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Servicing the

Kodak . . . . : FLASH SUPERMATIC SHUTTERS

- WITH KODAK EKTAR f/4.5 101mm LENS
- AND KODAK MONITOR SIX-20 CAMERA

Eastman Kodak Company • Rochester 4, N. Y.

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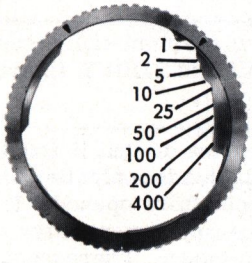
Capitalized words in the text indicate nomenclature which appears on illustrations. Such nomenclature, when not followed by a direct figure reference, will be found on the figure indicated in the last preceding figure references.

KODAK FLASH SUPERMATIC SHUTTER

WITH KODAK EKTAR f/4.5 101mm LENS

TROUBLE CHART

TROUBLE	CAUSE	REMEDY
Solenoid will not work flash shutter	Shutter is not designed for use with a solenoid.	
Synchronizer scale does not operate	Scale rivet pulled out.	Fit new rivet and readjust the scale.
Shutter does not trip easily	Possible burr on TRIGGER, figure 5.	Burnish the trigger at the point where it contacts the MAIN DRIVE ASSEMBLY, figure 7, when in a set position.
No Kodatron contact	The BLADE CONTROLLER CONTACT STUD, figure 16, is not touching the CONTACT SPRING, figure 8.	Adjust the contact spring so that it touches the contact stud on the blade controller when the blades are almost fully opened. It is possible to make the adjustment after removing the front lens mount. There must be no contact when the blades are held open with the blade arrestor.
Shutter blades remain open on high speeds	Plate blade studs loose or missing on mechanism plate.	Replace or restake the studs carefully to avoid swelling the tops of the studs.
	Split shutter blades.	Replace the shutter blades.
	Loose studs on the shutter blades.	Replace the shutter blades.
Shutter does not set	The TRIGGER LATCH, figure 5, is not returning to its proper position after the shutter has been released.	The trigger latch is bent and binding on the speed index plate or cover.
		It may be necessary to reduce the tension on the TRIGGER LATCH SPRING, figure 3.
The winding lever does not hold when the shutter is set	The winding gear pinion is loose on the gear.	Replace the pinion gear assembly.
	The CLUTCH ASSEMBLY, figure 4, is slipping.	Replace the clutch assembly.
	The latch point on the CONTACT LEVER COMPLETE, figure 8, is damaged.	Replace the contact lever complete.
Shutter speeds slow	Retard gears dirty.	Remove and clean the retard gears.
	The MAIN DRIVE SPRING, figure 7, is weak.	Replace the main drive spring.

TROUBLE	CAUSE	REMEDY
Shutter speeds slow (cont'd)	Shutter blades binding.	Remove and clean the shutter blades. If necessary, replace the blades.
	Excessive retard sector travel.	Swedge the speed control RING, figure 2, at the area controlling the slow speed (see figure 1).
	Blade controller binding.	Reform the diaphragm retainer plate to allow more clearance between the plate and the mechanism plate.
		Be sure the blade controller is flat.
Shutter speeds fast	Insufficient retard sector travel.	File the speed control ring at the area controlling the fast speed (see figure 1).
 Figure 1	Insufficient pallet engagement (on speeds 1/10 second or slower).	Remove material on the speed control ring in the area of contact with the pallet bracket stud.
		Check for bind of the PALLET BRACKET, figure 6, against the retard gear PLATE COMPLETE.
	Gear train dirty.	Clean the gear train thoroughly.
	Too much tension on the main drive spring.	Replace the main drive spring.
Shutter blades buckle	NOTE: The following conditions may contribute to blade buckle singly or in combination.	
	Loose studs on shutter blades or MECHANISM PLATE, figure 13.	Replace the shutter blades. Restake the studs on the mechanism plate carefully to avoid swelling the tops of the studs.
	BLADE CONTROLLER with contact stud, figure 14, not flat.	Straighten or replace the blade controller.
	Shutter blades not flat.	Replace the blades.
	Mechanism plate not flat.	Replace the mechanism plate.
	Blade controller too loose or too tight on the central hub of the mechanism plate.	Replace the blade controller.
	Too much play between the mechanism plate and the diaphragm retainer PLATE WITH WINGS ASSEMBLED, figure 14, due to retainer plate being bowed.	Replace the diaphragm retainer plate with wings assembled.
	Burr or roughness on diaphragm retainer plate with wings assembled.	Replace the plate.

TROUBLE	CAUSE	REMEDY
Shutter blades buckle (cont'd)	Blades opening too far.	File and burnish the LATCH at point "A" (see figure 7).
	Blades closing too far.	Swedge the mechanism plate at point "B" (see figure 16).
	No clearance between the blade controller latch and the BLADE CONTROLLER LUG, figure 16, when the shutter is in the tripped position.	Swedge the mechanism plate at point "C," figure 16, such that this point acts as a stop for the SETTING LEVER, with stop stud, figure 13.
	Shutter blades too loose.	Replace the blades.
Shutter operates instantaneously on B (bulb)	The lug on the side of the rectangular opening in the trigger is out of adjustment.	Bend the lug on the trigger in or out until proper adjustment is achieved.
Both flash settings are below the millisecond tolerances	The tension is too great on the WINDING GEAR SPRING, figure 4.	Relieve the tension slightly on the winding gear spring. However, there must be enough tension on the spring to permit the winding lever to carry through on both the F and M flash settings.
Both flash settings are above the millisecond tolerances (slow)	There is not enough tension on the winding gear spring.	Place the winding gear spring under slightly greater tension. Care should be taken during this adjustment not to disturb the trigger latch.
	The winding lever may be binding around the central opening of the cover or on the speed INDEX PLATE, figure 2.	Replace the WINDING LEVER, figure 2. Try lubricant.
The F (short stroke) is within the millisecond tolerances but the M (long stroke) is fast	The FLASH RETARD PALLET assembly, figure 3, is not meshing properly with the winding lever.	With special Tool No. 657, turn the eccentric post so that the pallet will mesh more firmly in the teeth of the winding lever. Make certain the post is tight on the cover after making this adjustment.
	The flash retard pallet may be binding on the speed index plate.	The index plate will be marked at the binding point Re-form the plate at this point to allow clearance for the pallet.
Constant flash short	The contact spring is bent and touching either the contact lever or the cover.	Re-form the contact spring.
Both flash settings are extremely fast	The trigger latch may not be falling into the slot on the cover. This allows the shutter blades to open too soon.	Add more tension to the trigger latch spring.

TROUBLE	CAUSE	REMEDY
Both flash settings are extremely fast (cont'd)	The end of the trigger latch is bent back, toward the trigger. When the latch falls into the slot on the cover, the bent latch will permit the trigger to go down far enough to trip the shutter blades.	Re-form the end of the trigger latch by bending it slightly toward the winding gear. After the shutter has been assembled, it can be checked to see if the shutter blades will open before the winding lever opens them. 1. Set the shutter. 2. Set the winding lever. 3. Holding the winding lever down, release the shutter. The shutter blades should not open while the winding lever is down.
Shutter will not flash lamps when all metal flasholder is in contact with camera, but will, when flasholder is held away from camera	Breakdown in insulation in ground strip.	There should be a resistance of 10,000 ohms between the connector pin nearest the blade arrestor button and any other spot on the shutter case. If not, replace the ground strip.

DISASSEMBLY AND REASSEMBLY

SPEED CONTROL RING

The sequence of disassembly is as follows:

1. Front lens mount, using Tool No. 501-0.
2. Diaphragm pointer TIP, figure 2.
3. Set the synchronizer scale at "M."
4. Speed and diaphragm INDEX PLATE by turning the plate counterclockwise until the three projections in the center of the plate fit into the three cutouts on the outside edge of the central collar.
5. Speed control RING.

CAUTION: If the WINDING LEVER is disturbed, the flash timing will have to be adjusted.

The sequence of reassembly is as follows:

1. Speed control ring, with shutter in tripped position. Be sure the projecting lug on the BULB LEVER ASSEMBLY, figure 5, the studs on the retarding SECTOR WITH STUD, figure 6, and the PALLET BRACKET with stud assembly are resting against the inside edge of the speed control ring and are not underneath the ring.
2. Speed and diaphragm index plate by lining up the three projections in the center of the plate with the three cutouts on the outside of the central collar. Turn the plate clockwise until it is properly positioned.
3. Diaphragm pointer tip.
4. Front lens mount.

WINDING LEVER

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-5, above.
2. Winding lever.

The sequence of reassembly is as follows:

1. Apply a thin film of grease (Texaco Unitemp-RCX169 Grease) to the teeth of the winding lever.
2. Set the shutter.
3. Winding lever, with the sixth or seventh tooth from the left meshed with the WINDING GEAR, figure 4. Place the WINDING GEAR SPRING in tension by giving two and one-quarter strokes to the winding lever, lifting and replacing the lever after the first and second strokes. This should be the approximate setting for the flash synchronization of the shutter.

CAUTION: Do not touch the TRIGGER LATCH, figure 5, as it may release the winding gear spring tension.

Trip the shutter and lightly hold the winding lever down around the central collar on the cover. As the shutter is tripped, the end of the latch should fall into the slot on the cover. If it does not, add more tension on the TRIGGER LATCH SPRING, figure 3. Check for a bind between the trigger latch and the TRIGGER, figure 5, at the point of attachment. The winding lever should contact the trigger latch, push the latch out of the slot in the cover, and open the shutter blades. After the shutter has been tripped, the latch should return to a position where it is resting on the ledge just above the small slot in the cover.

After the trigger is depressed, allow it to return to its proper position very slowly. If there is too much tension on the trigger latch spring, it will tend to retard the action of the latch and the trigger.

4. Speed control ring, paragraphs 1-4, above.

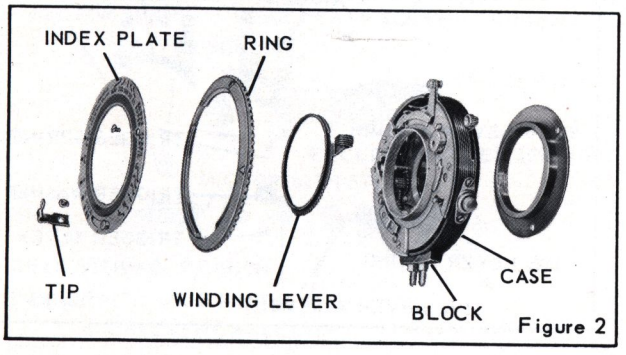


Figure 2

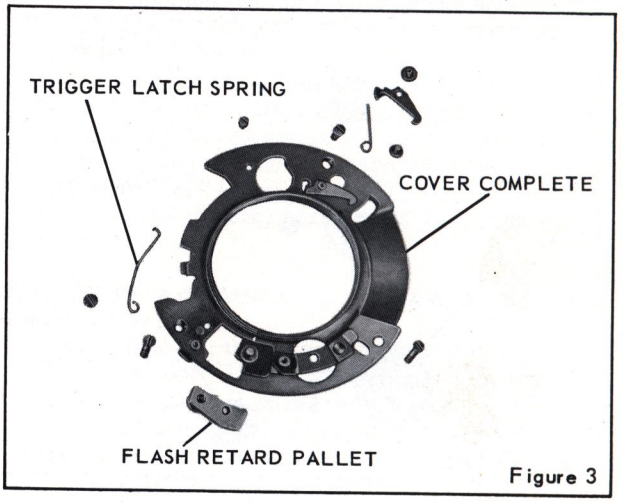


Figure 3

COVER COMPLETE

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-5, page 7.
2. Winding lever, paragraph 2, page 7.
3. TRIGGER LATCH SPRING, figure 3.
4. Lift up the loose end of the TRIGGER LATCH, figure 5, sufficiently to clear the COVER COMPLETE, figure 3. Move the loose end of the latch until it is clear of the CASE, figure 2.
5. High speed spring CAM, figure 7, and the HIGH SPEED SPRING.
6. FLASH RETARD PALLET assembly, figure 3.
7. Cover complete.

The sequence of reassembly is as follows:

1. Cover complete.
2. Set the shutter.
3. Trigger latch, with the long bent end of the latch contacting the inner edge of the CONTACT LEVER COMPLETE, figure 8. Be sure the latch does not bind.
4. Trigger latch spring; do not fasten it securely. Lift the loose end of the spring over the trigger latch until it is at a point half way between the latch and the central collar. Then secure the spring. Place the spring against the outside edge of the trigger latch. The latch should be burnished and a thin film of grease (Texaco Unitemp-RCX169 Grease) applied at the point of spring contact.
5. Winding lever, paragraphs 1-3, page 7.
6. Flash retard pallet assembly on the eccentric stud. Pull down the winding lever slowly and see that the pallet falls into every tooth of the lever. If it does not, turn the eccentric stud until the pallet is closer to the lever, using Tool No. 657. Care should be taken not to get the pallet too close to the lever, as this will cause the action of the lever to be rough.

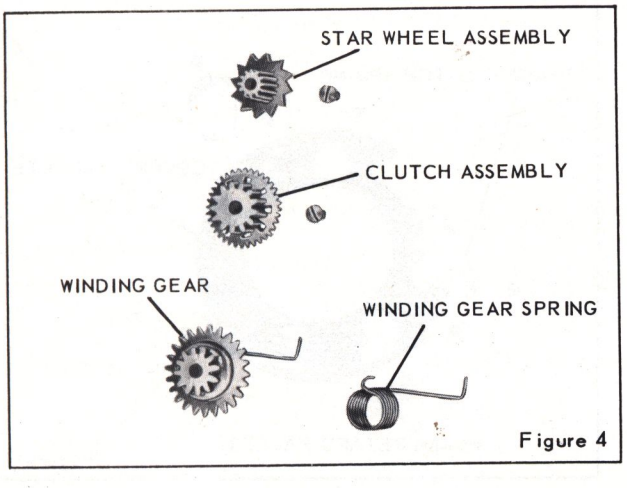


Figure 4

NOTE: Be sure the eccentric stud is tight on the cover. Anchor the stud securely if any adjustment is made.

7. High speed spring and high speed spring cam.
8. Winding lever, paragraph 4, page 7.

WINDING GEAR, CLUTCH ASSEMBLY, AND STAR WHEEL ASSEMBLY

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-5, page 7.
2. Winding lever, paragraph 2, page 7.
3. Cover complete, paragraphs 3-7, above.
4. WINDING GEAR, figure 4, and WINDING GEAR SPRING.
5. CLUTCH ASSEMBLY.
6. STAR WHEEL ASSEMBLY.

The sequence of reassembly is as follows:

1. Winding gear and winding gear spring on the WINDING GEAR STUD, figure 16.
2. Star wheel assembly.
3. Clutch assembly, with a thin film of grease (Texaco Unitemp-RCX169 Grease) on the underside of the assembly. The top gear of the clutch assembly should turn freely only in a clockwise direction when the lower gear of the clutch assembly is held tightly.
4. Cover complete, paragraphs 1-8, above.

TRIGGER, TIME LEVER ASSEMBLY, and BULB LEVER ASSEMBLY

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-5, page 7.
2. Winding lever, paragraph 2, page 7.
3. Cover complete, paragraphs 3-7, above.
4. Unhook the MAIN DRIVE SPRING, figure 7, from the MAIN DRIVE SPRING STUD, figure 16.
5. TRIGGER SCREW, figure 5, TRIGGER SPRING, and TRIGGER WASHER.

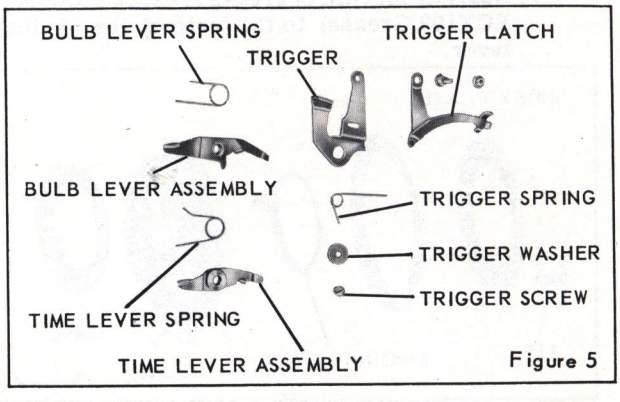


Figure 5

6. TRIGGER, TIME LEVER ASSEMBLY, TIME LEVER SPRING, BULB LEVER ASSEMBLY, and BULB LEVER SPRING.

The sequence of reassembly is as follows:

1. With the bulb lever spring underneath, hold the trigger with the oval hole up and insert the bulb lever assembly in the opening on the trigger. Place the time lever assembly and the time lever spring between the top of the trigger and the top of the bulb lever assembly, with the spring facing up. Grasp all three parts by inserting one prong of a pair of tweezers down through the center of the holes. With the long ends of the time and bulb lever springs turned in a clockwise direction and the short ends resting against the lugs on the levers, guide the parts down over the TIME AND BULB LEVER STUD, figure 16. The long ends of the springs should rest against the case.
2. Trigger washer, trigger spring, and trigger screw. Lift the long end of the spring over the end of the main drive spring stud, and rest it against the stud.
3. Hook the loose end of the main drive spring onto the main drive spring stud.
4. Cover complete, paragraphs 1-8, page 8.

RETARD GEAR TRAIN

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-5, page 7.
2. Winding lever, paragraph 2, page 7.
3. Cover complete, paragraphs, 3-7, page 8.
4. Unhook the retard PALLET BRACKET SPRING, figure 6.
5. Retard GEAR PLATE SCREWS.
6. Retard gear PLATE COMPLETE.
7. Retard GEAR WITH NO. 2 PINION assembly.
8. Retard GEAR WITH NO. 3 PINION assembly.
9. ESCAPEMENT WHEEL with No. 3 pinion assembly.
10. Retard PALLET.
11. PALLET BRACKET with stud assembly and the pallet bracket spring.

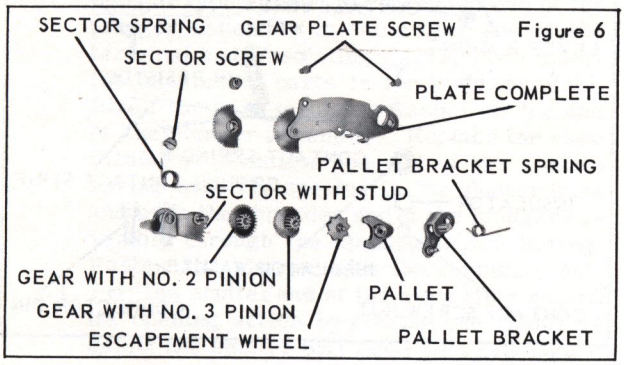


Figure 6

NOTE: If the retard gears are dirty, clean the retard gear bearing holes in the mechanism plate and all the parts of the gear train thoroughly.

12. Retarding SECTOR SCREW. Unhook the retarding SECTOR SPRING.
13. Set the shutter.
14. Retarding sector with stud and the retarding sector spring.

The sequence of reassembly is as follows:

1. Retarding sector with stud and the retarding sector spring, with the long end of the spring at the top.
2. Retarding sector screw.
3. Place the long end of the spring against the inner side of the blade controller LATCH SPRING BUSHING, figure 7.
4. With the short end of the pallet bracket spring down, place the spring inside the pallet bracket with stud assembly. Allow the long end of the spring to extend out, toward the case. Place the pallet bracket and the pallet bracket spring on the PALLET BRACKET SPRING STUD, figure 16. The long end of the spring should rest against the case.
5. Retard pallet.
6. Escapement wheel with No. 4 pinion assembly.
7. Retard gear with No. 3 pinion assembly.
8. Retard gear with No. 2 pinion assembly.
9. Retard gear plate complete, with the teeth of the gear facing the shutter blades.
10. Retard gear plate screw near the pallet bracket.
11. Lift up the gear end of the gear plate until the teeth of the retarding sector with stud pass freely under the gear. Place the retarding sector so that when the gear teeth are meshed the outer edge of the sector will be approximately 1/8 inch from the shutter case.
12. Remaining retard gear plate screw.
13. Put the pallet bracket spring in tension by placing the long end of the spring against the inside edge of the lug on the retard gear plate complete.
14. Cover complete, paragraphs 1-8, page 8.

MAIN DRIVE ASSEMBLY

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-5, page 7.
2. Winding lever, paragraph 2, page 7.
3. Cover complete, paragraphs 3-7, page 8.
4. Unhook the LATCH SPRING, figure 7, from the main drive LATCH.

5. Unhook the MAIN DRIVE SPRING from the MAIN DRIVE SPRING STUD, figure 16.
6. Set the shutter.
7. MAIN DRIVE ASSEMBLY, figure 7, to which is attached the main drive spring.

The sequence of reassembly is as follows:

1. Apply a thin film of grease (Texaco Unitemp-RCX169 Grease) to the slot on the main drive assembly where it engages the stop stud on the SETTING LEVER, figure 13; on the MAIN DRIVE STUD, figure 16; on the LATCH, figure 7, at the point of contact with the LATCH SPRING, and on the latch where it contacts the RETARDING SECTOR STUD, figure 16. This area of the latch should be burnished before applying the lubricant.
2. Main drive assembly on the main drive stud, being sure to fit the setting lever stop stud in the assembly.
3. Close the shutter blades. Push the latch toward the BLADE CONTROLLER LUG. The cutout part of the latch will come to rest around the lug. Place the loose end of the latch spring against the vertical lug on the tip of the latch.
4. Main drive spring.
5. Cover complete, paragraphs 1-8, page 8.

FLASH CONTACT PARTS

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-5, page 7.
2. Winding lever, paragraph 2, page 7.
3. Cover complete, paragraphs 3-7, page 8.
4. Retard gear train, paragraphs 4-11, page 9.
5. Winding gear and clutch assembly, paragraphs 4 and 5, page 8.
6. CONNECTOR PINS, figure 8, using Tool No. 635.
7. Connector BLOCK, figure 2.
8. Ground CONTACT STRIP CONNECTOR SCREW, figure 8.
9. Disengage the RESISTOR from the mechanism plate.

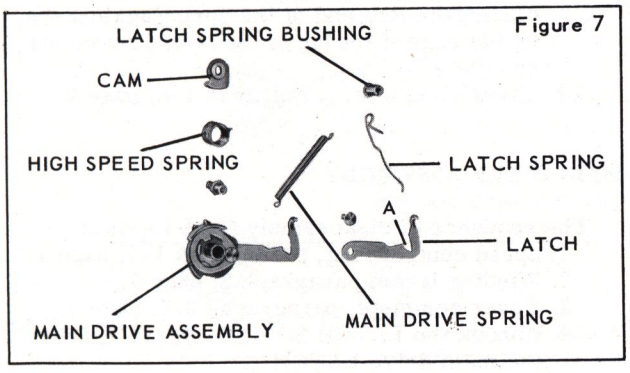


Figure 7

10. Holding the CONTACT SCREW with Tool No. 262, remove the CONTACT SCREW NUT, using Tool No. 503L. Remove the contact screw.
11. CONTACT SPRING, to which is fastened the GROUND CONTACT STRIP and the resistor. Remove the case INSULATOR WASHER and the case INSULATOR.
12. CONTACT LEVER COMPLETE.
13. Shutters of the flash receptacle type are disassembled as follows: Using Tool No. 503J, remove the TERMINAL NUT, figure 9, on the end of the PLUNGER ASSEMBLY. Remove the case INSULATOR WASHER, the plunger assembly, and the terminal body insulating SLEEVE. Remove the CONTACT SPRING and the case INSULATOR. Remove the CONTACT LEVER COMPLETE.

The sequence of reassembly is as follows:

1. If a new contact lever is to be used, place the contact LEVER LATCH SPRING, figure 8, on the contact LEVER BUSHING, with the long end of the spring at the bottom. Lift the long end of the spring and rest it against the outside edge of the spring lug on the contact lever latch. Form the short end of the spring around the vertical part of the contact lever tail. Then place the CONTACT LEVER SPRING on the contact lever bushing. Bend the last 1/8 inch of the long end of the spring clockwise at least 15 degrees.
2. Contact lever complete on the CONTACT LEVER STUD, figure 16. The ends of the contact lever spring should face in, toward the shutter blades. Turn the long end of the spring in a clockwise direction to place it in tension, and rest it in the groove in the case.

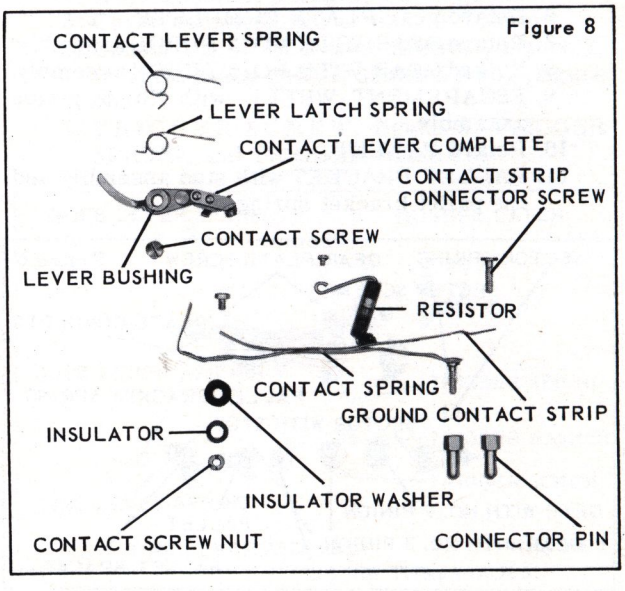


Figure 8

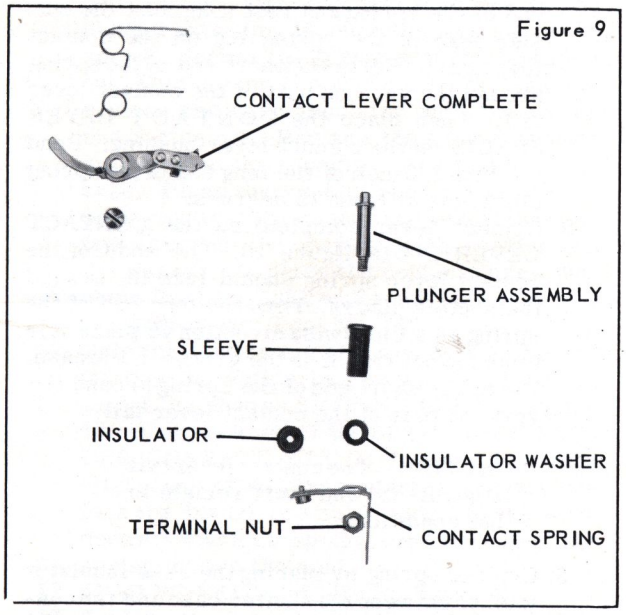


Figure 9

Form the short end of the spring around the vertical part of the contact lever tail.

CAUTION: The contact lever tail is burnished and must remain in that condition.

3. Contact spring. Place the case insulator washer between the shutter case and the contact end of the contact spring and insert the contact screw. Secure the spring by replacing the case insulator and the contact screw nut. To tighten the nut, hold the contact screw with Tool No. 262 and turn the nut with Tool No. 503L.
4. Ground contact strip connector screw.
5. Connector block.
6. Connector pins.
7. Secure the resistor.
8. Winding gear and clutch assembly, paragraphs 1 and 3, page 8.
9. Retard gear train, paragraphs 4-13, page 9.
10. If the shutter is of the flash receptacle plunger type, insert the threaded end of the plunger assembly in the collar end of the terminal body insulating sleeve. Then insert the assembled parts in the body terminal. Place the case insulator washer on the end of the plunger assembly. Replace the case insulator. Position the end of the contact spring over the opening in the shutter base and push the threaded end of the plunger assembly through the opening in the spring. Fasten the plunger with the terminal nut.
11. Trip the shutter and at the same time retard its opening action by placing one finder against the shutter SETTING LEVER, figure 13. Observe whether the BLADE CONTROLLER CONTACT STUD, figure 16, makes slight contact with the contact spring just before the blades are fully open. If the spring does not touch the stud, bend the end of the spring toward the stud.
12. Cover complete, paragraphs 1-8, page 8.

FLASH SYNCHRONIZATION

After the shutter is assembled, it must be checked to see if the winding lever will always trip the shutter blades when the trigger is released very slowly. Set the shutter and the winding lever. Release the winding lever very slowly. The lever must trip the shutter blades.

The shutter must be checked to see if the shutter blades will open while the latch is still in the slot in the cover plate. To check for this condition, set the shutter and the winding lever. While holding the winding lever in the fully wound position, depress the trigger. The shutter blades should not open while the winding lever is being held down. If they do, refer to the "Trouble Chart—Both flash settings extremely fast;" see page 5.

Check the operation of the winding lever safety latch. When the shutter is not set, the winding lever must be locked in the unwound position. After the shutter has been actuated with the winding lever, it must return fully and become locked in the unwound position.

The flash settings on the shutter should be timed with reliable shutter testing equipment. The tolerances of the delayed action in the shutter for synchronization with the flash bulbs are as follows:

F (short stroke)*	$3\frac{1}{2}$ — $5\frac{1}{2}$ milliseconds
M (long stroke)*	12 — 16 milliseconds

*From instant of contact until the shutter blades first begin to show light.

FLASH SHUTTER CONTACT CONVERSION KIT

A more satisfactory operation of the shutter has been achieved by a change in the design of the flash contact parts. The old-style parts which are to be discarded are no longer available. They are to be replaced by the parts furnished in the Flash Shutter Contact Conversion Kit No. 121349 - Supplement to Parts List No. 1-1490A.

OLD-STYLE FLASH CONTACT PARTS

The sequence of disassembly is as follows:

1. Retard gear train, paragraphs 4-11, page 9.
2. Winding gear and clutch assembly, paragraphs 4 and 5, page 8.
3. CONNECTOR PINS, figure 10, using Tool No. 635.

4. Disengage the RESISTOR from the mechanism plate.
5. CONTACT LEVER COMPLETE.
6. Connector BLOCK, figure 2.
7. Ground CONTACT STRIP CONNECTOR SCREW, figure 8.
8. Holding the CONTACT SCREW, figure 10, with Tool No. 262, remove the CONTACT SCREW NUT, using Tool No. 503L. Remove the contact screw, the case insulator WASHER, the CONTACT SPRING, and the case INSULATOR. Remove the resistor from the contact spring.
9. DETENT SPRING AND ROLLER BUSHING, DETENT SPRING AND ROLLER WASHER, and the DETENT SPRING AND ROLLER ASSEMBLY.
10. CONTACT ESCAPEMENT WHEEL.
11. SHUTTERS OF THE FLASH RECEPTACLE TYPE are disassembled as follows: Using Tool No. 503J, remove the TERMINAL NUT, figure 11, on the end of the PLUNGER ASSEMBLY. Remove the case INSULATOR WASHER, the plunger assembly, and the terminal body insulating SLEEVE. On the contact end of the CONTACT SPRING, remove the CONTACT SCREW NUT, using Tool No. 503L. Remove the CONTACT SCREW, contact spring, case INSULATOR WASHER, and the case INSULATOR. Remove the CONTACT LEVER COMPLETE.

NEW-STYLE FLASH CONTACT PARTS

The sequence of assembly is as follows:

1. Place the contact LEVER LATCH SPRING, figure 8, on the contact LEVER BUSHING, with the long end of the spring at the bottom and facing the shutter blades. Lift the long end of the spring and rest it against the outside edge of the spring lug on the contact lever latch. Form the short end of the spring around the vertical part of the contact lever tail. Then place the CONTACT LEVER SPRING on the contact lever bushing. Bend the last 1/8 inch of the long end of the spring clockwise at least 15 degrees.
2. Contact lever complete on the CONTACT LEVER STUD, figure 16. The ends of the contact lever spring should face in, toward the shutter blades. Turn the long end of the spring in a clockwise direction to place it in tension, and rest it in the groove in the case. Form the short end of the spring around the vertical part of the contact lever tail.

   CAUTION: The contact lever tail is burnished and must remain in that condition.

3. Contact spring by placing the case insulator washer between the shutter case and the contact end of the contact spring and insert the contact screw.
4. Contact screw nut, using Tool No. 503L. Hold the screw in position with Tool No. 262.
5. Ground contact strip connector screw.
6. New connector block.
7. Connector pins.
8. Secure the looped wire end of the resistor to the mechanism plate. Solder the other end of the resistor to the ground contact strip.
9. Winding gear and clutch assembly, paragraphs 1-3, page 8.
10. Retard gear train, paragraphs 4-13, page 9.
11. SHUTTERS OF THE FLASH RECEPTACLE TYPE are reassembled as follows: Replace the contact lever spring and the contact lever as described in paragraphs 1 and 2 above. Insert the collar end of the terminal body insulating sleeve. Then insert the assembled parts in the terminal body. Replace the case insulator washer on the threaded end of the plunger assembly. Replace the con-

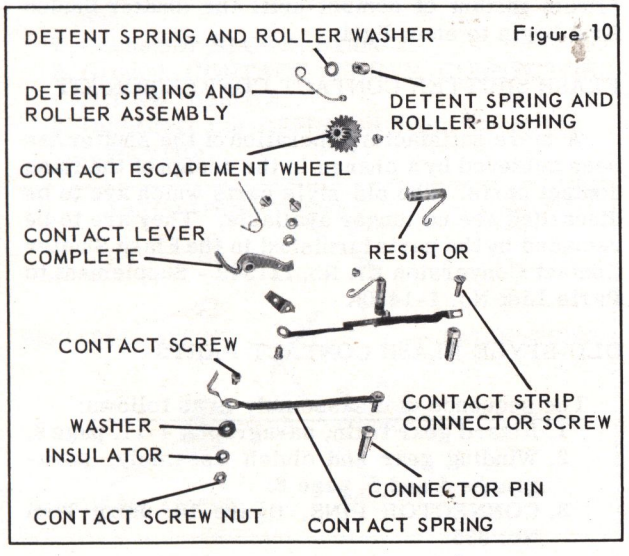


Figure 10

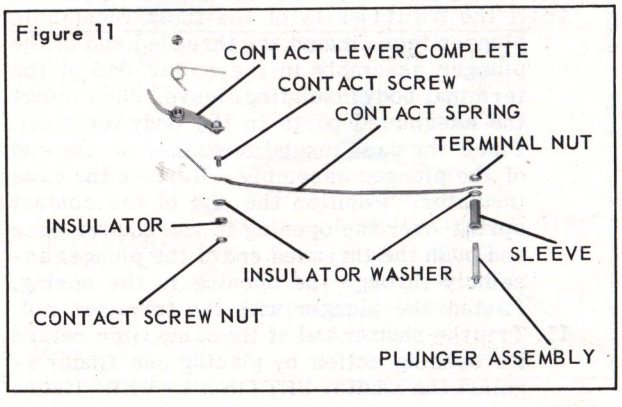


Figure 11

tact spring, with the threaded end of the plunger extending through the opening in the spring. Secure the spring with the terminal nut. On the contact end of the contact spring, replace the case insulator with the collar end facing out. Replace the case insulator washer over the opening on the inside of the case. Place the contact end of the contact spring against the washer and insert the contact screw in the opening in the spring and the washer. Replace the contact screw nut, using Tool No. 503L while holding the screw in position with Tool No. 262.

12. Trip the shutter and at the same time retard its opening action by placing one finger against the shutter SETTING LEVER, figure 13. Observe whether the BLADE CONTROLLER CONTACT STUD, figure 16, makes slight contact with the contact spring just before the blades are fully open. If the stud does not touch the spring, bend the end of the spring toward the stud.
13. STAR WHEEL ASSEMBLY, figure 4.
14. Replace the cover complete and the winding lever.
15. Cock the shutter; then press the trigger to release the shutter. At the same time hold the winding lever to prevent its return. The trigger latch must drop into the slot on the cover with a distinct snap. If it does not, check for a bind between the trigger and the trigger latch or between the trigger latch and the cover complete. If no bind exists, increase the tension on the trigger latch spring. A slight downward pressure on the spring is desirable. There must be approximately .005-inch clearance between the contact lever tail and that part of the trigger latch which engages the tail. The contact points must be in contact. If there is no clearance or if there is excessive clearance, the spacing may be controlled by bending the contact lever tail in or out.

Allow the winding lever to go to the at rest position. Depress the trigger, and watch to see that the flash contacts do not close. If they close, hold the end of the contact lever tail toward the shutter case, place a screwdriver blade against the vertical portion of the contact lever tail near the contact lever stud, and apply pressure toward the shutter blades at this point.

With the shutter tripped, there must be approximately .005 inch clearance between the contact lever latch spring lug and the side of the contact lever. This is to assure full pressure of the contact lever latch into the star wheel.

While pressing the trigger down fully, watch the contacts to make sure they do not close at any time. If they close, the contact lever tail on the contact lever has been bent too far and should be moved back slightly. If necessary, the winding lever should be stoned at point "A," figure 12. Corner "B" must be square.

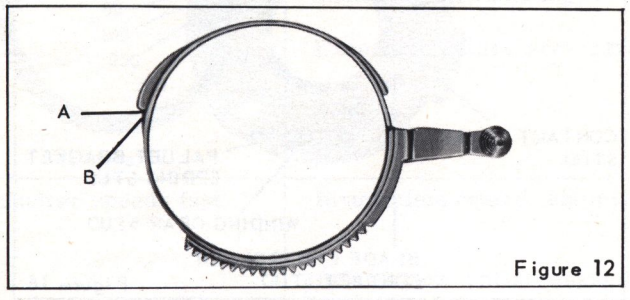


Figure 12

SHUTTER BLADES

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-5, page 7.
2. Winding lever, paragraph 2, page 7.
3. Cover complete, paragraphs 3-7, page 8.
4. Winding gear, clutch assembly, and star wheel assembly, paragraphs 4-6, page 8.
5. Trigger assembly, time lever assembly, and bulb lever assembly, paragraphs 4-6, page 8.
6. Retard gear train, paragraphs 4-14, page 9.
7. Main drive assembly, paragraphs 4-7, page 9.
8. Flash contact parts, paragraphs 4-13, page 10.
9. Rear lens mount.
10. Blade controller LATCH SPRING BUSHING, figure 7 and the LATCH SPRING.
11. MECHANISM PLATE, figure 13.
12. Diaphragm retainer PLATE WITH WINGS ASSEMBLED.
13. Shutter blades.
14. BLADE CONTROLLER, figure 14.

The sequence of reassembly is as follows:

1. If necessary, clean the shutter blades thoroughly. Hold the blades carefully to avoid

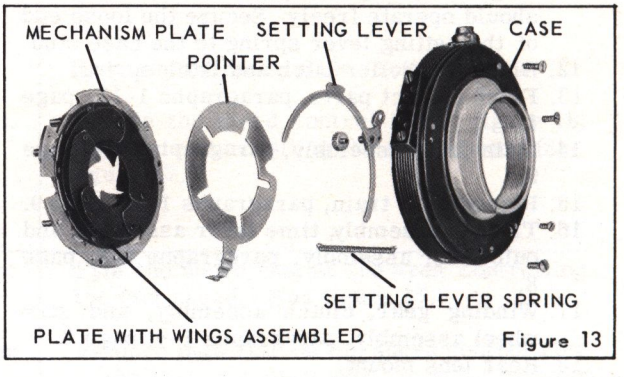


Figure 13

bending them and clean their surfaces with a soft cloth. Fingerprints on the blades will cause corrosion.

2. Blade controller.
3. BLADE WITH DOUBLE BLADE BUSHING and stud, figure 14, with the hole in the blade over the stud near the BLADE CONTROLLER LUG, figure 17, on the mechanism plate.
4. Proceeding counterclockwise, replace four BLADES WITH STUD, figure 14, allowing the wide end of each blade to overlap the narrow end of the preceding blade.
5. BLADE over the blade with double blade bushing and stud. The back of the mechanism plate should appear as shown in figure 15.
6. Diaphragm retainer plate with wings assembled, with the cutout slot in the outer edge of the retainer plate over the opening in the mechanism for the PALLET BRACKET with stud assembly, figure 6. After the retainer plate is secured, the shutter blades should operate freely.
7. Open the shutter blades. Close the diaphragm wings and run the side of a screwdriver blade around the central opening in the mechanism plate. This will open the diaphragm wings to the maximum aperture.
9. The shutter CASE, figure 13, diaphragm POINTER and setting lever should be thoroughly cleaned. Apply a thin film of grease (Texaco Unitemp-RCX169 Grease) to the recess in the case occupied by the setting lever. Then wipe this area lightly with a clean cloth.
9. Diaphragm pointer. Turn the pointer until the projecting arm is near the cable release socket.
10. Setting lever, with one end of the SETTING LEVER SPRING attached to the lever and the loose end of the spring resting against the side of the shutter case.
11. Mechanism plate. See that the circular projections on the ends of the diaphragm wings are in position in the slots in the pointer. After the plate is secured, the diaphragm ring, the setting lever, and the shutter blades should operate freely. Secure the loose end of the setting lever spring to the case stud.
12. Blade controller latch and latch spring.
13. Flash contact parts, paragraphs 1-11, page 10.
14. Main drive assembly, paragraphs 1-4, page 9.
15. Retard gear train, paragraphs 1-13, page 9.
16. Trigger assembly, time lever assembly, and bulb lever assembly, paragraphs 1-3, page 8.
17. Winding gear, clutch assembly, and star wheel assembly, paragraphs 1-4, page 8.
18. Rear lens mount.

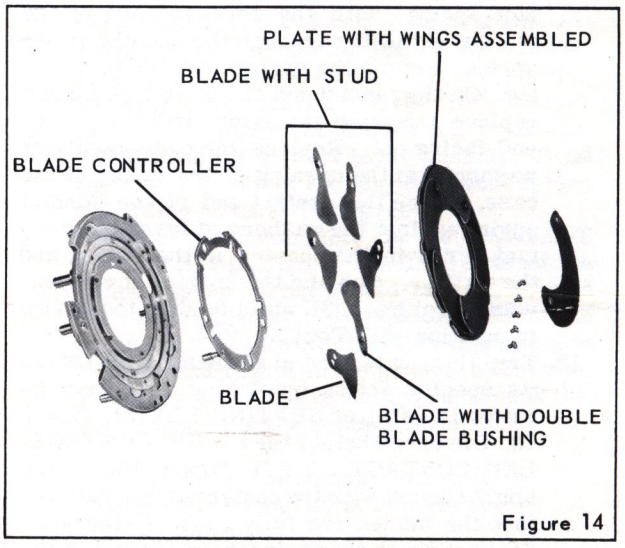


Figure 14

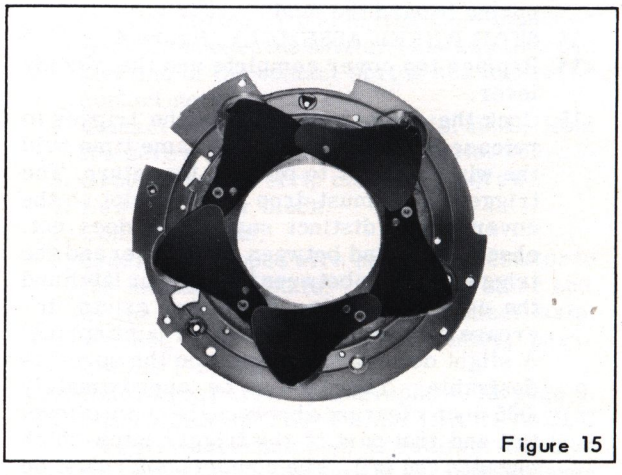


Figure 15

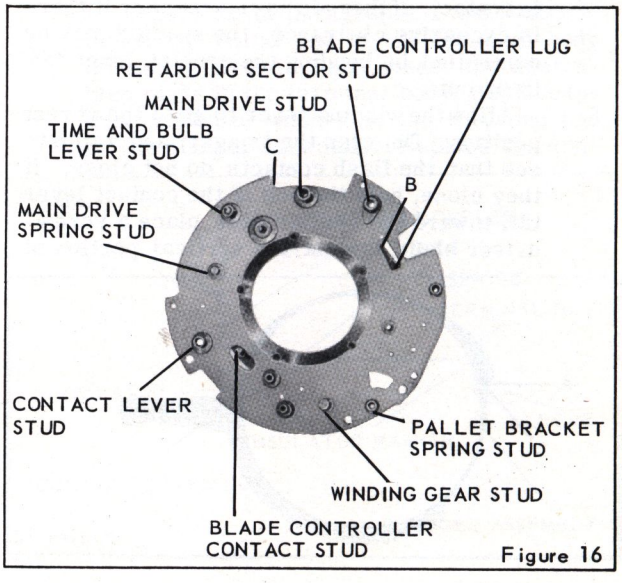
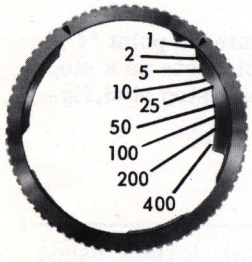


Figure 16

KODAK FLASH SUPERMATIC SHUTTER

FOR KODAK MONITOR SIX-20 CAMERA

TROUBLE CHART

TROUBLE	TROUBLE	REMEDY
Shutter does not trip easily	Possible burr on TRIGGER ASSEMBLY, figure 21.	Burnish the trigger and collar assembly at the point where it contacts the MAIN DRIVE ASSEMBLY, figure 24, when in a set position.
Shutter blades remain open on high speeds	Split shutter blades.	Replace the shutter blades.
	Loose studs on the shutter blades.	Replace the shutter blades.
	Plate blade studs loose or missing on mechanism plate.	Replace or restake the studs carefully to avoid swelling the top of the studs.
Shutter does not set	The TRIGGER LATCH, figure 21, is not returning to its proper position after the shutter has been released.	The trigger latch is bent and binding on the speed index plate or cover. It may be necessary to reduce the tension on the TRIGGER LATCH SPRING, figure 19.
The winding lever does not hold when the shutter is set	The winding gear pinion is loose on the gear.	Replace the pinion gear assembly.
	The CLUTCH ASSEMBLY, figure 20, is slipping.	Replace the clutch assembly.
	The latch point on the CONTACT LEVER COMPLETE, figure 24, is damaged.	Replace the contact lever complete.
Shutter speeds slow  Figure 17	Retard gears dirty.	Remove and clean the retard gears.
	The MAIN DRIVE SPRING, figure 23, is weak.	Replace the main drive spring.
	Shutter blades binding.	Remove and replace the shutter blades.
	Excessive retard sector travel.	Swedge the speed control RING, figure 18, at the area controlling the slow speed. (See figure 17.)
Shutter speeds fast	Insufficient retard sector travel.	File the speed ring at the area controlling the fast speed. (See figure 17.)
	Insufficient pallet engagement (on speeds 1/10 or slower).	Remove material on the speed control ring in the area of contact with the pallet bracket stud.

TROUBLE	CAUSE	REMEDY
Shutter speeds fast (cont'd)		Check for bind of the PALLET BRACKET, figure 22, against the retard gear PLATE COMPLETE.
	Gear train dirty.	Clean the gear train thoroughly.
	Too much tension on the main drive spring.	Replace the main drive spring.
Shutter blades buckle	NOTE: The following conditions may contribute to blade buckle, singly or in combination.	
	Loose studs on shutter blades or MECHANISM PLATE, figure 27.	Replace the shutter blades. Restake the studs on the mechanism plate carefully to avoid swelling the tops of the studs.
	BLADE CONTROLLER with contact stud, figure 28, not flat.	Straighten or replace the blade controller.
	Shutter blades not flat.	Replace the blades.
	Mechanism plate not flat.	Replace the mechanism plate.
	Blade controller too loose or too tight on the central hub or the mechanism plate.	Replace the blade controller. If it is still too loose or too tight, replace the mechanism plate.
	Too much play between the mechanism plate and the diaphragm retainer PLATE WITH WINGS ASSEMBLED, figure 27, due to retainer plate's being bowed.	Replace the diaphragm retainer plate with wings assembled.
	Burr or roughness on diaphragm retainer plate with wings assembled.	Replace the plate.
	Blades opening too far.	File and burnish the blade controller LATCH at point "A." (See figure 23.)
	Blades closing too far.	Swedge the mechanism plate at point "B." (See figure 29.)
	No clearance between the blade controller latch and the BLADE CONTROLLER LUG, figure 29, when the shutter is in the tripped position.	Swedge the mechanism plate at point "C," figure 29, such that this point acts as a stop for the SETTING LEVER with stop stud, figure 27.
	Shutter blades too loose.	Replace the blades.
Winding lever does not hold	The latch point on the CONTACT LEVER COMPLETE, figure 24, is broken off.	Replace the contact lever.
Shutter operates instantaneously on B (Bulb)	The lug on the side of the rectangular opening in the trigger is out of adjustment.	Bend the lug on the trigger in or out until proper adjustment is achieved.

TROUBLE	CAUSE	REMEDY
The flash setting is below the millisecond tolerance (fast)	The tension is too great on the WINDING GEAR SPRING, figure 20.	Relieve the tension slightly on the winding gear spring. However, there must be enough tension on the spring to permit the winding lever to carry through on the flash setting.
	The FLASH RETARD PALLET, figure 19, is not meshing properly with the winding lever.	With special Tool No. 657, turn the eccentric post so that the pallet will mesh more firmly in the teeth of the winding lever. Make certain the post is tight on the cover after making this adjustment.
	The flash retard pallet may be binding on the speed index plate.	The index plate will be marked at the grinding point. File the plate at this point to allow clearance for the pallet.
The flash setting is above the millisecond tolerance (slow)	There is not enough tension on the winding gear spring.	Place the winding gear spring under slightly greater tension. Care should be taken during this adjustment not to disturb the trigger latch.
	The winding lever may be binding around the central opening of the cover or on the speed INDEX PLATE, figure 18.	Replace the winding lever. Try lubricant.
Constant flash short	The contact spring may be bent and touching either the contact lever or the cover.	Re-form the contact spring.
	Insulation breaking down on the contact spring.	Replace the contact spring.
	Terminal body loose.	Restake the terminal body.
The flash setting is extremely fast	The trigger latch may not be falling into the slot on the cover. This allows the shutter blades to open too soon.	Add more tension to the trigger latch spring.
	The end of the trigger latch is bent back, toward the trigger. When the latch falls into the slot on the cover, the bent latch will permit the trigger to go down far enough to trip the shutter blades.	Re-form the end of the trigger latch by bending it slightly toward the winding gear. After the shutter has been assembled, it can be checked to see if the shutter blades will open before the winding lever opens them. 1. Set the shutter. 2. Set the winding lever. 3. Holding the winding lever down, release the shutter. The shutter blades should not open while the winding lever is down.
Speed control ring too loose or too tight	Speed and diaphragm index plate not formed properly.	Re-form the speed and diaphragm index plate. Bow the index plate up to place more tension on the speed control ring.

DISASSEMBLY AND REASSEMBLY

SPEED CONTROL RING

The sequence of disassembly is as follows:

1. Front lens mount, using Tool No. 256.
2. Focusing mount STOP SCREW, figure 18.
3. Speed and diaphragm INDEX PLATE by turning the plate counterclockwise until the three projections in the center of the plate fit into the three cutouts on the outside edge of the central collar.
4. Speed control RING.

CAUTION: If the WINDING LEVER is disturbed, the flash timing will have to be adjusted.

The sequence of reassembly is as follows:

1. Speed control ring, with shutter in tripped position. Be sure the projecting lug on the BULB LEVER ASSEMBLY, figure 21, the studs on the retarding SECTOR WITH STUD, figure 22, and the PALLET BRACKET with stud assembly are resting against the inside edge of the speed control ring and are not underneath the ring.
2. Speed and diaphragm index plate by lining up the three projections in the center of the plate with the three cutouts on the outside edge of the central collar on the COVER COMPLETE, figure 19. Turn the plate clockwise until it is properly positioned.
3. Focusing mount stop screw.
4. Front lens mount.

WINDING LEVER

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-4, above.
2. Winding lever.

The sequence of reassembly is as follows:

1. Apply a thin film of grease (Texaco Unitemp-RCX169 Grease) to the teeth of the winding lever.
2. Set the shutter.
3. Winding lever, with the sixth or seventh tooth from the left meshed with the WINDING GEAR, figure 20. Place the WINDING GEAR SPRING in tension by giving two and one-quarter strokes to the winding lever, lifting and replacing the lever after the first and second strokes. This should be the approximate setting for the flash synchronization of the shutter.

CAUTION: Do not touch the TRIGGER LATCH, figure 21, as it may release the winding gear spring tension.

4. Trip the shutter and lightly hold the winding lever down around the central collar on the cover. As the shutter is tripped, the end of the latch should fall into the slot on the cover. If it does not, add more tension to the TRIGGER LATCH SPRING, figure 19. Check for a bind between the trigger latch and the TRIGGER ASSEMBLY, figure 21, at the point of attachment. The winding lever should contact the trigger latch, push the latch out of the slot in the cover, and open the shutter blades. After the shutter has been tripped, the latch should return to rest on the ledge just above the small slot in the cover.

   After the trigger is depressed, allow it to return to its proper position very slowly. If there is too much tension on the trigger latch spring, it will tend to retard the action of the latch and the trigger.
5. Speed control ring, paragraphs 1-4, above.

COVER COMPLETE

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-4, above.

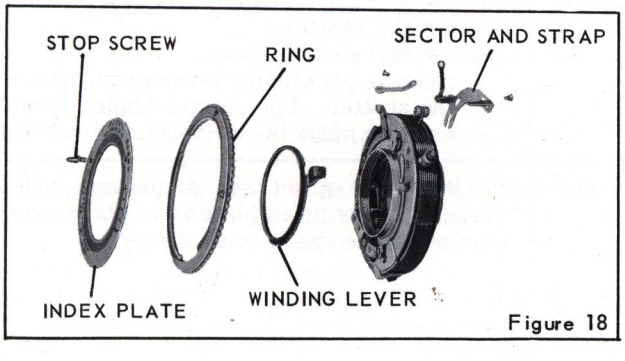


Figure 18

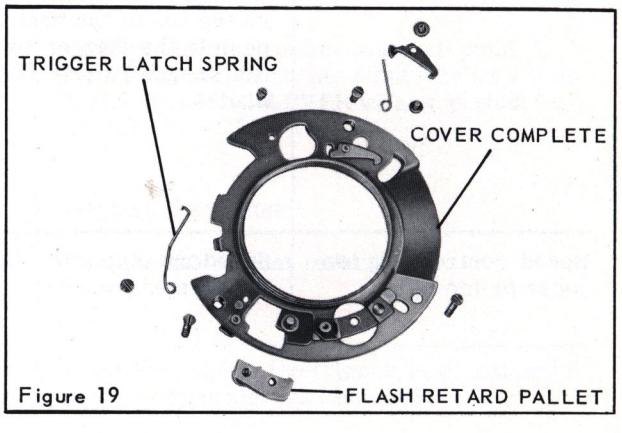


Figure 19

2. Winding lever, paragraph 2, page 18.
3. TRIGGER LATCH SPRING, figure 19.
4. Lift up on the loose end of the TRIGGER LATCH, figure 21, sufficiently to clear the COVER COMPLETE, figure 19. Move the loose end of the latch until it is clear of the CASE, figure 27.
5. FLASH RETARD PALLET, figure 19.
6. Cover complete.

The sequence of reassembly is as follows:

1. Cover complete.
2. Set the shutter.
3. Trigger latch, with the long bent end of the latch contacting the inner edge of the CONTACT LEVER COMPLETE, figure 24. Be sure the latch does not bind.
4. Trigger latch spring; do not fasten it securely. Lift the loose end of the spring over the trigger latch until it is at a point halfway between the latch and the central collar, then secure the spring. Place the spring against the outside edge of the trigger latch. The latch should be burnished and a thin film of grease (Texaco Unitemp-RCX169 Grease) applied at the point of spring contact.
5. Winding lever, paragraphs 1-4, page 18.
6. Flash retard pallet on the eccentric stud. Pull down the winding lever slowly and see that the pallet falls into every tooth of the lever. If it does not, turn the eccentric stud until the pallet is closer to the lever, using Tool No. 657. Care should be taken not to get the pallet too close to the lever, as this will cause the action of the lever to be rough.

   NOTE: Be sure the eccentric stud is tight on the cover. Anchor the stud securely after any adjustment is made.

7. Winding lever, paragraphs, page 18.

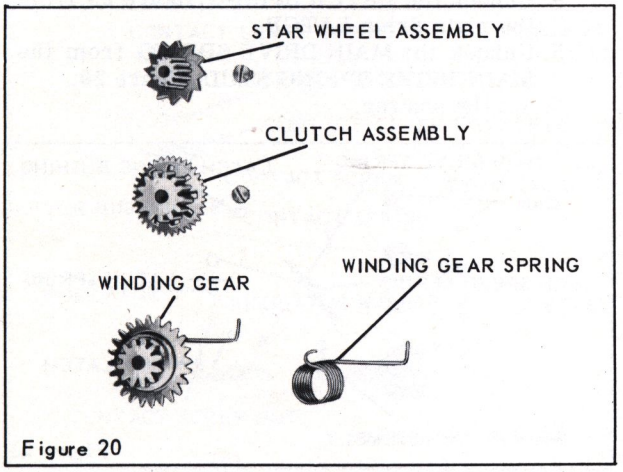


Figure 20

WINDING GEAR, CLUTCH ASSEMBLY, AND STAR WHEEL ASSEMBLY

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-4, page 18.
2. Winding lever, paragraph 2, page 18.
3. Cover complete, paragraphs 3-6, page 18.
4. WINDING GEAR, figure 20, and the WINDING GEAR SPRING.
5. CLUTCH ASSEMBLY.
6. STAR WHEEL ASSEMBLY.

The sequence of reassembly is as follows:

1. Star wheel assembly.
2. Clutch assembly, with a thin film of grease (Texaco Unitemp-RCX169 Grease) on the underside of the assembly. The top gear on the clutch assembly should turn freely only in a clockwise direction.
3. Winding gear and winding gear spring.
4. Cover complete, paragraphs 1-7, page 18.

TRIGGER ASSEMBLY AND BULB LEVER ASSEMBLY

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-4, page 18.
2. Winding lever, paragraph 2, page 18.
3. Cover complete, paragraphs 3-6, page 18.
4. Unhook the MAIN DRIVE SPRING, figure 23, from the MAIN DRIVE SPRING STUD, figure 29.
5. TRIGGER SCREW, figure 21, TRIGGER SPRING, and TRIGGER WASHER.
6. TRIGGER ASSEMBLY, bulb lever SPACERS, BULB LEVER ASSEMBLY, and BULB LEVER SPRING.

The sequence of reassembly is as follows:

1. With the bulb lever spring underneath, hold the trigger assembly with the oval hole up and insert the bulb lever assembly in the opening on the trigger. Place the two bulb lever spacers on the top of the bulb lever assembly. Grasp all four parts by inserting one prong of a pair of tweezers down through the center of the holes.

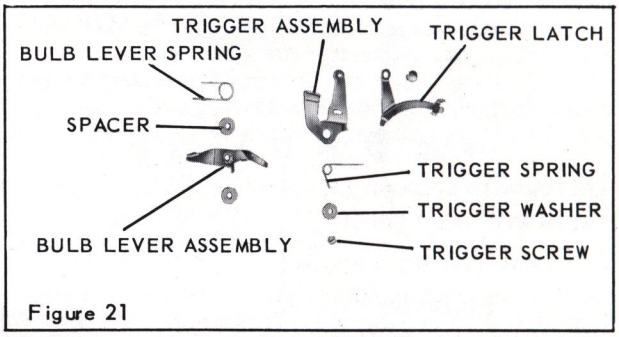


Figure 21

With the long end of the bulb lever spring turned in a clockwise direction and the short end resting against the lug on the bulb lever assembly, guide the parts down over the BULB LEVER STUD, figure 29. The long end of the spring should rest against the case.

2. Trigger washer, trigger spring, and trigger screw. Lift the long end of the spring over the end of the main drive spring stud and rest it against the stud.
3. Hook the loose end of the main drive spring onto the main drive spring stud.
4. Cover complete, paragraphs 1-7, page 18.

RETARD GEAR TRAIN

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-4, page 18.
2. Winding lever, paragraph 2, page 18.
3. Cover complete, paragraphs 3-6, page 18.
4. Retard gear PLATE COMPLETE, figure 22.
5. Retard GEAR WITH NO. 2 PINION assembly.
6. Retard GEAR WITH NO. 3 PINION assembly.
7. ESCAPEMENT WHEEL with No. 4 pinion assembly.
8. Retard PALLET.
9. PALLET BRACKET with stud assembly and the PALLET BRACKET SPRING.

NOTE: If the retard gears are dirty, clean the retard gear bearing holes in the mechanism plate and all the parts of the gear train thoroughly.

10. Retarding SECTOR SCREW. Unhook the retarding SECTOR SPRING.
11. Set the shutter.
12. Retarding SECTOR WITH STUD and the retarding sector spring.

The sequence of reassembly is as follows:

1. Retarding sector with stud and the retarding sector spring, with the long end of the spring at the top.
2. Retarding sector screw.
3. Place the long end of the spring against the inner side of the blade controller LATCH SPRING BUSHING, figure 23.
4. With the short end of the pallet bracket spring down, place the spring inside the pallet bracket with stud assembly. Allow the long end of the spring to extend out, toward the case. Place the pallet bracket and the pallet bracket spring on the PALLET BRACKET STUD, figure 29. The long end of the spring should rest against the case.
5. Retard pallet.
6. Escapement wheel with No. 4 pinion assembly.
7. Retard gear with No. 3 pinion assembly.
8. Retard gear with No. 2 pinion assembly.
9. Retard gear plate complete, with the teeth of the gear facing the shutter blades.
10. Retard gear plate screw, near the pallet bracket.
11. Lift up the gear end of the gear plate until the teeth of the retarding sector with stud pass freely under the gear. Place the retarding sector so that when the gear teeth are meshed the outer edge of the sector will be approximately 1/8 inch from the shutter case.
12. Remaining retard gear plate screw.
13. Put the pallet bracket spring in tension by placing the long end of the spring against the inside edge of the lug on the retard gear plate complete.
14. Cover complete, paragraphs 1-7, page 18.

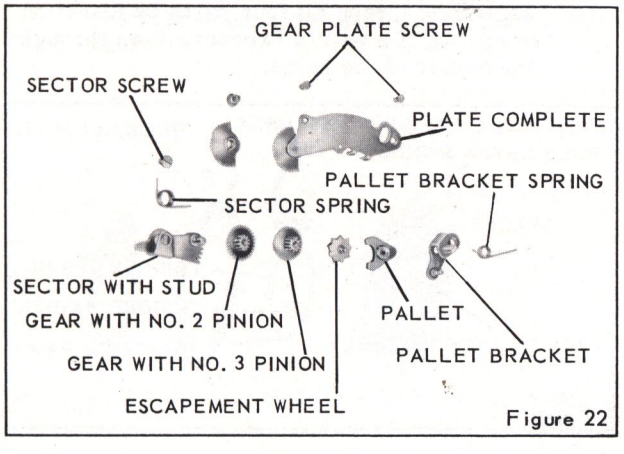


Figure 22

MAIN DRIVE ASSEMBLY

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-4, page 18.
2. Winding lever, paragraph 2, page 18.
3. Cover complete, paragraphs 3-6, page 18.
4. Unhook the LATCH SPRING, figure 23, from the main drive LATCH.
5. Unhook the MAIN DRIVE SPRING from the MAIN DRIVE SPRING STUD, figure 29.
6. Set the shutter.

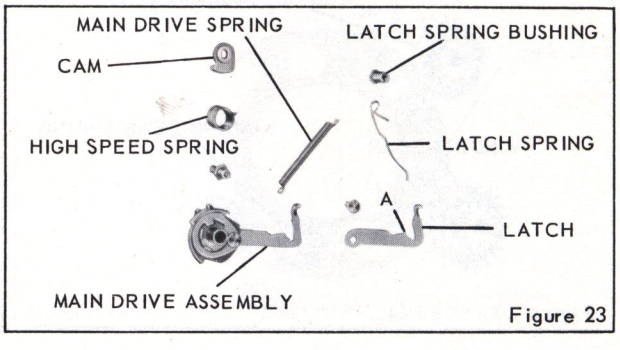


Figure 23

7. MAIN DRIVE ASSEMBLY, figure 23, to which is attached the main drive spring.

The sequence of reassembly is as follows:

1. Apply a thin film of grease (Texaco Unitemp-RCX169 Grease) to the slot on the main drive assembly where it engages the stop stud on the SETTING LEVER, figure 27; on the MAIN DRIVE STUD, figure 29; on the LATCH, figure 23, at the point of contact with the LATCH SPRING, and on the latch where it contacts the RETARDING SECTOR STUD, figure 29. This area of the latch should be burnished before applying the lubricant.
2. Main drive assembly on the main drive stud, being sure to fit the setting lever stop stud into the assembly.
3. Close the shutter blades. Push the latch toward the BLADE CONTROLLER LUG. The cutout part of the latch will come to rest around the lug. Place the loose end of the latch spring against the vertical lug on the top of the latch.
4. Main drive spring.
5. Cover complete, paragraphs 1-7, page 18.

FLASH CONTACT PARTS

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-4, page 18.
2. Winding lever, paragraph 2, page 18.
3. Cover complete, paragraphs 3-6, page 18.
4. TERMINAL NUT, figure 24.
5. Case INSULATOR WASHER, PLUNGER ASSEMBLY, and terminal body insulating SLEEVE.
6. On the contact end of the CONTACT SPRING, remove the CONTACT SCREW NUT, using Tool No. 503L.
7. CONTACT SCREW, contact spring, case INSULATOR WASHER and case INSULATOR.
8. CONTACT LEVER COMPLETE.

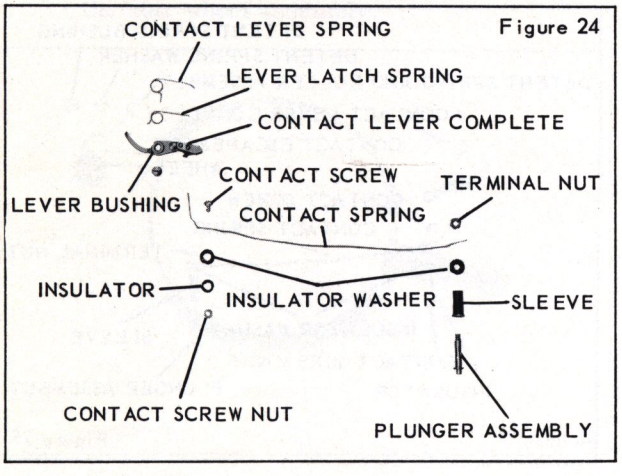


Figure 24

The sequence of reassembly is as follows:

1. If a new contact lever is to be used, place the contact LEVER LATCH SPRING, figure 24, on the contact LEVER BUSHING, with the long end of the spring at the bottom. Lift the long end of the spring and rest it against the outside edge of the spring lug on the contact lever latch. Form the short end of the spring around the vertical part of the contact lever tail. Then place the CONTACT LEVER SPRING on the contact lever bushing. Bend the last 1/8 inch of the long end of the spring clockwise at least 15 degrees.
2. Contact lever complete on the CONTACT LEVER STUD, figure 29. The ends of the contact lever spring should face in, toward the shutter blades. Turn the long end of the spring in a clockwise direction to place it in tension, and rest it in the groove in the case. Form the short end of the spring around the vertical part of the contact lever tail.

   CAUTION: The contact lever tail is burnished and must remain in that condition.

3. Terminal body insulating sleeve and the plunger assembly.
4. Case insulator washer on the threaded end of the plunger assembly.
5. Contact spring, with the threaded end of the plunger assembly extending through the opening in the spring.
6. Terminal nut.
7. Case insulator, with the collar end of the insulator facing out.
8. Case insulator washer over the opening on the inside of the case.
9. Contact end of the contact spring against the washer. Insert the contact screw in the opening in the spring and the washer.
10. Contact screw nut, using Tool No. 503L. Hold the screw in position with Tool No. 262.
11. Cock the shutter. Release the shutter and at the same time retard its opening action by placing one finger against the shutter setting lever. Observe whether the BLADE CONTROLLER CONTACT STUD makes contact with the contact spring when the shutter blade opening approximates the f/16 diaphragm opening. If the stud does not touch the spring at this diaphragm opening, bend the end of the spring toward or away from the stud.
12. Cover complete, paragraphs 1-7, page 18.

FLASH SYNCHRONIZATION

After the shutter is assembled, it must be checked to see if the winding lever will always trip the

shutter blades when the trigger is released very slowly. Set the shutter and the winding lever. Release the winding lever very slowly. The lever must trip the shutter blades.

The shutter must be checked to see if the shutter blades will open while the latch is still in the slot in the cover plate. To check for this condition, set the shutter and winding lever. While holding the winding lever in the fully wound position, depress the trigger. The shutter blades should not open while the winding lever is being held down. If they do, refer to the "Trouble Chart"—The flash setting is extremely fast; see page 17.

Check the operation of the winding lever safety latch. When the shutter is not set, the winding lever must be locked in the unwound position. After the shutter has been actuated with the winding lever, the lever must return fully and become locked in the unwound position.

The flash settings on the shutter should be timed with reliable shutter testing equipment. The tolerance of the delayed action in the shutter for synchronization with the flash bulbs is as follows:

M (long stroke* 12 — 16 milliseconds

*From instant of contact until the shutter blades first begin to show light.

FLASH SHUTTER CONTACT CONVERSION KIT

A more satisfactory operation of the shutter has been achieved by a change in the design of the flash contact parts. The old-style parts which are to be discarded are no longer available. They are to be replaced by the parts furnished in the Flash Shutter Contact Conversion Kit No. 121350 - Supplement to Parts List No. 1-1490A.

OLD-STYLE FLASH CONTACT PARTS

The sequence of disassembly is as follows:

1. TERMINAL NUT, figure 25.
2. Case INSULATOR WASHER, PLUNGER ASSEMBLY, and terminal body insulating SLEEVE.
3. On the contact end of the CONTACT SPRING, remove the CONTACT SCREW NUT, using Tool No. 503L.
4. CONTACT SCREW, contact spring, case INSULATOR WASHER and case INSULATOR.
5. CONTACT LEVER COMPLETE.
6. DETENT SPRING BUSHING, DETENT SPRING WASHER, and DETENT SPRING and ROLLER ASSEMBLY.
7. CONTACT ESCAPEMENT WHEEL.

NEW-STYLE FLASH CONTACT PARTS

The sequence of assembly is as follows:

1. Place the contact LEVER LATCH SPRING, figure 24, on the contact LEVER BUSHING, with the long end of the spring at the bottom. Lift the long end of the spring and rest it against the outside edge of the spring lug on the contact lever latch. Form the short end of the spring around the vertical part of the contact lever tail. Then plate the CONTACT LEVER SPRING on the contact lever bushing. Bend the last 1/8 inch of the long end of the spring clockwise at least 15 degrees.
2. Contact lever complete on the CONTACT LEVER STUD, figure 29. The ends of the contact lever spring should face in, toward the shutter blades. Turn the long end of the spring in a clockwise direction to place it in tension, and rest it in the groove in the case. Form the short end of the spring around the vertical part of the contact lever tail.

   CAUTION: The contact lever tail is burnished and must remain in that condition.

3. Terminal body insulating sleeve and the plunger assembly.
4. Case insulator washer on the threaded end of the plunger assembly.
5. Contact spring, with the threaded end of the plunger assembly extending through the opening in the spring.
6. Terminal nut.
7. Case insulator, with the collar end of the insulator facing out.
8. Case insulator washer over the opening on the inside of the case.
9. Contact end of the contact spring against the washer. Insert the contact screw in the opening in the spring and the washer.
10. Contact screw nut, using Tool No. 503L. Hold the screw in position with Tool No. 262.
11. Cock the shutter. Release the shutter and at the same time retard its opening action by

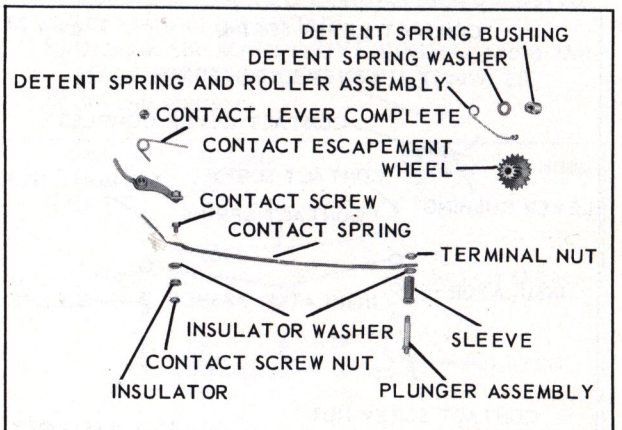


Figure 25

placing one finger against the shutter setting lever. Observe whether the BLADE CONTROLLER CONTACT STUD makes contact with the contact spring when the shutter blade opening approximates the f/16 diaphragm opening. If the stud does not touch the spring at this diaphragm opening, bend the end of the spring toward or away from the stud.

12. STAR WHEEL ASSEMBLY, figure 20.
13. Replace the cover complete and the winding lever.
14. Cock the shutter and press the trigger to release the shutter; at the same time hold the winding lever to prevent its return. The trigger latch must drop into the slot on the cover with a distinct snap. If it does not, check for a bind between the trigger and the trigger latch or between the trigger latch and the cover complete. If no bind exists, increase the tension on the trigger latch spring. A slight downward pressure on the spring is desirable. There must be approximately .005 inch clearance between the contact lever tail and the part of the trigger latch which engages the tail. The contact points must be in contact. If there is no clearance, or if there is excessive clearance, the spacing may be controlled by bending the contact lever tail in or out.

Allow the winding lever to go to the at rest position. Depress the trigger and watch to see that the flash contact points do not close. If they close, hold the end of the contact lever tail toward the shutter case, place a screwdriver blade against the vertical part of the contact lever tail near the contact lever stud, and apply pressure toward the shutter blades at this point.

With the shutter tripped, there must be approximately .005 inch clearance between the contact lever latch spring lug and the side of the contact lever. This is to assure full pressure of the contact lever latch into the star wheel assembly.

Figure 26

While pressing the trigger down fully, watch the contacts to make sure they do not close at any time. If they close, the contact lever tail has been bent too far and should be moved back slightly. If necessary, the winding lever should be stoned at point "A," figure 26. Corner "B" must be square.

SHUTTER BLADES

The sequence of disassembly is as follows:

1. Speed control ring, paragraphs 1-4, page 18.
2. Winding lever, paragraph 2, page 18.
3. Cover complete, paragraphs 3-6, page 18.
4. Winding gear, clutch assembly, and star wheel assembly, paragraphs 4-6, page 19.
5. Trigger assembly and bulb lever assembly, paragraphs 4-6, page 19.
6. Retard gear train, paragraphs 4-12, page 20.
7. Main drive assembly, paragraphs 4-7, page 20.
8. Flash contact parts, paragraphs 4-8, page 21.
9. Shutter release SECTOR AND STRAP assembly, figure 18.
10. Rear lens mount.
11. Blade controller LATCH SPRING BUSHING, figure 23, and the LATCH SPRING.
12. MECHANISM PLATE, figure 27.
13. Diaphragm retainer PLATE WITH WINGS ASSEMBLED.
14. Shutter blades.
15. BLADE CONTROLLER, figure 28.

The sequence of reassembly is as follows:

1. If necessary, clean the shutter blades thoroughly. Hold the blades carefully to avoid bending them and clean their surfaces with a soft cloth.
2. Blade controller.
3. BLADE WITH DOUBLE BLADE BUSHING and stud, figure 28, with the hole in the blade over the stud near the MAIN DRIVE STUD, figure 29, on the mechanism plate.
4. Proceeding counterclockwise, replace four BLADES WITH STUD, figure 28, allowing the wide end of each blade to overlap the narrow

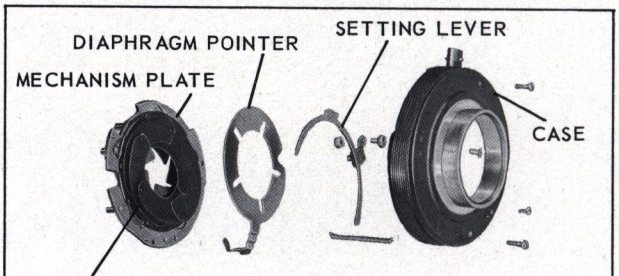


Figure 27

Lithographed in the United States of America

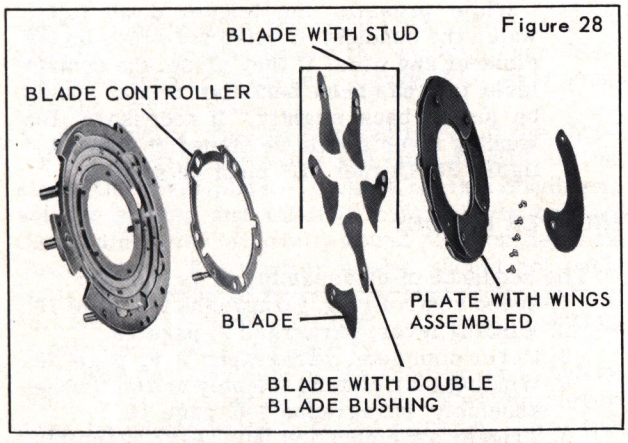


Figure 28

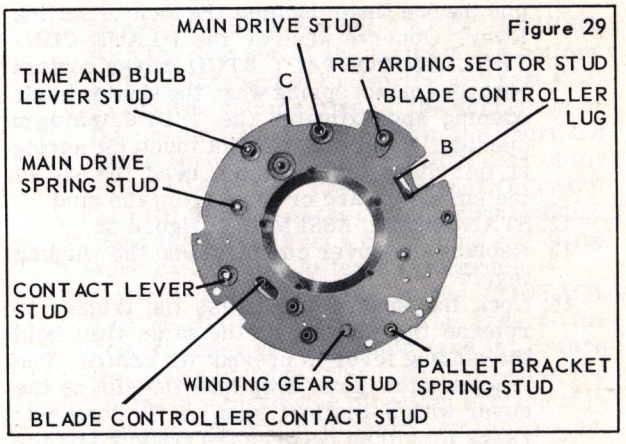


Figure 29

end of the preceding blade.

5. BLADE over the blade with double blade bushing and stud.
6. Diaphragm retainer plate with wings assembled, with the cutout slot in the outer edge of the plate over the opening in the mechanism plate for the PALLET BRACKET with stud assembly, figure 22. After the diaphragm retainer plate is secured, the shutter blades should operate freely.
7. Open the shutter blades. Close the diaphragm wings and run the side of a screwdriver blade around the central opening in the mechanism plate. This will open the diaphragm wings uniformly to the maximum aperture.
8. The shutter CASE, figure 27, and the DIAPHRAGM POINTER should be cleaned.
9. Diaphragm pointer. Turn the pointer until the projecting arm is near the cable release socket.
10. Mechanism plate. See that the circular projections on the ends of the diaphragm wings are in position in the slots in the diaphragm ring. After the plate is secured, the diaphragm ring and the shutter blades should operate freely.
11. Blade controller latch spring bushing and latch spring.
12. Shutter release sector and strap assembly.
13. Flash contact parts, paragraphs 1-11, page 21.
14. Main drive assembly, paragraphs 1-4, page 20.
15. Retard gear train, paragraphs 1-13, page 20.
16. Trigger assembly and bulb lever assembly, paragraphs 1-3, page 19.
17. Winding gear, clutch assembly, and star wheel assembly, paragraphs 1-3, page 19.
18. Cover complete, paragraphs 1-7, page 18.
19. Rear lens mount.

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