THE SYNCHRO-COMPUR 1-MX

The Synchro-Compur 1-MX is the larger cousin of a shutter you have already studied. In your lesson "Complex Escapement Retard Shutter - Part I," you examined the rim-set Compur-Rapid which uses a ring-type main lever. This pattern is closely followed in the Synchro-Compur 1-MX.

You will frequently encounter the Synchro-Compur 1-MX when working on large-format cameras. For example, figure 1 shows the Synchro-Compur 1-MX mounted on a modern press camera, the Graflex xl.

Although you are already familiar with the basic design, there are several variations in the Synchro-Compur 1-MX worth noting. The larger size permits features not found in the smaller model previsously studied. For this reason, we will now concentrate on the variations in the Synchro-Compur 1-MX -- the most important of these are:

1. THE DELAYED-ACTION ESCAPEMENT -- The Synchro-Compur 1-MX uses a delayed-action mechanism (self-timer) exactly as described in your lesson text. This is found in the section "Variations in the Compur Rim-Set Shutter" of "Complex Escapement Retard Shutter - Part I." Since the delayed action is explained in your text, it will not be covered here -- however, you may wish to review this section of your lesson before you proceed.

2. THE PRESS-FOCUS MECHANISM -- You know that press and view cameras often provide a means of opening the shutter blades for viewing and composing on a ground glass. This feature is also described in "Variations in the Compur Rim-Set Shutter." The Synchro-Compur 1-MX uses the lever-type press-focus which operates independently of the setting lever.

3. THE "TIME" AND "BULB" ACTIONS -- Smaller Compur models having both "time" and "bulb" actions are automatic at these settings. That is, the shutter is not cocked when used on "time" or "bulb." However, the "time" and "bulb" actions are set-and-release in the Synchro-Compur 1-MX. Since the "time" and "bulb" operations are unique, they will be examined in detail.

4. THE SYNC DELAY MECHANISM -- This is the most complex variation in the Synchro-Compur 1-MX. Cocking the shutter automatically tensions the sync delay mechanism. Then, when the shutter is released, the flash is fired according to the sync setting. If the shutter is set to "X," the flash is fired when the blades reach the full-open position -- if the shutter is set to "M," the flash is fired a fraction of a second before the blades start to open.

To examine these variations, first remove the shutter from the camera and unscrew the front and rear lens cells. Then, using the same procedures described for the smaller Compur, remove the cover plate and the speed cam. On some shutters, it may first be necessary to take off the nameplate which is held to the cover plate by three screws.

You can now see how closely the Synchro-Compur 1-MX resembles the Compur-Rapid you studied earlier, Fig. 2. As with other Compur designs, you must hold the main lever against the lens flange while operating the shutter.

The sync delay mechanism is pointed out in figure 2. This is a spring-driven escapement which releases the main lever after a brief delay. That is, tripping the shutter releases the sync delay mechanism — the sync delay mechanism then runs down and releases the main lever. During the delay, the flash is fired -- an "M"-type flashbulb thus has the split second it needs to reach its maximum light output.

To set the desired sync delay time, move the MX selector switch, Fig. 2, to one of its two positions: "M" or "X." In figure 2, the MX selector switch is at the "M" setting; in figure 3, the MX selector switch has been moved to "X."

The flash is fired when the sync contact, Fig. 3, is moved against the sync terminal tab. This is true whether the MX selector switch is set to "M" or "X." The only difference is in what shutter part is used to actuate the sync contact. At the "M" setting, the movement of the sync contact is effected by the sync delay mechanism — before the main lever is released; at the "X" setting, the flash is fired by the leaf lever when the blades reach the full-open position.

In figure 3, the shutter has been cocked so you may see the leaf lever more clearly. As the leaf lever moves to open the shutter blades, it presses the sync contact against the sync terminal tab. This can be seen in figure 5, with the shutter blades held open on "time."

At the "M" setting, the sync contact is actuated by the contact closing lever in the sync delay mechanism, Fig. 4. To study this action, first reset the MX selector switch to "M," Fig. 2. Next, cock the shutter and hold the main lever in the cocked position. While watching the action of the contact closing lever, depress the outer release lever -- notice that the contact closing lever "jumps" toward the sync contact, closing the contacts to fire the flash.

Here is what happens: when you cock the shutter, the sync delay mechanism is simultaneously tensioned. Depressing the outer release lever unlatches the sync delay mechanism, allowing it to run down and actuate the contact closing lever. In turn, the contact closing lever presses the sync contact against the sync terminal tab to fire the flash -- before the main lever is released. Then, after the split-second delay, the sync delay mechanism releases the main lever.

You can now see the function of the MX selector switch. At the "M" setting, the MX selector switch does nothing but allow freedom of movement of the contact closing lever -- however, when set to "X," the MX selector switch holds the contact closing lever toward the outside of the shutter, Fig. 3. This prevents the contact closing lever from actuating the sync contact. As a result, the flash is not fired until the leaf lever reaches the full-open position, Fig. 5.

Further disassembly will clarify the operation of the sync delay mechanism. First, however, let's take a look at the unique "time" and "bulb" actions. Three spring-loaded levers mounted on top of the sync delay mechanism provide the "time" and "bulb" settings. These levers are: the catch lever, the time stop lever, and the bulb stop lever, Fig. 4.

Since the speed cam has been removed, the shutter now delivers "time" operation. That is, the shutter blades remain in the open position until the outer release lever is actuated a second time.

The catch lever blocks the main lever at both the "time" and "bulb" settings. Cocking the shutter allows the spring-loaded catch lever to move toward the main lever, Fig. 4. The catch lever is now in position to intercept a lug on the main lever during the release cycle.

Release the shutter and hold the outer release lever depressed. Notice that the main lever rotates counterclockwise until it is arrested by the catch lever. This action opens the shutter blades.

Were it not for the bulb stop lever, the main lever would simply push the catch lever aside and complete its release rotation. However, depressing the outer release lever allows

the bulb stop lever to move behind the catch lever. Thus, the bulb stop lever holds the catch lever engaged with the main lever lug.

Now, let the outer release lever return slowly to its rest position. As it returns, the outer release lever pushes the bulb stop lever out of engagement with the catch lever. Simultaneously, the outer release lever permits the time stop lever to move into position behind the catch lever. The catch lever is then pushed aside (by the main lever) until it is once again blocked -- this time by the time stop lever, Fig. 5.

Depressing the outer release lever a second time pushes the time stop lever away from the catch lever. Consequently, the main lever moves the catch lever aside, completing its release rotation and closing the shutter blades.

The catch lever and the time stop lever are individually controlled by the speed cam. At the "time" setting, both levers are free to move, as just described. Turning the speed cam to "bulb" blocks the time stop lever out of action. Hence, the catch lever is arrested only by the bulb stop lever -- the shutter blades then close as soon as the outer release lever is allowed to return to its rest position.

Setting the speed cam to an instantaneous speed blocks the catch lever. As a result, the catch lever cannot intercept the main lever during the release cycle.

Now, we can proceed with the disassembly and more closely examine the sync delay mechanism. Locate the spring-loaded sync release lever which rides against the outer edge of the main lever, Fig. 6. The sync release lever has two purposes -- one is that it prevents the outer release lever from being depressed until the shutter is cocked.

With the shutter in the released position, a tip on the sync release lever rests in the path of the outer release lever, Fig. 6. As the shutter is cocked, the main lever cams the sync release lever aside. The outer release lever may then be depressed to trip the shutter.

Blocking the outer release lever is just a secondary duty of the sync release lever. Its main function is to latch the sync delay mechanism in the cocked position. This can more easily be studied after removing the levers which provide the "time" and "bulb" operations. First, disconnect the catch lever spring, Fig. 5, and lift the catch lever out of its bearing on the sync bridge.

Next, disconnect the time stop lever spring, Fig. 6. The spring which operates the bulb stop lever is the short end of the sync release lever spring -- the long end of this spring hooks behind the delayed-action escapement. Disconnect the short end of the sync release lever spring from the bulb stop lever -- now, hook this end of the spring to the side of the sync release lever, as shown in figure 7. This makes the short end of the sync release lever spring easily accessible for reassembly.

Finally, remove the time and bulb stop levers by taking out their retaining screw, Fig. 6. Both the time stop lever spring and the sync release lever spring remain attached to the sync release lever.

You can now see the sync release lever more clearly, Fig. 7 -- this figure shows the shutter in the cocked position. Also, locate the spring-loaded lug on the sync drive sector extending from beneath the sync bridge in figure 7. The sync drive sector is the key to the operation of the sync delay mechanism.

Since most of the sync drive sector is still hidden from view by the sync bridge, refer to the drawing in figure 8 to study the operation. Notice that the spring-loaded lug on the sync drive sector sits in the path of a stud on the underside of the main lever. The mainspring, not shown in the drawing, hooks to this main lever stud.

The sync drive spring, Fig. 8, is a tension-type spring that powers the sync delay mechanism. One end of the sync drive spring hooks to the sync drive sector, while the other end attaches to the hooking plate.

Figure 8 shows the parts in the released position. Here, the vertical tab on the sync drive sector is against a downward-projecting pin on the end of the inner release lever — the inner release lever is not shown in the drawing, but is pointed out in figure 3. The sync drive sector thus holds the inner release lever away from the main lever.

As the shutter is cocked, the main lever rotates in a clockwise direction. The stud on the underside of the main lever then contacts the spring-loaded lug on the sync drive sector. This pushes the sync drive sector as shown in figure 8, tensioning the sync drive spring.

Now, the vertical tab on the sync drive sector moves away from the downward-projecting pin on the inner release lever. Consequently, the spring-loaded inner release lever swings into position to latch the main lever.

When the sync drive sector reaches the cocked position, it is latched by the sync release lever, Fig. 7. The main lever continues its clockwise rotation until it is latched at the end of its travel by the inner release lever, also shown in figure 7.

Remember, tripping the shutter releases the sync delay mechanism. In turn, the sync delay mechanism releases the main lever. Let's see how this is accomplished.

As the outer release lever is depressed, it strikes the tip of the sync release lever. The sync release lever is thus pushed out of engagement with the sync drive sector.

Once freed, the sync drive sector is pulled back to its starting position by the sync drive spring. During its return travel, the sync drive sector is slowed down slightly by an escapement mechanism (which you will later see). Finally, upon nearing the end of its movement, the sync drive sector tab again strikes the downward-projecting pin on the inner release lever. This kicks the inner release lever out of engagement with the main lever. The main lever then rotates in a counterclockwise direction, opening and closing the shutter blades.

At the end of its counterclockwise rotation, the main lever again strikes the spring-loaded lug on the sync drive sector. This time, however, the spring-loaded lug moves aside and allows the main lever to return freely to its rest position. Now, the pin on the underside of the main lever is on the proper side of the spring-loaded lug for the next cocking cycle, as in figure 8.

If the shutter is set to "M" sync, the contacts are closed during the sync drive sector's return travel. Hence, the flash is fired before the main lever is released. You will see the parts which actuate the sync contact later in the disassembly.

The speed that the sync drive sector travels after release is one factor affecting the length of the "M" delay. Another factor is the tension on the inner release lever spring. Increasing the tension on the inner release lever spring results in a longer "M" delay. This is because the contact is closed before the sync drive sector disengages the inner release lever -- the greater the pressure on the inner release lever, the harder it will be for the sync drive sector to release the shutter. The result is a longer period of time between contact closure and shutter opening.

You can see that altering the inner release lever spring tension is one adjustment you can make to change the "M" delay. In fact, the shutter takes advantage of this principle at one speed setting. When the speed cam is turned to the fastest shutter speed (1/400 second), it adds additional tension to the inner release lever spring.

Notice that the free end of the inner release lever spring curves upward, Fig. 7. Here, it is engaged by the speed cam at the 1/400 second setting. The speed cam pushes against this end of the spring, adding tension to the inner release lever.

Why increase the "M" delay at 1/400 second? Actually, part of the total "M" delay is the time it takes the shutter blades to reach the full-open position. Now at the 1/400 second shutter speed, the blade-opening time is shortened -- remember, this shutter uses a high-speed spring at the fastest speed. The high-speed spring adds tension to the main lever, decreasing the blade-opening time. Thus, the time between contact closure and main lever release is made longer to compensate for the faster opening cycle. The total "M" delay between contact closure and the point at which the shutter blades reach their full-open position remains the same.

In later lessons, you will learn more about flash synchronization. At this time, you need only be concerned with the mechanical operation of the sync delay mechanism in the Synchro-Compur 1-MX.

You can now continue with the shutter disassembly. Disconnect the sync release lever spring from its hooking point on the delayed-action escapement. Then, remove the sync release lever by taking out its retaining screw.

Next, disconnect the end of the mainspring from the post on the delayed-action retaining screw, Fig. 3. Now, carefully work the main lever up and out of the shutter -- you may have to hold the delayed-action latch away from the delayed-action escapement for clearance as you remove the main lever.

The parts of the press-focus mechanism are now visible, Fig. 9. Before we proceed with the disassembly of the sync delay mechanism, let's take a look at the operation of the press-focus. This is advantageous because the two assemblies are interconnected.

Figure 9 shows the press-focus mechanism engaged, opening the shutter blades. If the main lever were in place, the shutter would have to be cocked to use the press-focus -- this is because the main lever in the released position holds the blades closed.

A special two-piece leaf lever makes the press-focus feature possible. To avoid confusion, we will call the upper piece the leaf lever, and the lower piece the blade ring lever, Fig. 9.

The press-focus mechanism is more clearly shown in figures 10 and 11. Notice that the leaf lever spring holds the leaf lever against the blade ring lever, Fig. 10. In normal operation, the leaf lever and the blade ring lever act as one part.

When the main lever rotates counterclockwise on its release cycle, a cam on its underside strikes the raised lip on the leaf lever. This swings the lip-end of the leaf lever toward the outside of the shutter.

A downward-projecting tab at the other end of the leaf lever rests against the side of the blade ring lever. Thus, when the leaf lever is moved by the main lever, it pushes the blade ring lever from left-to-right, as seen in figure 10. Since the blade ring lever engages the blade operating ring, this action opens the shutter blades.

The main lever also drives the blades in the closing direction. As the main lever continues in its counterclockwise rotation, a lug on its underside strikes the raised tab on the blade ring lever. The blade ring lever is thus moved in the opposite direction to close the shutter blades.

This is how the blades are opened and closed in normal operation. Now, let's see what happens when the press-focus lever, Fig. 9, is actuated.

In figure 11, the press-focus lever has been pushed in to open the blades. Notice that one end of the press-focus lever contacts the blade ring lever -- this moves the blade ring lever to open the shutter blades. Here, the press-focus spring, Fig. 11, pushes the press-focus lever downward against the detent stud, Fig. 10. The press-focus lever is thus held engaged, keeping the shutter blades open.

Simultaneously, the contact prevention lever, Fig. 9, comes against the leaf lever. The contact prevention lever and the press-focus lever are coupled, always moving together. However, notice in figure 11 that the leaf lever is moved opposite to its normal direction of travel. In other words, the leaf lever and the blade ring lever are spread apart and are no longer in contact.

Why disengage the leaf lever when the press-focus is used? Remember, the leaf lever closes the sync contact when the blades reach the full-open position. If the leaf lever were not moved as shown in figure 11, it would follow the blade ring lever and close the contacts. Thus, the contact prevention lever is needed to keep the flash from firing when the press-focus is engaged.

Notice also that the long tail of the contact prevention lever slides up against the contact closing lever. This blocks the contact closing lever, Fig. 11. Now, if the shutter is released while the press-focus mechanism is engaged, the main lever will close the shutter blades. This will disengage the press-focus mechanism. However, the flash will not fire because neither the leaf lever nor the contact closing lever (if set on "M") can actuate the sync contact.

If you are going to remove the shutter mechanism plate, you must disassemble the press-focus parts. This is necessary because the press-focus lever extends through a slot in the side of the shutter housing.

Disengage the press-focus mechanism by slipping your thumbnail under the tab on the press-focus lever (at the outside of the shutter housing). Now, lift the press-focus lever slightly outward. This allows the spring-loaded blade ring lever to close the shutter blades, returning the contact prevention lever and the press-focus lever to their rest positions.

Next, disengage the press-focus spring from the stud on the contact prevention lever. Remove the shoulder screw which passes through the slotted ends of the contact prevention lever and the press-focus lever -- now, work the contact prevention lever out of the shutter. Notice that a pin on the underside of the contact prevention lever fits into a hole in the press-focus lever, coupling these two parts together.

Slide the press-focus lever as far as it will go toward the outside of the shutter -- until it is blocked by the detent stud. Then, unscrew the detent stud and slide the press-focus lever the rest of the way out of the shutter.

We can study the remaining operation of the sync delay mechanism by removing the sync bridge. It should be noted, however, that the sync bridge is not normally removed for routine cleaning and maintenance. Unless parts replacement is indicated, the sync delay mechanism may be left together and cleaned as a unit on the shutter mechanism plate.

For our study purposes, we will completely disassemble the sync delay mechanism. First, disconnect the outer release lever spring -- lift the outer release lever straight up and off its post.

Locate the sync drive spring hooking plate which is held by a screw to the shutter mechanism plate, Fig. 12. For reassembly reference, carefully note the position of this hooking plate. At first glance, it appears that the hole in the end of the hooking plate should fit over the small pin at the end of the delayed-action escapement. However, as you can see in figure 12, the end of the hooking plate fits between this pin and the shutter housing.

Now, disconnect the end of the sync drive spring from the tab on the hooking plate. This prevents the sync drive sector from recoiling after the sync bridge has been removed.

At the other end of the sync bridge, examine the location of the MX selector switch detent spring, Fig. 12. The detent spring serves to hold the MX selector switch at either one of its two

positions, "X" or "M." Note that one end of the detent spring fits into a hole in the sync bridge. The detent spring then passes around a post on the sync bridge and reaches to a stud on the MX selector switch.

To remove the detent spring, disconnect its long end from the MX selector switch. Now, work the detent spring completely free from the sync bridge.

Two screws hold the sync bridge. One is the sync bridge screw pointed out in figure 12 -- the other is the MX selector switch screw, also shown in figure 12. Remove the MX selector switch screw using the special spanner wrench you made for the Synchro-Compur 00-MXV Wide-Reflex in your lesson, "Complex Escapement Retard Shutter - Part II." (This spanner wrench is described in ***Manual*** #328.) Then, lift out the MX selector switch and remove the sync bridge screw.

Using your tweezers, lift the sync bridge out of the shutter -- the contact closing lever remains attached to the sync bridge.

Three parts are now loose in the shutter. These are: the sync contact, the high-speed spring, and a spacer which sits between the sync bridge and the sync contact. (The sync contact and the high-speed spring may cling to the sync bridge during removal.) Take out all three parts -- their exact positions will be described during reassembly.

The sync drive sector, now clearly visible, is pointed out in figure 13. Notice that the sync drive sector is geared to the pinion of the sync gear. Thus, the sync drive sector turns the sync gear during both the cocking and releasing cycles.

The sync cam is riveted to the top of the sync gear, Fig. 13. This is the part that actuates the contact closing lever to fire the flash on "M" sync. Because of the eccentric shape of the sync cam, the timing between the sync drive sector and the sync gear is critical. The correct timing procedure will be covered during reassembly.

To visualize the operation of the sync cam, first examine the underside of the sync bridge. Here, you can see the forked end of the contact closing lever, Fig. 14. When the sync bridge is in place, the sync cam rides against the longer of the two prongs at the end of the contact closing lever.

The shorter prong of the contact closing lever hooks on the pallet lever in the sync delay escapement, Fig. 13. The spring-loaded pallet lever provides the spring tension which holds the contact closing lever against the sync cam.

Since the contact closing lever was removed with the sync bridge, its role in the operation may at first be difficult to visualize. For this reason, we have sketched the sync cam, the contact closing lever, and the pallet lever in figure 15. The drawing shows the parts at the beginning of the cocking cycle.

Keep in mind that the pallet lever spring tends to move the pallet lever toward the outside of the shutter housing. This brings the pallet into engagement with the star wheel and holds the contact closing lever against the sync cam. The star wheel and pallet are shown in figure 16, with the sync drive sector and sync gear removed.

Now, refer again to figure 15. During the cocking cycle, the sync cam rotates in a clockwise direction, as indicated on the drawing. Thus, the sync cam pushes the forked end of the contact closing lever toward the center of the shutter. The contact closing lever pulls the pallet lever in the same direction, moving the pallet out of engagement with the star wheel.

Once the sync drive sector reaches the cocked position, the sync cam allows the contact closing lever to swing in the other direction. The forked end of the contact closing lever then

moves toward the outside of the shutter and the opposite end drops toward the sync contact. Hence, the pallet re-engages the star wheel in the sync delay escapement.

When the shutter is released, the sync cam turns in a counterclockwise direction -- opposite to the arrow in figure 15. The sync cam then drives the contact closing lever against the sync contact, closing the contacts to fire the flash. As the sync cam nears the end of its release rotation, it frees the contact closing lever. Now, the sync contact, moving away from the sync terminal tab under its own tension, pushes the contact closing lever toward the outside of the shutter.

You will recall that on "X" sync the MX selector switch engages the contact closing lever, Fig. 3. This pulls the forked end of the contact closing lever clear of the sync cam -- simultaneously disengaging the pallet in the sync delay escapement. Consequently, the sync cam cannot strike the contact closing lever during the release rotation.

Lift out the sync drive sector and the sync gear together. Now, the only sync parts remaining in the shutter are those shown in figure 16. These parts are riveted to the sync mechanism plate, a separate unit held to the shutter mechanism plate from the back. The shutter mechanism plate must be taken out before the sync mechanism plate can be removed. Figure 17 is an exploded view of the sync delay parts you have just disassembled.

Further shutter disassembly is accomplished following standard procedures, and will not be described here. There are, however, some critical considerations on reassembly which we will now examine.

One important factor is the placement of the shutter blades. If you examine the five blades carefully, you will note that only two are alike. Each of the other three has its own peculiar design and is intended for a specific spot on the blade operating ring.

Notice that the tips of the first and last blades are bent slightly, pointing in opposite directions. This allows the blades to slide more easily over one another. The fourth blade has a clearance notch cut in one edge. Figure 18 shows the proper positions of the shutter blades, seen from the back of the mechanism plate.

You will find it easier to install the shutter blades with the blade operating ring in the full-open position. Now, looking from the back of the mechanism plate, install the first blade nearest the leaf lever position -- this is the blade with the tip bending toward the front of the shutter. Next, pick out the two identical blades -- replace these two blades in counterclockwise rotation at the second and third blade locations.

The fourth blade, the one with the clearance notch, goes next. Finally, install the fifth blade -- the tip of this blade points up.

Another important point on reassembly is the timing of the sync delay mechanism. Remember, this timing is critical for proper operation of the contact closing lever.

We will start with the shutter reassembled to the stage shown in figure 16. Now install the sync drive sector and the sync cam. Hook the sync drive spring to its hooking plate.

Figure 19 illustrates the proper timing between the sync drive sector and the sync gear. Here, the first tooth of the sync drive sector is engaged with the sync gear pinion. Take carefull note of the position of the sync cam -- this position is the critical timing we have mentioned.

You may alter the timing after disengaging the sync drive sector from the sync gear. Using your tweezers, move the sync drive sector toward the outside of the shutter -- the sync gear may then be turned in either direction to change its timing. Adjust the sync gear timing until you have the relationships shown in figure 19.

Now, seat the high-speed spring over its post (the post pointed out in figure 13). As you replace the sync bridge, make sure it passes underneath the upper end of the high-speed spring.

While seating the sync bridge, test the placement of the contact closing lever. Remember, the shorter prong at the forked end must hook behind the stud on the pallet lever -- that is, between the pallet lever stud and the shutter housing. Check this by grasping the vertical tab on the contact closing lever (the tab which strikes the sync contact) with your tweezers and moving it toward the outside of the shutter. If the contact closing lever is properly positioned, you will be able to feel the spring tension of the pallet lever.

Another factor to remember is the position of the inner release lever. The downward-projecting pin on the inner release lever must sit to the inside of the tab on the sync drive sector -- that is, between the tab and the center of the shutter.

Now, only the sync drive sector prevents you from seating the sync bridge fully. This is because the sync drive spring pulls the sync drive sector past its normal rest position. Consequently, the latching end of the sync drive sector is sitting underneath the sync bridge.

Using your tweezers, push the sync drive sector slightly in the cocking direction -- until the latching end of the sync drive sector is against the edge of the sync bridge, as it is in figure 9. This allows the sync bridge to seat properly.

When you are certain the sync bridge is properly positioned, replace the sync bridge retaining screw. Next, slip the sync contact into place at the other end of the sync delay mechanism. The sync contact must pass to the inside of the vertical tab on the contact closing lever and to the outside of the sync terminal tab (check this positioning with figure 2). Install the spacer between the sync contact and the sync bridge, seat the MX selector switch, and replace the MX selector switch screw.

You can now test the timing of the sync delay mechanism. Looking through the catch lever bearing hole, Fig. 12, you should be able to see one corner of the sync cam. If timed correctly, this is the corner which is shaded in figure 15.

While watching the action of the contact closing lever, use your tweezers to slowly push the sync drive sector in the cocking direction. The vertical tab on the contact closing lever should first move toward the outside of the shutter. It should then drop back toward the sync contact -- stop moving the sync drive sector at this point.

Now, allow the sync drive sector to return slowly in its release direction. During this travel, the contact closing lever should press the sync contact against the sync terminal tab. As the sync drive sector nears the end of its travel, the sync contact should move the contact closing lever back toward the outside of the shutter.

If your shutter operates as just described, the timing of the sync gear is correct. You may now complete the shutter reassembly.

General lubrication tips, such as you learned in "Complex Escapement Retard Shutter - Part II," also apply here. That is, rubbing and sliding levers and latches are lightly lubricated with moly-lube. There are three critical lubrication points in the sync delay mechanism which should be stressed. These points, identified in figure 20, are:

1. The latching point between the inner release lever and the main lever -- make sure the latching end of the inner release lever is free of burrs.
2. The latching point between the sync release lever and the sync drive sector -- the surfaces of these parts must also be burr-free for proper operation.
3. The lug on the sync drive sector -- this is the side of the lug which is engaged by the main lever during the cocking cycle.

In later lessons, you will learn the methods of testing flash synchronization. Thus, we will not go into this subject now. However, we will take a look at the specific adjustment points in the Synchro-Compur 1-MX.

The adjustments are shown in figure 21. Note the correct distance between the sync contact and the sync terminal tab.

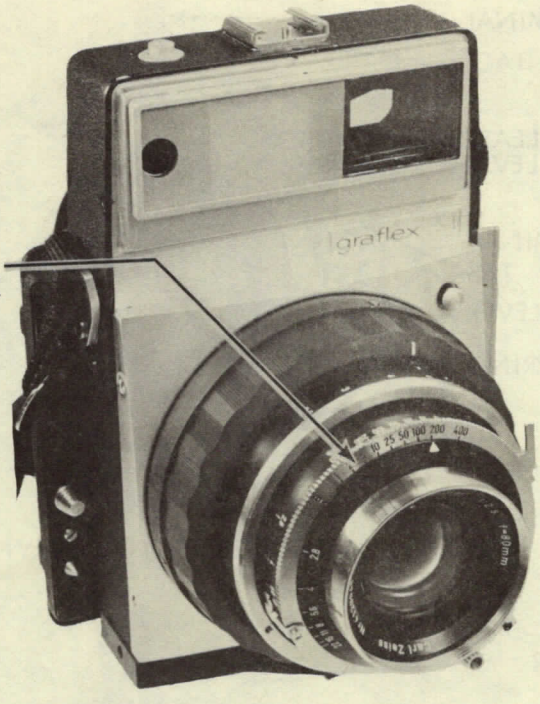
For the Synchro-Compur 1-MX, the factory specifies that the "M" delay should be 16 1/2 milliseconds from the time the contact is closed to the point the shutter blades are one-half open. However, if the shutter reaches the full-open position 18 to 20 milliseconds after release, the "M" delay should operate properly (you will later learn how to measure this delay time). The delay is checked at two shutter speeds: 1/200 second and 1/400 second.

Adjusting the sync delay is a rather delicate procedure which may require reforming certain parts. Fortunately, if the sync delay mechanism is clean and properly lubricated, adjustment is rarely necessary. Although we will describe the adjustment points, you should keep one thing in mind at all times: if your measured "M" delay is incorrect, the remedy in most cases is simply cleaning and lubricating the sync delay mechanism.

The "M" delay at 1/200 second may be changed by reforming the inner release lever. Be very careful while making this adjustment to avoid distorting the inner release lever -- it is essential that the inner release lever moves freely without bind. To shorten the "M" delay at 1/200 second, bend the inner release lever toward the outside of the shutter -- as shown in figure 21. This allows the sync drive sector to release the main lever sooner. To lengthen the delay, bend the inner release lever toward the center of the shutter.

The "M" delay at 1/400 second is adjusted by reforming the free end of the inner release lever spring. This alters the amount of additional tension the speed cam applies to the spring. Remember, increasing the tension lengthens the delay.

"X" sync is adjusted by reforming the sync contact. Just the tip of the sync contact should be altered (the tip that is engaged by the leaf lever when the shutter blades are opened).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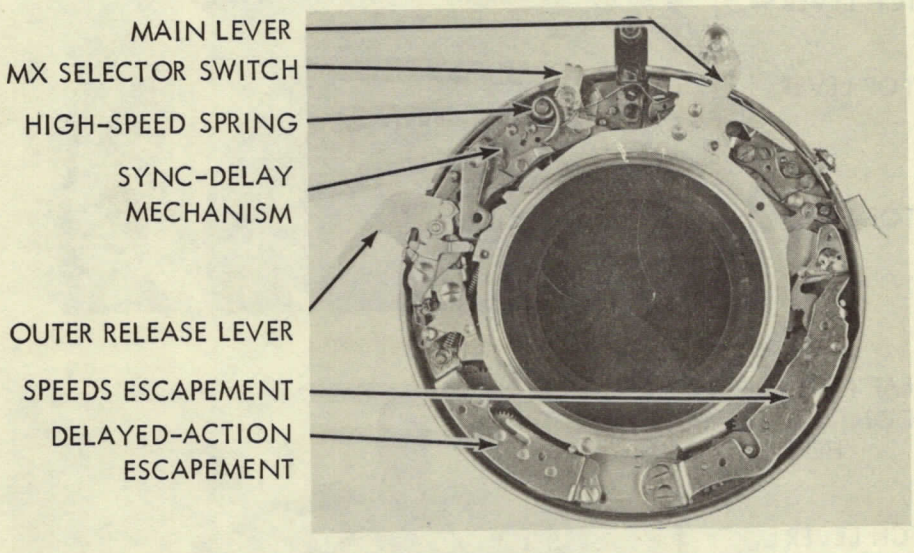
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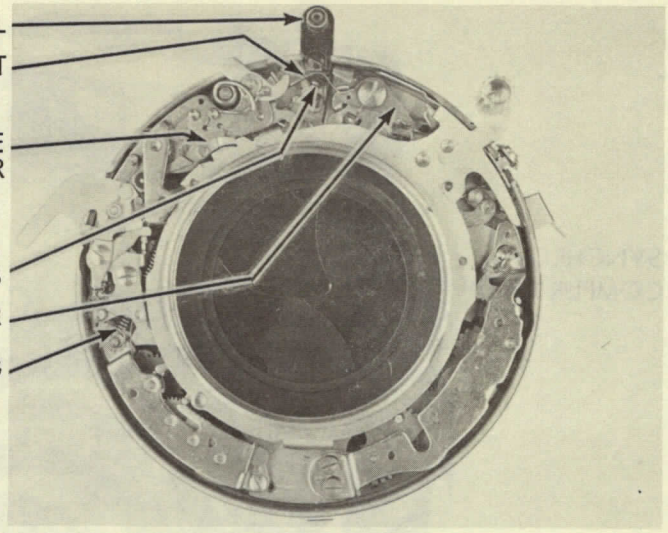
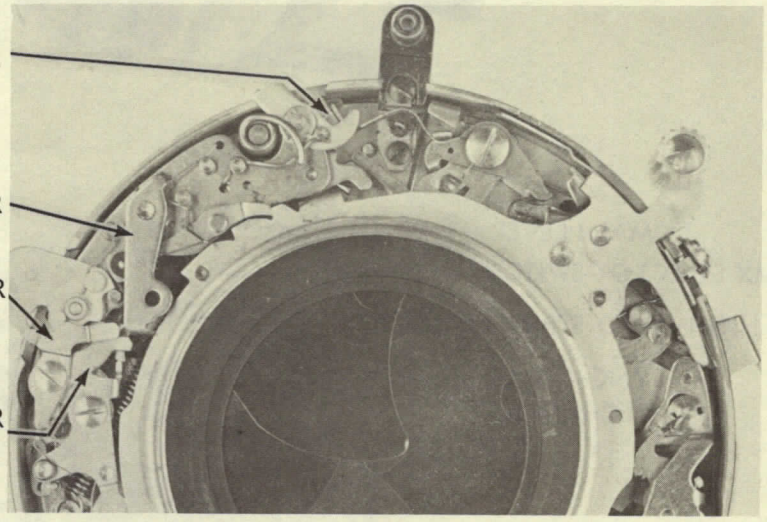
ESCAPEMENT

2



SHUTTER SET TO "X" SYNC

3



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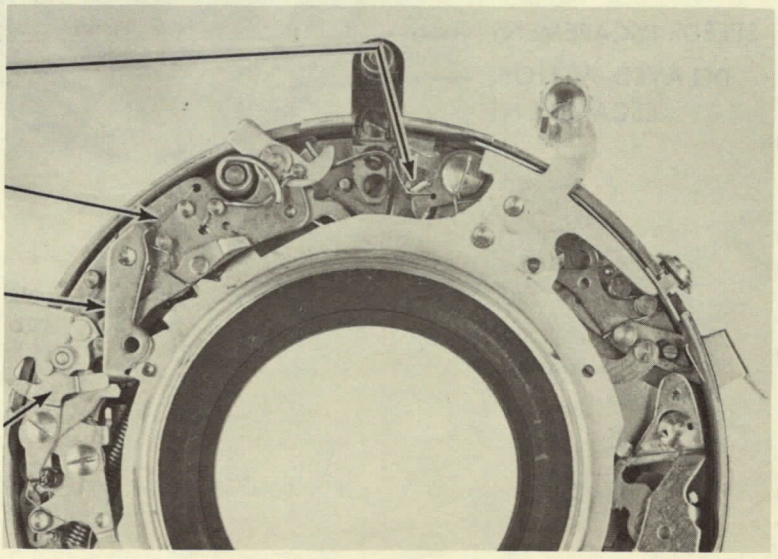

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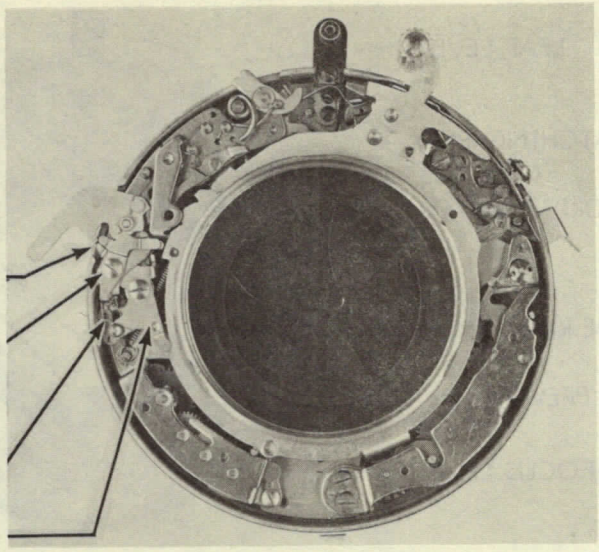
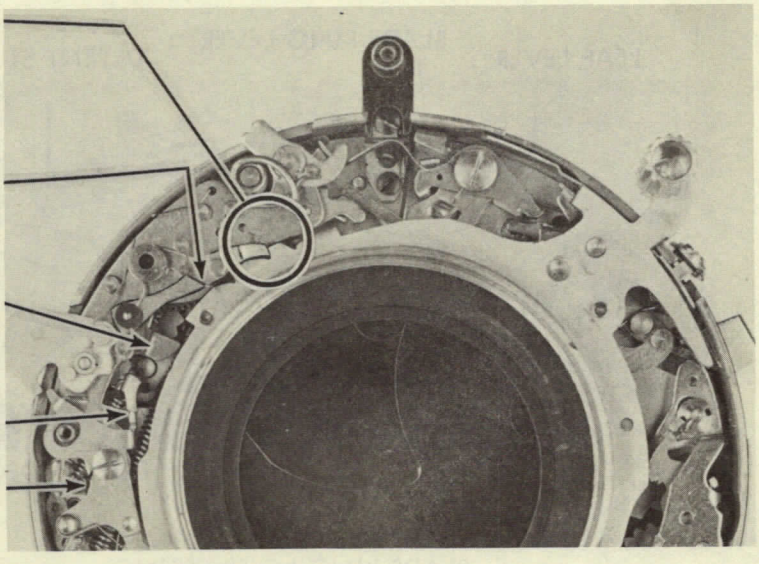
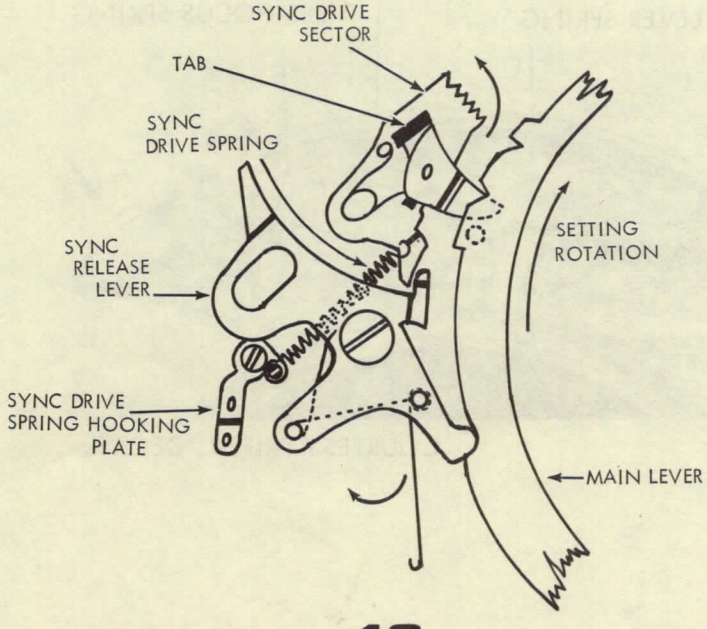

SYNC RELEASE LEVER BLOCKS
OUTER RELEASE LEVER HERE
SCREW HOLDING TIME AND BULB STOP LEVERS
TIME STOP LEVER SPRING
SYNC RELEASE LEVER

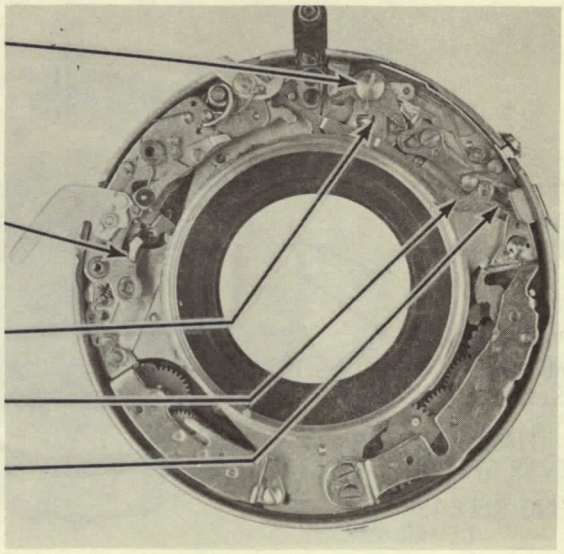
6


INNER RELEASE LEVER LATCHES MAIN LEVER HERE
FREE END OF INNER RELEASE LEVER SPRING
SYNC DRIVE SECTOR LUG
SYNC RELEASE LEVER LATCHES SYNC DRIVE SECTOR HERE
SHORT END OF SYNC RELEASE LEVER SPRING

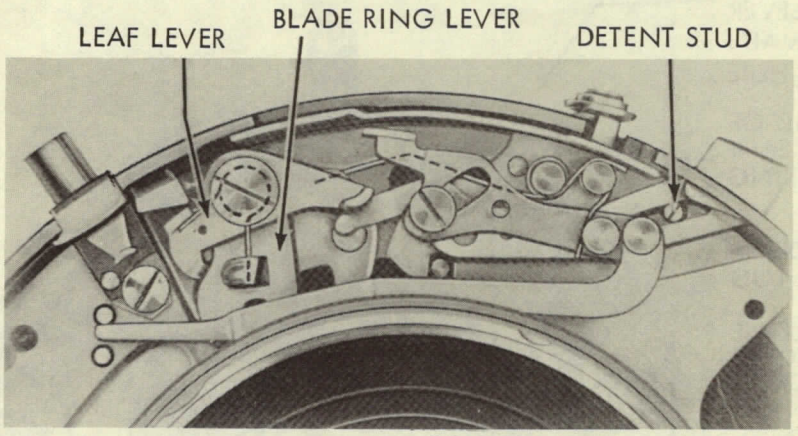
7


SYNC DRIVE SECTOR
TAB
SYNC DRIVE SPRING
SYNC RELEASE LEVER
SETTING ROTATION
SYNC DRIVE SPRING HOOKING PLATE
MAIN LEVER

8

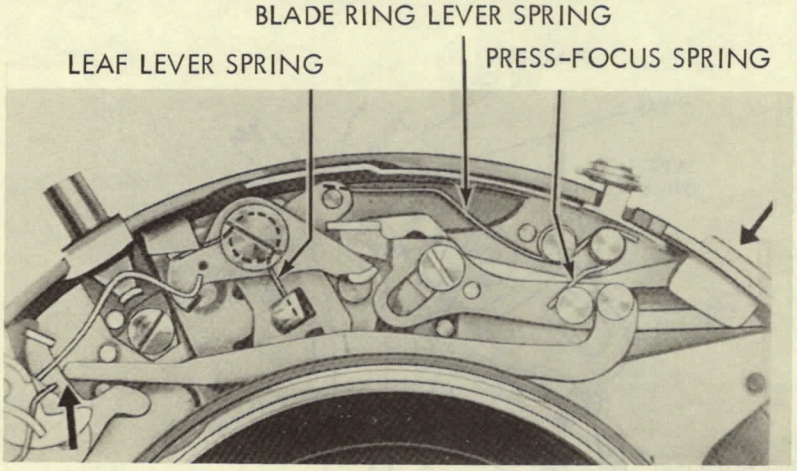


9



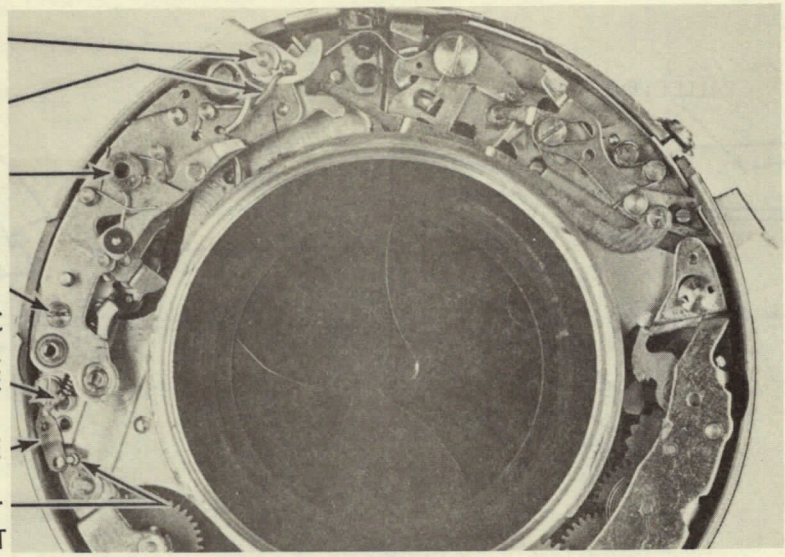
COURTESY FRIEDR. DECKEL

10

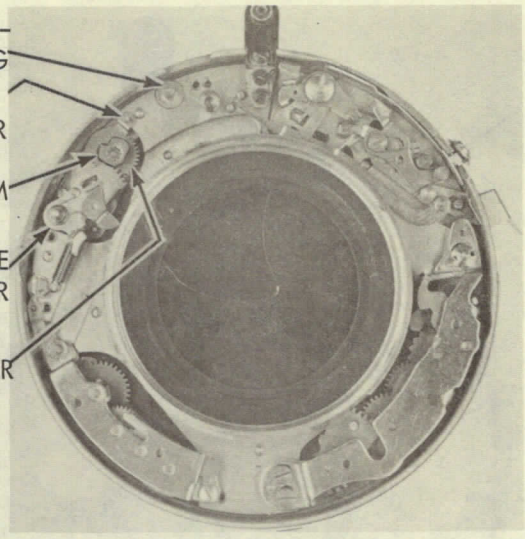


COURTESY FRIEDR. DECKEL

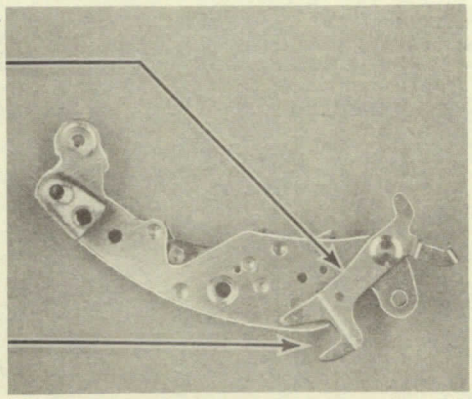
11


MX SELECTOR SWITCH SCREW
DETENT SPRING
CATCH LEVER BEARING HOLE
SYNC BRIDGE SCREW
DISCONNECT SYNC DRIVE SECTOR SPRING HERE
HOOKING PLATE
PIN ON DELAYED-ACTION ESCAPEMENT

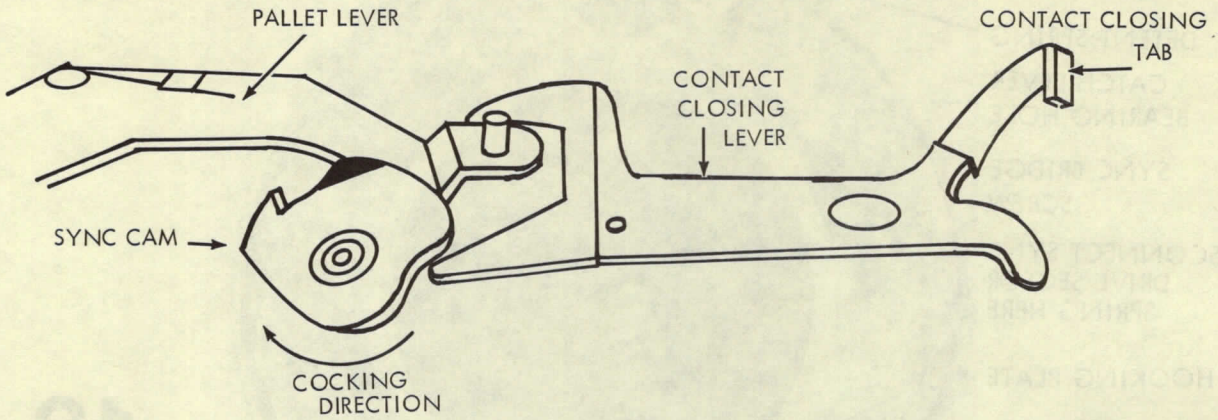
12


POST FOR HIGH-SPEED SPRING
PALLET LEVER
SYNC CAM
SYNC DRIVE SECTOR
SYNC GEAR

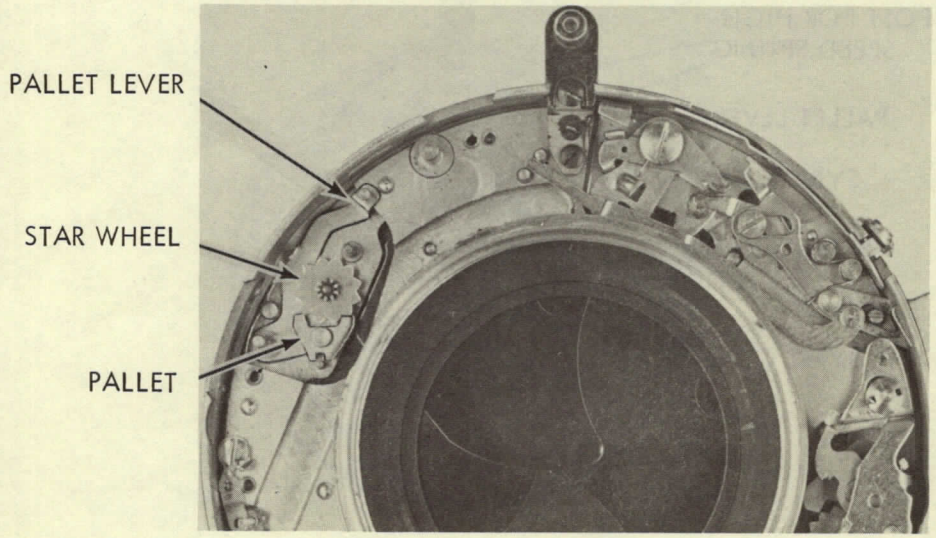
13


CONTACT CLOSING LEVER
FORKED END OF CONTACT CLOSING LEVER

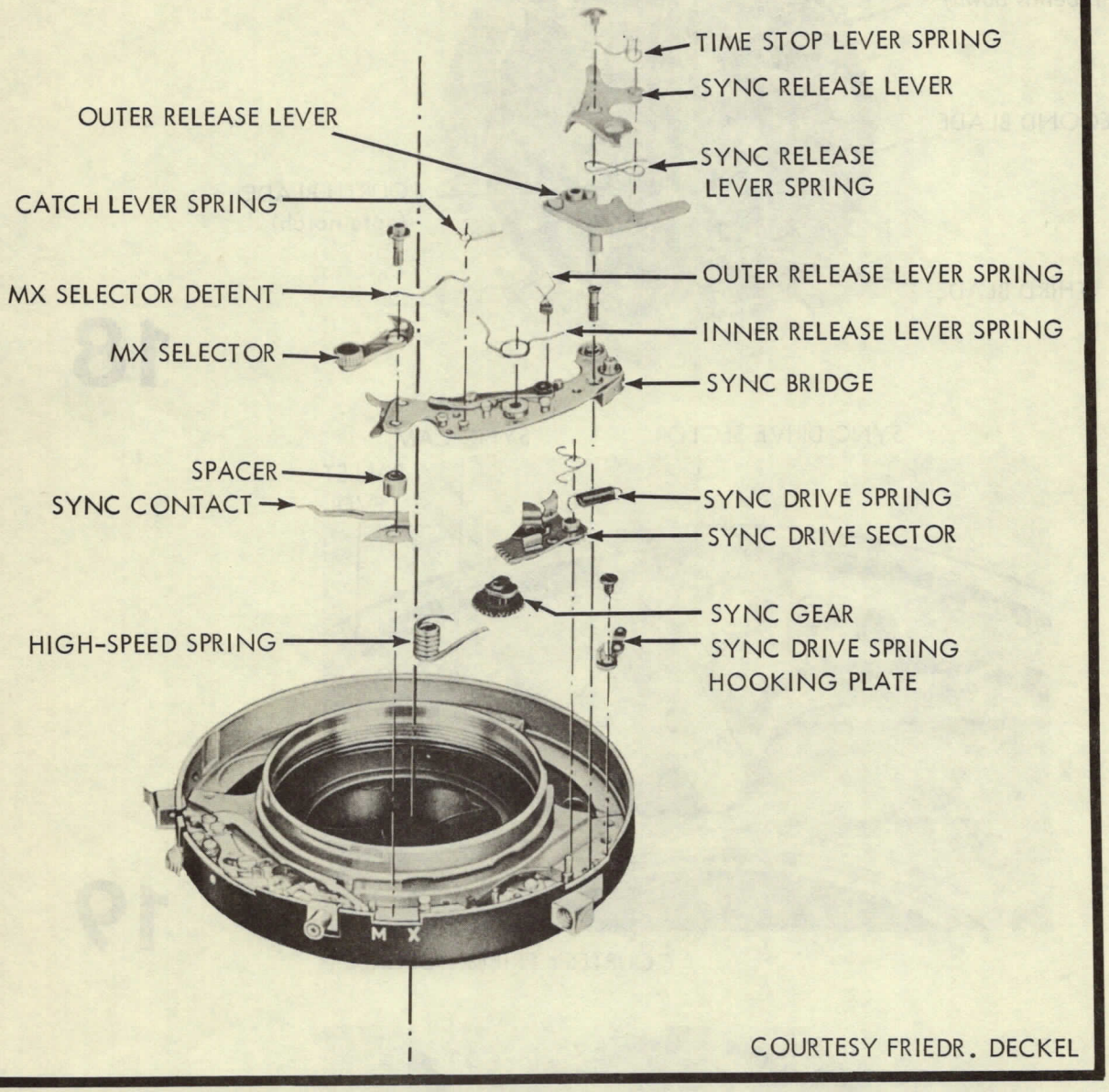
14


PALLET LEVER
CONTACT CLOSING TAB
CONTACT CLOSING LEVER
SYNC CAM
COCKING DIRECTION

15

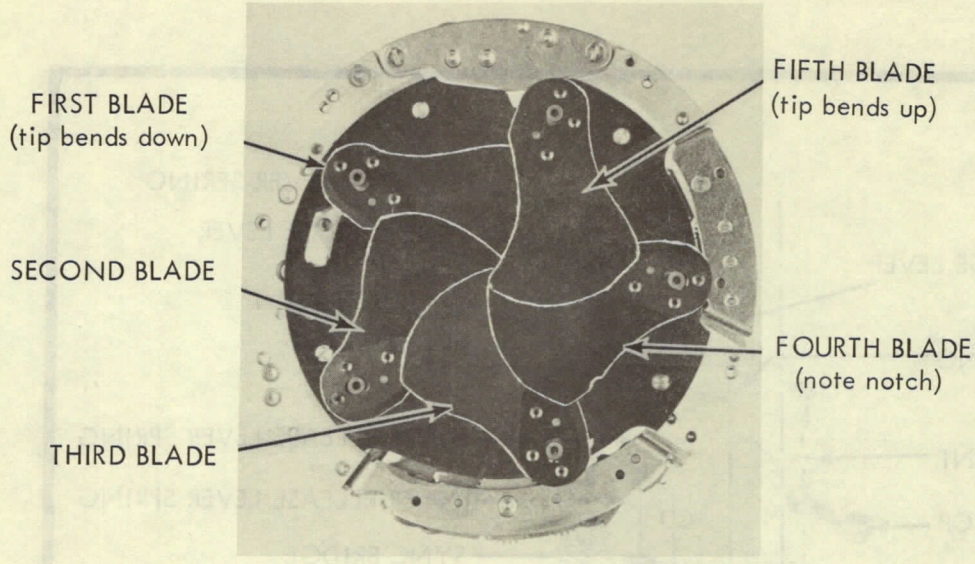

PALLET LEVER
STAR WHEEL
PALLET

16

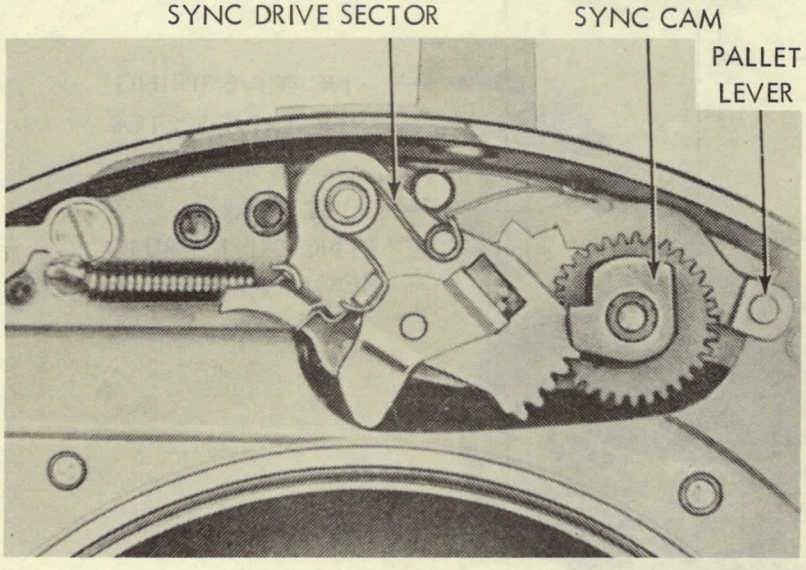


COURTESY FRIEDR. DECKEL

17

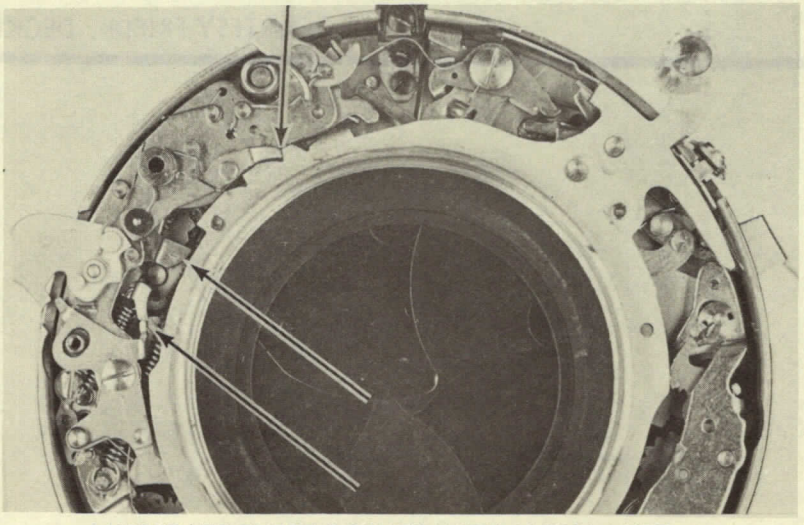


18



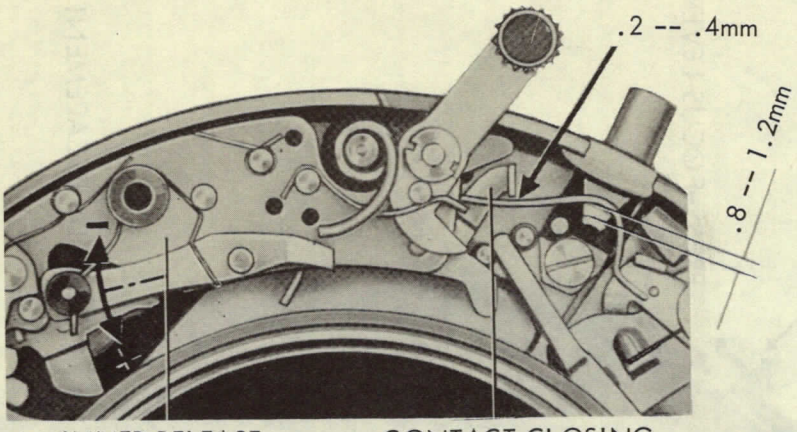
19

COURTESY FRIEDR. DECKEL



20

LUBRICATE THESE POINTS WITH MOLY-LUBE



INNER RELEASE LEVER ADJUSTMENT

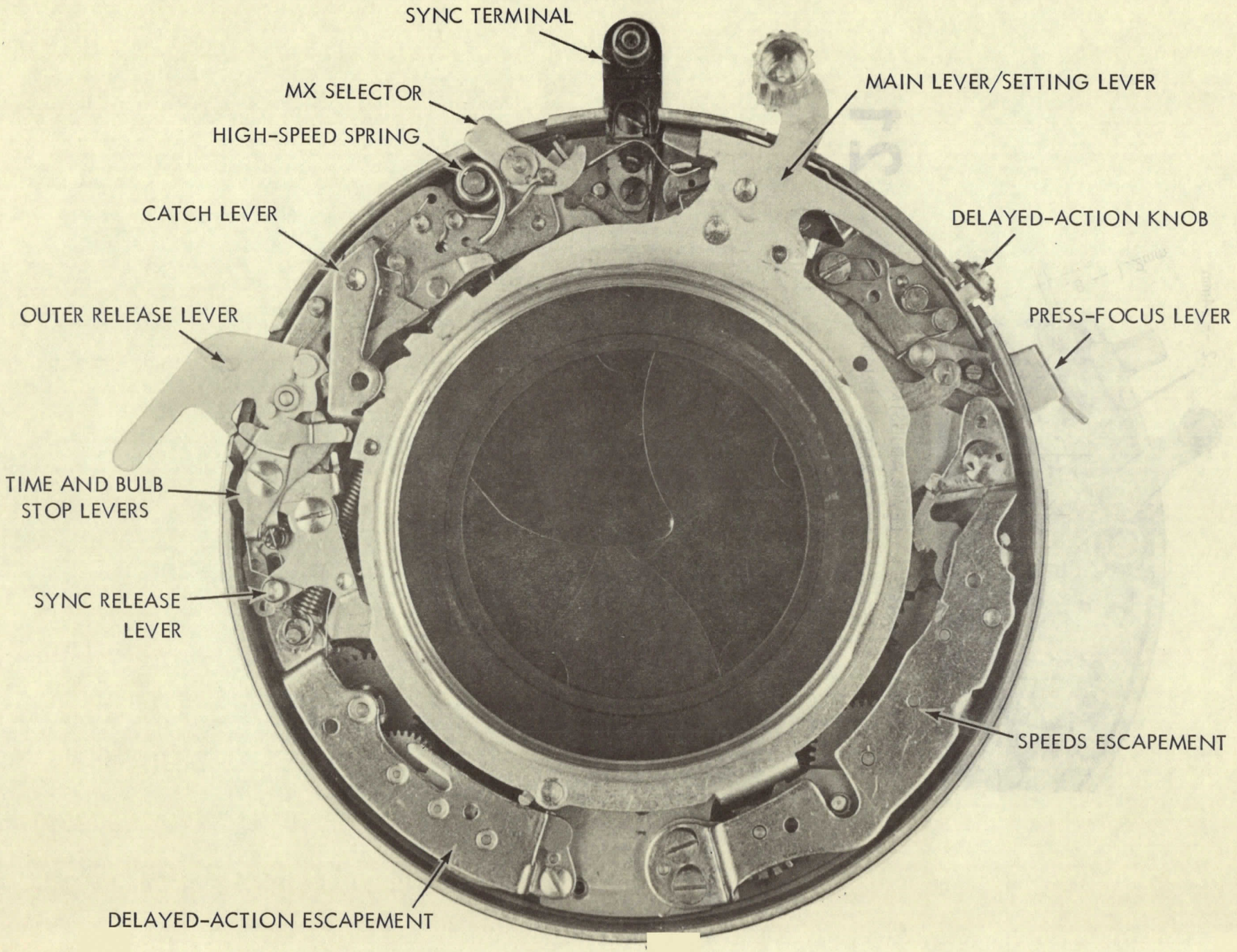
CONTACT CLOSING LEVER ADJUSTMENT

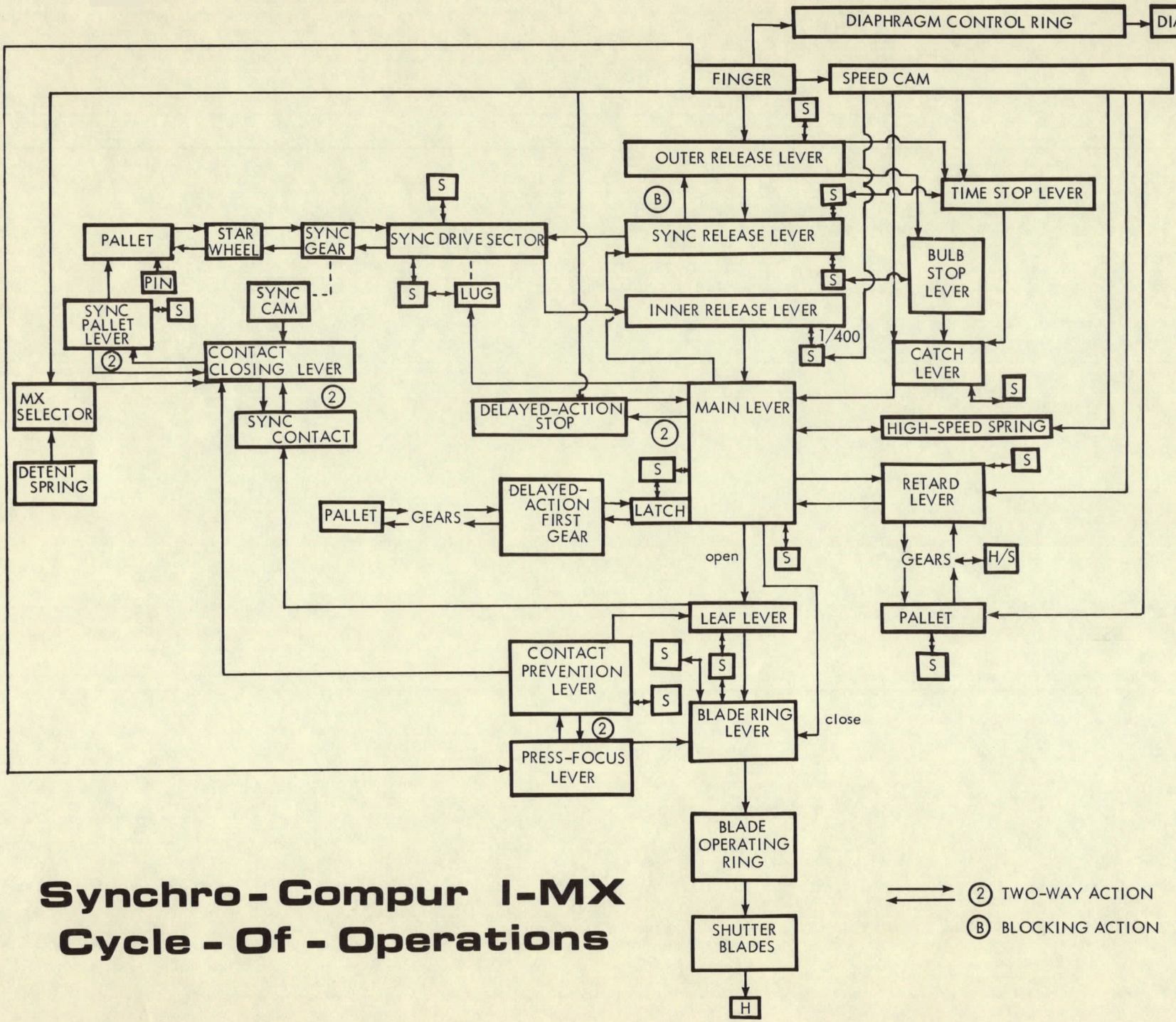
COURTESY FRIEDR. DECKEL

21

Notes:

Note: This enlarged illustration of the Synchro-Compur 1-MX is included as extra reference material. It does not relate to any specific portion of the text.





Synchro-Compur I-MX
Cycle-Of-Operations