens sets it to infinity. A screw to the right of it sets it to 4 feet. Loosen it, and turn the thing it holds. The screw at the very back of the camera keeps it from going too far. It is seldom turned.

Under the little screw in the chrome top housing of screw mount Leicas that concealed the infinity RF adjustment, you find in M Leica instead, an adjustment to make the two images move up and down to align vertically. You can remove an M Series RF by removing the three setting screws inside the camera through the hole in the bottom. Take off the arm. Then remove two more screws way up inside where the film cartridge goes. Then lift RF off. No need to take the bottom of the camera apart. Then it is easier to reach the timer. It is best not to work on the RF itself. After you replace it you will have to make all the adjustments again. You need tweezers and a screwdriver to set the screws back in place, especially in the film chamber. It is a lot of fun.

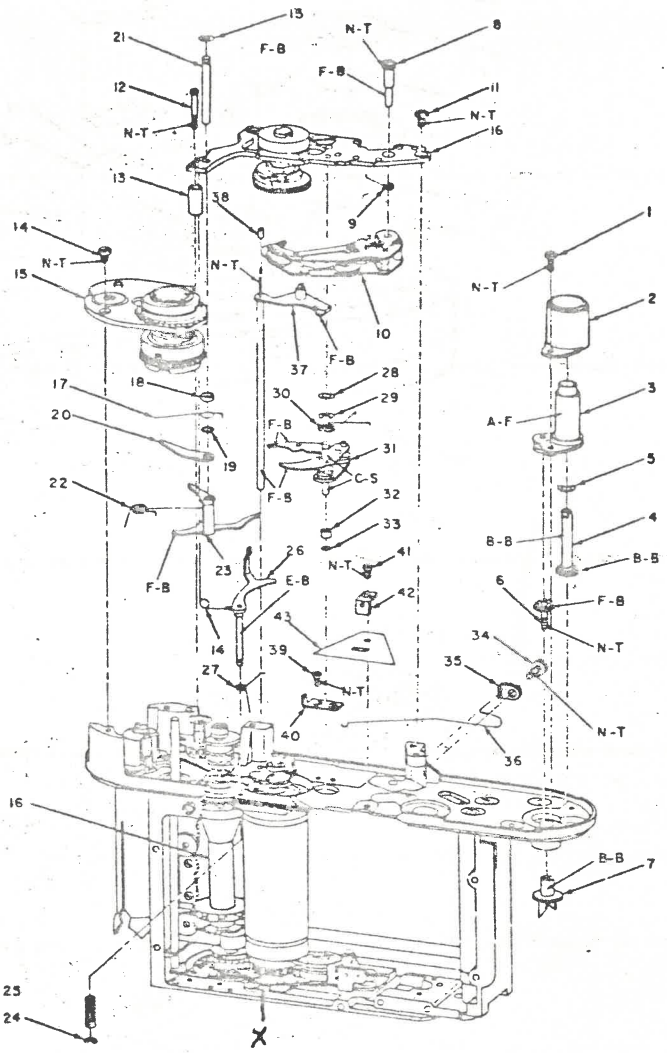
TAKING AN M LEICA BODY APART: First remove top as we described before. Then remove all the black screws in the camera body, one under bottom tip. Remove rewind by unscrewing. Do not remove lens ring. Lift body out of leather grain plastic covered shell as you did on SM Leica. Inside the camera is made like this:





1	Two screws	13	Double-end screw (1A5A2H1)
2	Screw	14	Two screws (1H3)
3	Bottom cover (1MP3)	15	Range-viewfinder assembly (1A5)
4	Locking bar (1MP4)	16	Light shield (1AM-P55)
5	Spacer (1MP5)	17	Light shield (1A-MP56)
6	Cover plate (1A4)	18	Light shield (p/o 1A5)
7	Screw (1A5H1)	19	Light shield (p/o 1A5)
8	Washer (1A5H2)		
9	Cam (1A5MP1)		
10	Roller arm (1A5A1)		
11	Stop arm (1A5MP2)		
12	Eccentric nut (1A5-A2MP1)		

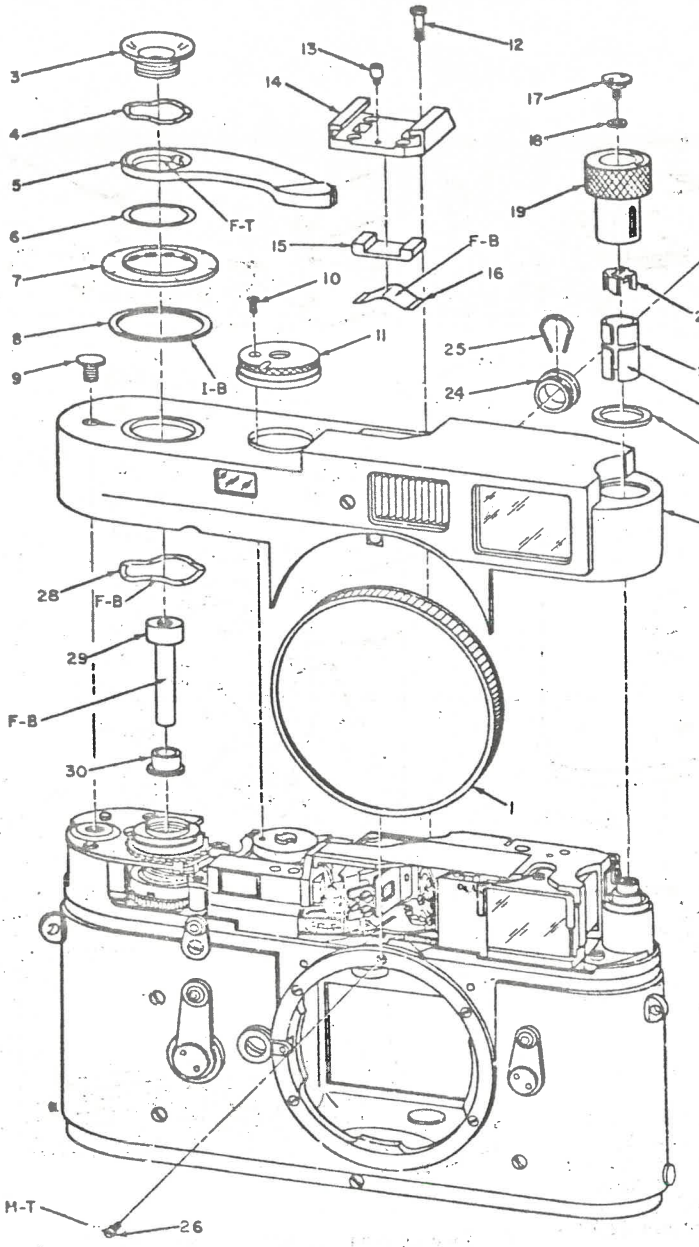
Range-viewfinder assembly removed, exploded view.

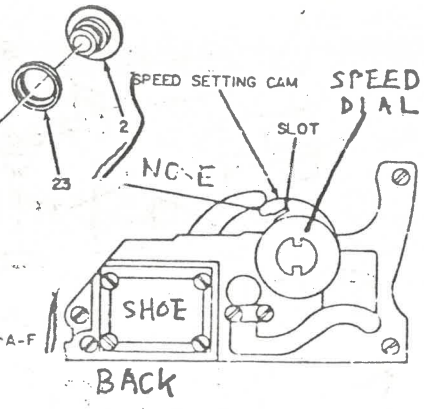


1	Two screws (1A8H1)	24	Retaining ring (1MP18)
2	Sleeve (1A8MP3)	25	Spring (1MP19)
3	Bearing assembly (1A8MP4)	26	Contact arm (1A10)
4	Rewind shaft (1A8MP6)	27	Spring (1MP20)
5	Washer (1A8MP5)	28	Washer (1A9A4MP2)
6	Gear (1AMP48)	29	Retaining ring (1A9A4MP1)
7	Rewind fork (1AMP49)	30	Spring (1A9A4MP3)
8	Threaded shaft (1A9MP3)	31	Adjusting lever assembly (1A9A4)
9	Spring (1A9MP4)	32	Spacer sleeve (1A9A4MP4)
10	Slow-speed escapement (1A9A2)	33	Washer (1A9A4MP5)
11	Two screws (1A9H2)	34	Screw (1H18)
12	Long screw (1A9H1)	35	Holding plate (1MP21)
13	Sleeve (1A9MP2)	36	Spring (1MP22)
14	Ground wire (p/o 1A10)	37	Arresting lever B (1A11)
15	Retaining ring (1A9MP1)	38	Insulating cap (1A11MP1)
16	Shutter bearing plate assembly (1A9A1)	39	Two screws (1H20)
17	Spring (1A9MP13)	40	Stop plate (1MP25)
18	Spacer ring (1A9MP14)	41	Screw (1H19)
19	Washer (1A9MP15)	42	Angle bracket (1MP23)
20	Stop lever (1A9MP16)	43	Light shield (1MP24)
21	Shaft (1A9MP19)	44	Three screws (1A12H1)
22	Spring (1A9MP18)	45	Driveshaft assembly (1A12)
23	Double stop lever (1A9MP17)	46	Sprocket wheel assembly (1A13)

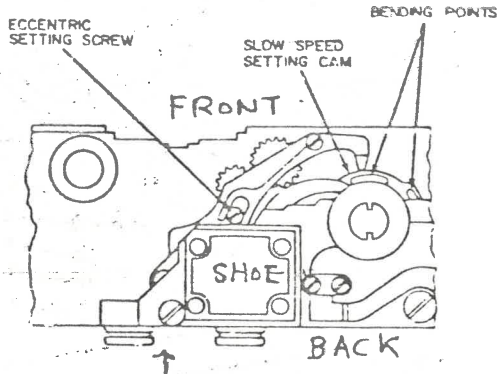
Bearing plate, drive shaft and rewind assembly, partial exploded view.

These illustrations reproduced from a military manual show the mechanism of the M2, M3 and M4 have slight differences. Yes indeed, they are harder to strip than the screw mount versions; but they are very dependable and usually all they need is cleaning and lubrication and sometimes an adjustment of speed or RF or viewfinder framing. This is well within the ability of the home repairman. We do suggest the TV set and neon light method to set speeds to the high accuracy possible.

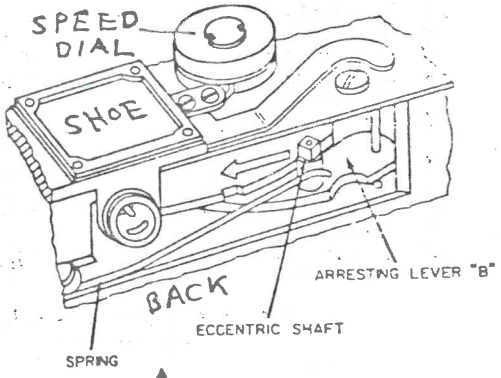




Speed setting cam for 1/1000-second adjustment.



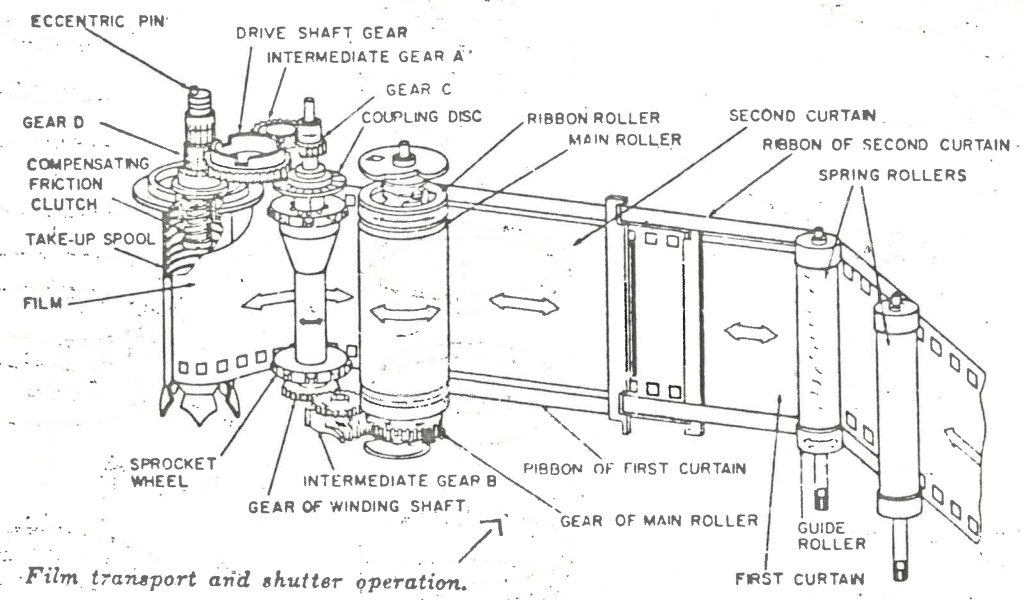
Slow shutter speed adjustments.



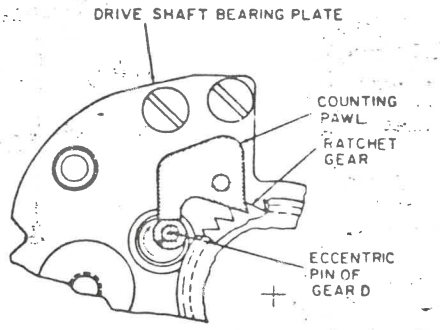
Fast shutter speed adjustment.

1 Body cover (1MP1)
2 Two flash socket covers (1MP2)
3 Screw ring (1A3MP1)
4 Saddle spring (1A3MP2)
5 Winding lever (1A3MP3)
6 Spacer (1A3MP4)
7 Counting dial (1A3MP5)
8 Felt ring (1A3A1MP1)
9 Screw (1A3H1)
10 Screw (1A3H2)
11 Speed dial (1A3MP6)
12 Four screws (1A3H3)
13 Stop screw (1A3H4)
14 Accessory clip (1A3MP7)
15 Pressure plate (1A3MP8)
16 Pressure spring (1A3MP9)
17 Screw (1A3H5)
18 Washer (1A3H6)
19 Rewind knob (1A3MP10)
20 Forked carrier (1A8MP2)
21 Slotted friction sleeve (1A8MP1)
22 Retaining ring (1A3H7)
23 Two cover rings (1A3MP11)
24 Two bushings (1A3MP12)
25 Two locking springs (1A3MP13)
26 Screw (1H1)
27 Top cover (complete) (1A3A1)
28 Saddle spring (1H2)
29 Release knob (1AMP50)
30 Release sleeve (1AMP51)

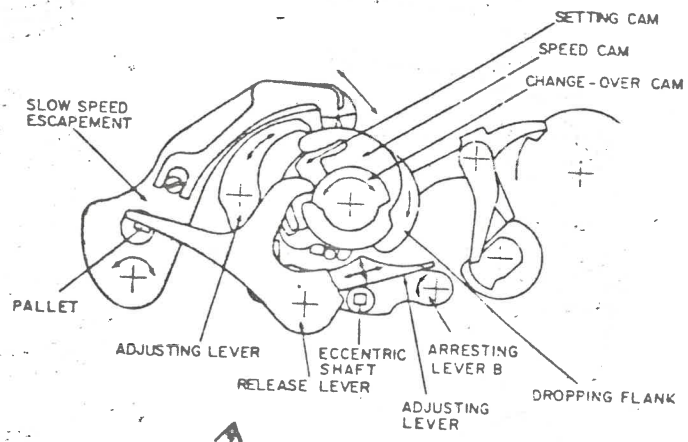
NOTE: Lever wind is geared up to spin take-up spool faster in late models. A sheet metal housing conceals the curtains, removed by 3 screws. X Synch contacts are above the arrow marked X. With screw mount Leica experience you should have no trouble with the M. The closing curtain is held by a screw plate on the drum so it is easier to replace and get it the same length.



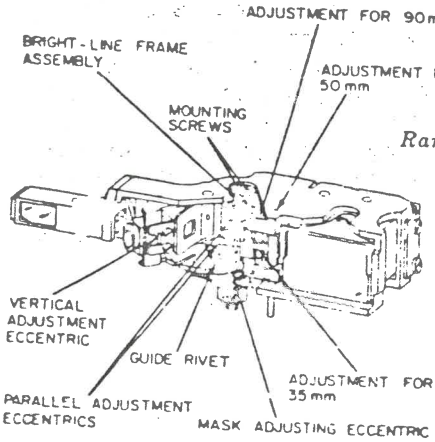
Film transport and shutter operation.



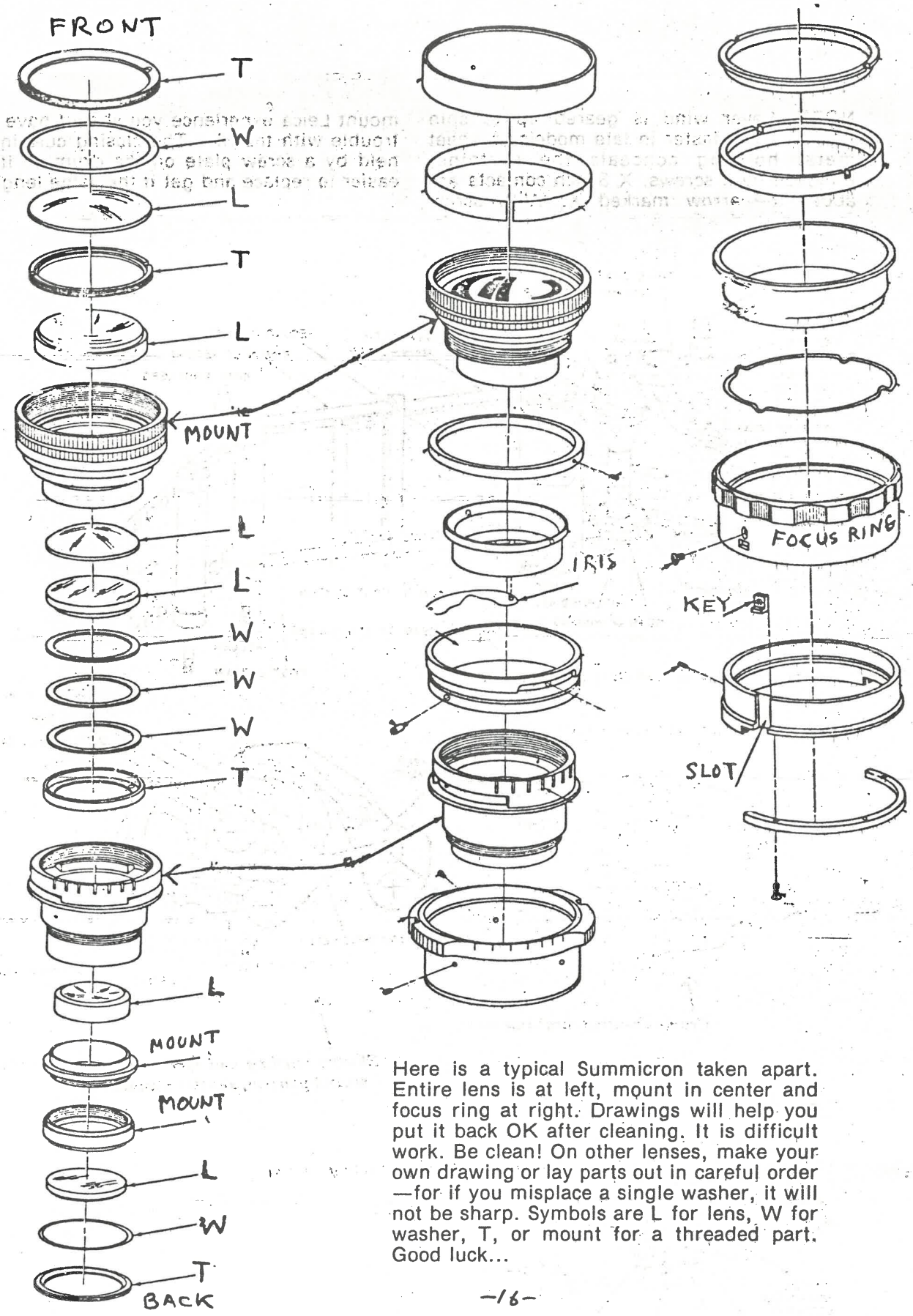
Frame counting mechanism.



Shutter winding and speed controls in 1/1000-second position, shutter wound.



Range-viewfinder adjusting points.



Here is a typical Summicron taken apart. Entire lens is at left, mount in center and focus ring at right. Drawings will help you put it back OK after cleaning. It is difficult work. Be clean! On other lenses, make your own drawing or lay parts out in careful order —for if you misplace a single washer, it will not be sharp. Symbols are L for lens, W for washer, T, or mount for a threaded part. Good luck...

TROUBLESHOOTING

LEICA BAYONET — MOUNT CAMERAS

Malfunction	Probable cause	Remedy
Shutter release knob cannot be depressed, or remains depressed.	Release disc loose	Tighten release disc
	Release sleeve has shifted	Reposition release sleeve
Shutter does not release when release knob is depressed.	Foreign matter in shutter mechanism	Remove foreign matter.
Shutter curtains do not open when release knob is depressed.	Flat spring incorrectly adjusted	Adjust flat spring
	Arresting lever B incorrectly adjusted	Adjust arresting lever
	Foreign matter between bottom cover and flat spring.	Remove foreign matter between bottom cover and flat spring
Winding lever loose	Loose screw ring	Tighten screw ring
	Defective saddle spring	Replace saddle spring
Winding lever cannot be advanced.	Foreign matter in winding, shutter, or release mechanism.	Remove foreign matter.
	Loose sprocket wheel shaft bearing	Tighten bearing
	Intermediate gear incorrectly positioned.	Realign intermediate gear
Winding lever will not fully wind shutter.	Defective rachet plate	Replace ratchet plate
	Broken or misaligned gear in winding or shutter mechanism.	Replace, or realign gear causing the malfunction.
Frame counter rotates too freely	Defective saddle spring	Replace saddle spring
Rewind knob difficult to pull up, or will not stay up.	Defective slotted friction sleeve	Replace slotted friction sleeve or clean and lubricate
Rewind knob difficult to turn	Dry rewind assembly bearings	Clean and relubricate bearings.
Rewind knob will not rotate	Damaged rewind assembly gears	Replace damaged gear or rewind shaft
Rewind knob rotates without rewinding film.	Sheared rewind knob shaft key	Replace rewind knob
	Defective forked carrier	Replace forked carrier
Frame selector will not position bright-line frames.	Defective range-viewfinder mask adjusting mechanism.	Readjust, or replace mechanism
	Spring defective, or disconnected from frame selector sliding bars.	Replace, or reconnect spring
Reverse lever remains in R position when winding shutter.	Defective coupling disc	Replace coupling disc
	Defective camshaft	Replace camshaf.
Delayed action lever will not fully wind clockwise.	Loose retaining screw	Tension clockwise spring and tigthen retaining screw
	Broken main spring in clockwork	Replace spring
Delayed action release button will not activate clockwork.	Foreign matter in clockwise mechanism	Remove foreign matter from clockwork mechanism clean and relubricate.
Lens lock release remains depressed.	Foreign matter under retaining ring	Remove foreign matter between bushing and retaining ring
Locked lens can be rotated slightly, positioning incorrect bright-line frames.	Slot in lens mounting flange worn or damaged.	Replace lens mounting flange
Lens seats roughly or loosely in lens mounting flange.	Worn or damaged lens mounting flange	Replace lens mounting flange 19).
	Worn or damaged spring ring	Replace spring ring
Light leaks on film	Loose or missing neck strap lugs	Replace neck strap lugs
	Hole in shutter curtains	Replace defective shutter curtain
	Deformed shutter curtains	Replace shutter curtain
	Damaged or missing light shields	Replace sealing cap , or light shields
	Defective or maladjusted shutter brake	Replace or adjust brake assembly
	Defective guide spring	Replace guide spring

Malfunction	Probable cause	Remedy
Electronic flash fires when connecting cord is inserted in electronic flash socket and shutter is wound or released.	Shorted electronic flash terminal	Repair or replace terminal
	Electronic flash socket lead grounded	Replace insulated wire
	Grounded long contact spring	Remove ground. Replace insulating plates (2 and 4, fig. 3–10) if required.
Electronic flash fires when connecting cord is inserted in electronic flash socket and shutter is released.	Grounded short contact spring	Remove ground. Replace insulating plates and insulating shield if required.
	Helical spring disengaged and touching short contact spring.	Relocate spring against insulating cap
	Foreign matter in precontact switch	Remove foreign matter from precontact switch
Electronic flash fires erratically	Intermittent open in electronic flash socket.	Resolder or replace insulated wire
		Replace terminal
	Foreign matter in precontact switch	Remove foreign matter and clean precontact switch
	Broken or disconnected ground wire	Resolder or replace ground wire
	Loose guide spring retaining nut	Tighten nut

Malfunction	Probable cause	Remedy
	Insufficient tension of long contact spring.	Adjust tension of long contact spring
	Short contact spring too far from long contact spring.	Reset adjusting eccentric
	Defective brake	Clean, lubricate and readjust, or replace, brake assembly
Scratches on emulsion side of film.	Film tracks rough	Hone film tracks.
	Curved bracket plate too high	Readjust or replace curved bracket plate
	Insufficient tension of compensating friction clutch.	Adjust tension of compensating friction clutch by adding washers
Scratches on back of film	Foreign matter on pressure plate	Clean pressure plate
	Damaged or scratched pressure plate	Replace pressure plate
Image on film unsharp	Rangefinder maladjusted	Readjust rangefinder, paragraph
	Lens flange-to-focal plane distance incorrect.	Adjust lens mounting flange, paragraph
	Lens flange not parallel with film plane	Adjust lens mounting flange, paragraph
Rangefinder does not indicate correct distance.	*Note.* Lens mounting flange must be correctly adjusted before troubleshooting rangefinder.	
	Roller arm maladjusted	Adjust rangefinder, paragraph
	Roller arm bent	Straighten roller arm, paragraph
Rangefinder roller arm does not follow lens focusing cam.	Objective lever pulling spring disengaged.	Re-engage pulling spring
	Objective lever ball screw too tight	Readjust and relubricate ball screw
Viewfinder field dark except for rangefinder movable image.	Beam-splitting prism separated	Replace range-viewfinder assembly including roller arm
Bright-line frames have hairlines.	Glass plates decemented	Replace bright-line frame assembly fig.
Bright-line frame does not move, or position correctly, when interchanging lenses, actuating the frame selector or roller arm.	Spring disengaged	Re-engage spring
	Foreign matter between brightline frame carrier and glass plate mount.	Remove foreign matter between mask carrier and glass plate mount
	Foreign matter between metal mask and glass plate.	Remove foreign matter between glass plate and metal mask
Film magazine does not open or close in camera.	Defective inner shell knob	Replace inner shell
Film does not wind onto magazine film spool.	Defective film spool	Replace film spcol
Film magazine does not lock in closed position.	Defective retaining spring	Replace retaining spring

Malfunction	Probable cause	Remedy
Shutter does not completely traverse film aperture when release knob is depressed.	Shutter curtain ribbons loose	Reglue shutter curtain ribbons
	Light shield felt strips loose	Reglue felt strips
	Loose retaining nut	Tighten retaining nut
	Slow speed escapement hangs below 1/50 second.	Clean and adjust slow-speed escapement
	Damaged ribbon rollers	Replace main roller assembly
Uneven spacing between frames	Loose retaining nut	Adjust stop arm stop disc , and tighten retaining nut
	Loose sprocket wheel screw	Tighten screw
	Maladjusted compensating friction clutch.	Remove or add washers
Baseplate lock has no positive stop.	Locking plate bent	Straighten locking plate
	Angled stop bent or broken	Straighten stop or replace baseplate.
Baseplate lock has insufficient friction.	Defective upper or lower washers	Replace spring washer or washer
Shutter speeds below 1/50 second too slow.	Foreign matter in slow speed escapement	Remove foreign matter from slow-speed escapement
	Slow-speed escapement dry	Clean and relubricate slow-speed escapement
Shutter speeds below 1/50 second too fast.	Slow-speed escapement pallet does not fully engage.	Readjust pallet assembly
	Hairspring defective	Replace slow-speed escapement
	Second shutter curtain tension too high	Reduce tension of spring
Shutter speeds above 1/50 second too slow.	Foreign matter in shutter mechanism	Remove foreign matter from shutter mechanism.
	Dry shutter mechanism bearings	Clean and relubricate bearings.
	First shutter curtain tension too high	Reduce tension of spring
	Second shutter curtain tension too low	Increase tension of spring
Shutter speeds above 1/50 second too fast.	First shutter curtain tension too low	Increase tension of spring
	Second shutter curtain tension too high	Reduce tension of spring
Uneven exposures	Foreign matter in shutter mechanism	Remove foreign matter from shutter mechanism.
	Dry shutter mechanism bearings	Clean and relubricate shutter mechanism bearings.
Flashbulb does not fire when shutter release is depressed.	*Note.* Shutter must be correctly adjusted before troubleshooting synchronization.	
	Damaged terminal	Replace terminal
	Loose insulated wire	Resolder insulated wire
	Foreign matter between contacts	Remove foreign matter from contact spring synchro adjusting lever
	Pitted or burned contacts	Clean or replace contact spring or synchro adjusting lever and contact arm
Flash unit fires when connecting cord is inserted in flashlamp socket.	Shorted flashlamp socket	Replace terminal or insulated wire
	Precontact switch upper spring grounded	Remove ground. Replace insulating plates
	Insulating cap on arresting lever missing.	Replace insulating cap
Flash unit fires erratically	Intermittent open in flashlamp socket	Resolder insulated wire
	Intermittent contact of precontact switch	Clean precontact switch
	Dirty, pitted or burned switch contacts	Clean or replace synchro adjusting lever and clean spring contacts.
	Broken or disconnected ground wire	Resolder or replace ground wire
Flashbulb fires too early or late	Maladjusted contact arm	Readjust contact arm
Electronic flash does not fire when shutter release is depressed.	Damaged terminal	Replace terminal
	Foreign matter in precontact switch	Remove foreign matter and clean contacts of precontact switch
	Pitted or burned contacts of precontact switch.	Replace flat spring with riveted contact spring, and snort contact spring
	Foreign matter in main contact switch	Remove foreign matter and clean main contact switch
	Pitted or burned contacts of main contact switch.	Replace short contact spring and long contact spring
	Electronic flash socket open	Replace, or resolder insulated wire

Selecting and Using Leica Today...

Value of Leicas to collectors is directly related to their scarcity, most Leica experts believe. Read Roy Long's fine column in the Shutterbug Ads and join Leica Historical Soc. % Gordon L. Hight, Rome, Ga. 30161 to keep up with Leica collecting.

For use, the Ic and If cameras without rangefinder make excellent compact pocket cameras that challenge Rollei 35 and other modern cameras. Most people fit the brightline finder. Any Leica, back to the A, will take excellent pictures today. Elmar lens is sharpest stopped down to F8, not quite equal to typical Japanese F1.8 lens on a modern SLR. Summar and Summitar give beautiful soft results full open, sharpen up by F5.6, are competitive today. Elmar and Summaron WA are best at F8. Tele 90 and 135 are competitive today. Imarect finder masks down image for tele, is almost impossible to see through. Many prefer Nikon zoom finder or individual Leitz bright line finders. Visoflex is still competitive. Nooky is fun for close-ups. Most users pay a premium to get viewfinder rangefinder on IIIG Leica. F2 Summicron is one of all-time best lenses ever made. 35mm version is excellent too. M2, M3, M4, M5 are preferable to USE.

Problems that bother new users of Screw Mount Leica that old-timers are accustomed to are... you have to LIFT dial to set shutter speed. Readout is only correct when shutter is wound. Low speeds are on a second dial which is set for example to 1 sec, will give you 1 sec when you set top dial to 1/30 sec expecting to get 1/30 sec. Slow speed dial on earlier cameras can be jarred by accident to another speed. On later models, it has a lock at 1/30 sec. Elmar, F3.5 Summaron F3.5 WA and some other lenses revolve to set focus so you can easily change focus setting while setting aperture. If your finger touches speed dial while you are taking a picture shutter can drag or stick part open since speed dial revolves each time you take a picture. Elmar has little sunshade protection in mount, is easily scratched; give it a sunshade and contrast improves greatly. Working a Leica expertly and quickly shows sophistication, expertise and a cultivated appreciation of classic precision mechanism. Learn it.

I have some experience using screw mount Leica, mostly a pair of IIIF and a IIIA with synch added. I have had jams from improper loading. I have also used M5 which is easy to load.... Working with screw mount, you have to take time to see that the film holes are meshed with the sprocket teeth. You may have to rotate wind to a certain position to get it to load. You need tiny fingers to reach the take-up spool. You can forget and take pictures with lens cap on since it is not an SLR. Summar and other fast lenses block off viewfinder in corner. You have to guess parallax on regular finder on screw mount Leica. F2 lenses are far better than earlier F1.5 Summarit, etc.

I have won considerable attention and acclaim with some pictures taken with my Leicas. On the back cover is a picture of Mr. Karl Struss, the noted cinematographic photo director, responsible for the photography in such film classics as SUNSET, Dr Jekyll and Mr Hyde and The Island of Dr Morneau. I photographed Karl Struss candid while he was addressing a film festival at Univ.of Mich with the IIIF with Summitar full open. Mr.Struss later wrote me that this was the best picture ever taken of him, a compliment I take seriously, since Struss is also a world renowned Pictorial photographer and the last living member of the Photo Secession group. The Leica I used had been overhauled by me. Later I had the honor to work on Struss' favorite Graflex.

The second picture on the back cover was made by the bromoil process from a negative taken with Leica IIIF and F3.5 Elmar, about F8 or F11 as I remember. I find Leica good for careful landscape work too. -20-

SUPPLEMENTARY NOTES AND INFORMATION...

DISMANTLING AND CLEANING SCREW-MOUNT LENSES. The 50 mm Summar often appears cloudy, looks as if its cement has separated..but the only problem is that grease from the iris has settled between the lens glasses, Clean it. To take apart this type of lens, you first remove three very tiny screws 120 degrees apart around the lens barrel... the part that slides...then you pull front and back of lens apart. They come apart easy."Nothing to it,"says Leica expert, Bryan LaPlante.

DELAYED ACTION..IN M LEICA has a left hand screw in its center. In the screw mount cameras, it is right hand. You cock first before removing.the lever. Otherwise you have to set its spring tension all over again. Usually flush cleaning, squirting benzine or ether into it will clean it. In a few cases readers have had trouble here.

Removing wind knob in IIIf and IIIG involves turning its shell until you see slotted screw thru the hole in it. Do not unscrew slotted screw all the way, turn just 1 ½ turns. Then unscrew knob from shaft. You have to remove self timer plate held by one screw and plate beneath held by three screws before you can get mechanism out of body housing in Leicas with self-timer,

IIIG SHUTTER HAS METAL FINS INSTEAD OF PIN AND HOLE but they work the same way, last longer. There are three variations in speed knob on IIIf and IIIG. Black dial simply has three screws in knob itself. Red dial model dial comes off by lifting and turning until you see the three screws under the knob head. You can adjust the synch by rotating the synch cam which you see beneath dial. Loosen its screws and rotate with wrench until you see a full frame at 1/25 sec and synch set to 0. Fire a strobe and look at curtain thru lens opening. You should also see a full frame at 1/50 sec with synch dial at 20. Leica IIIG has no synch dial and you have to takeoff top plate to set synch. Speed setting knob is a shell with disk beneath held by three screws in its stem, in IIIG only. When you remove this disk you see the rotor with fins that sets shutter speeds. You can set synch onIIIG by bending points a bit. Usual reason synch fails is first that points fail to make good contact, need cleaning..,or second, that dirt short-circuits them. Dirt may even be in PC contact. To get at wires to unsolder, remove accessory shoe and you will see them beneath. You have to unsolder wires in most cameras to remove top housing. It is not difficult.
M2, M3, M4 rangefinder-viewfinder has screws to adjust field of finder to exact coverage of lens. Put a ground glass in the back to do it and INSIST on 100% exact alignment. Leica is one of few cameras ever built that gives perfect finder alignment. Its fun to work with a mechanism that can attain <u>perfection</u> !!!

MAKING LEICA CURTAINS,,,Most people use cloth from National Camera. If you find another source, let me know. DuPont stopped making it. Here are the dimensions for IIIC thru IIIG. First curtain, opening is 1 and i/4 inches wide by 2 x 7/8 " long plus 1/8" inch hems for metal strips. Second closing curtain also 1¼ wide but 3 and 3/4" long;tapes are 5/32" wide. 3 and 3/4"long for first curtain, 3 and7/8" for second curtain. In IIIA and earlier cameras curtains are 1 and 3/16" wide instead of 1¼". Adjust by slipping while glue is not yet set until metal strips overlap perfectly. With shutter cocked set the curtain that goes around the big main roller, the closing curtain, is 1/16 to 3/32" beyond the film opening and towards the mail roller. You get in trouble with too thick cloth. Mine measured 006." If you want to use a torque wrench to set curtain tension, set to 11 oz on first curtain, 8 oz. on second, on Screw-mount cameras. If you lack one, set equal to a well-working camera in your collection.

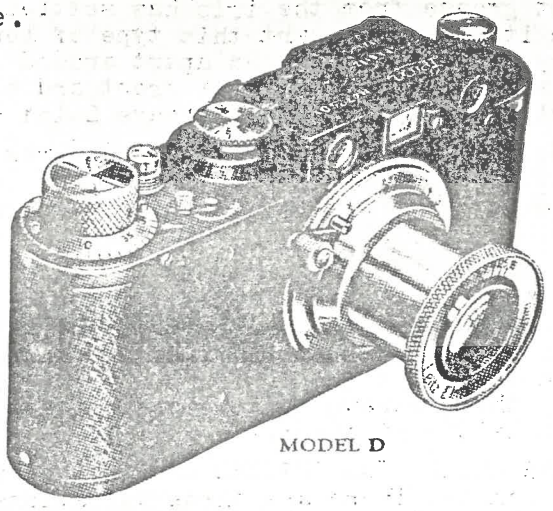
We sincerely wish you success, profit and happiness in your Leica restorations and repair. We publish repair manuals on most all desirable cameras you can repair, old and new. Our very popular TRADE SECRETS OF CAMERA REPAIR GIVES THE BASICS. To get our latest catalog send a self addresses stamped envelope. We also sell the very popular TRADE SECRETS FOR PHOTO DEALERS, which will help you make big money trading in Leica and other cameras by mail. It shows how to buy them cheap locally and how to sell by mail.

This 1933 Advertisement featuring Leica I and II models helps explain the appeal of this marvelous camera to so many intelligent people.

Remember—when speed photography was unknown to amateurs—and many professionals?

—When night photography was limited to posed flash light pictures?

—When precision lenses were seen only in the laboratories of scientists?



MODEL D

—When telephoto lenses were available only to a few?

—When a camera fan, to be "up-to-date", needed a wagon-load of expensive equipment?

The LEICA Camera has made these all things of the past!

HOW LEICA HAS CREATED A NEW ERA IN PHOTOGRAPHY

LEICA photography differs from old-fashioned photographic conceptions as much as the modern automobile differs from the horse and buggy. The LEICA Camera offers more picture-taking convenience, speed, accuracy, and versatility than has ever before been thought possible. It has blazed many trails, broken many precedents. It was the first precision camera to be built small enough and light enough to carry in the pocket. It was the first precision camera to simplify all controls for greater speed and certainty of operation. It was the first precision camera to adapt lenses of microscope quality to photography. It was the first pocket precision camera designed with interchangeable lenses, including telephoto and wide-angle lenses, and high speed lenses for indoor and night photography. It was the first pocket camera with a built-in range finder coupled with lens, giving correct focus instantly, without guesswork. It was the first pocket camera equipped with a focal-plane shutter of standard *cloth construction*, eliminating danger of internal reflections at high speeds. It was the first "still" camera to use cinema film, giving the photographer the advantage of the very latest refinements in cinema film manufacture. And the makers of the LEICA Camera were the first to offer a complete line of accessories and attachments (now over 300!) thus opening the entire field of modern photographic art to every LEICA owner at a great saving in cost.

AUTOFOCAL CAMERA Leica

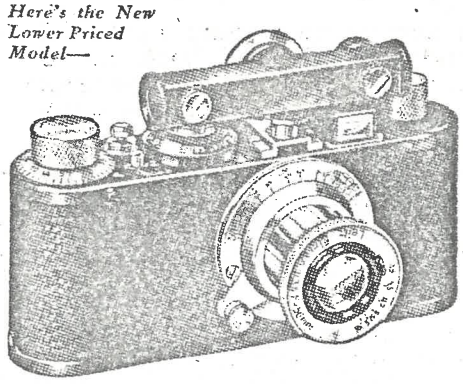
The LEICA Camera takes up to 36 pictures on a single roll of film. Sharp negatives, giving perfect enlargements up to 12 x 18 inches. Shutter speeds 1/20th to 1/500th seconds including time exposure.

A New & Broader Conception of Service, Too

The LEICA purchaser receives a 2 year guarantee certificate with camera. "LEICA PHOTOGRAPHY" an interesting illustrated monthly bulletin is sent free to every LEICA owner. LEICA Camera Clubs now organized in many cities throughout the country help the LEICA owner to get the most out of his camera. Lectures and demonstrations by leading experts are given before these clubs.

Price of the MODEL D LEICA, with 50 m/m ELMAR f3.5 lens, $92.50.

Here's the New Lower Priced Model—



The STANDARD LEICA

Including Range Finder **$66**

A Leica model within the intermediate price range. Has all the improvements of the Model D LEICA, with the exception of the built-in range-finder. It is equipped, however, with a new type, short base range finder mounted horizontally on the camera. Convertible at any time into the Model D LEICA, at a charge which brings the total cost no higher than the regular price of the Model D. Write for free booklet, "The Standard Leica".

Ed Romney's famous repair text helps Leica enthusiasts keep most models of Leica running today.

Top: Karl Struss lecturing at Ann Arbor
Botton: Ellenboro Cottage
Both pictures by Ed Romney