Servicing the Canon F-1 Camera

by Leland R. Bartel

The Canon F-1 camera is a single lens reflex camera with interchangable viewing screen and prism assemblies. The prism is easily removed from the camera body by pressing the two prism release buttons on each side of the prism head and then pulling the prism off to the rear of the camera body. The viewing screen can be removed by slipping your fingernail into one of the two cutouts at the rear of the viewing screen and lifting up. Note the beam splitter in the viewfinder condensing lens which reflects light to the CdS cell at the rear of the prism area.

The exposure meter measures the amount of light with the lens aperture full open. The meter is weighted toward the center of the viewing area. The three position meter switch on the left rear of the camera body provides a battery test position. Set the shutter speed dial to ASA 100 and 1/2000th second. Turn the meter switch to the test position and the meter needle should move into the blue square visible in the viewfinder.

Setting the shutter speed dial mechanically programs the meter mechanism. Rotating the lens diaphragm control ring moves a circular indicator in the viewfinder. The photographer simply sets the shutter speed and the ASA and then selects the appropriate f-stop to match the meter needle and the circular diaphragm indicator in the viewfinder. This is

FIGURE 1 – THE CANON F-1 CAMERA

a basic match needle meter system. There is also a shutter speed readout in the viewfinder.

The film compartment door is opened by pulling up on the rewind knob. The knob is locked by a latch which must first be released by pushing the chrome button in front of the rewind knob. This lock prevents accidental opening of the film compartment.

The delayed action mechanism is set by pulling down the lever on the right front of the camera body. The delayed action is released by activating the shutter release button. The delay setting lever also serves as the preview lever. Pushing it toward the lens stops down the diaphragm and moves the circular diaphragm indicator from the viewfinder. The photographer may take meter readings with the diaphragm stopped down. He simply sets the diaphragm so that the meter needle centers on the battery test area in the viewfinder. This gives the same reading as the full open aperture setting but allows the photographer to check depth of field and lighting right up to the instant that the shutter is released.

The mirror control lever (below the delayed action setting lever) also serves more than one purpose. Setting the mirror control lever to the M position locks the mirror in the up position (but only when the diaphragm is stopped down). Setting it to the L position will lock the diaphragm in the stopped down position when the delayed action lever is set to the preview position. Setting the mirror control lever opposite the white square will release the diaphragm from the preview position and allow full open meter readings. Normally the mirror control lever is set to the white square. At that position the diaphragm stops down only as long as the delay setting lever is pushed toward the lens. Another handy feature is the locking collar around the shutter release button.

Removing the battery cap from the bottom of the camera body will reveal another interesting Canon F-1 feature. The bottom plate is held to the camera body by the battery cap. The motor drive assembly attaches directly to the bottom of the camera body when the bottom plate is removed.

Other standard features include single stroke film advance, automatic counter return and a single PC sync outlet. The camera automatically provides X sync at 1/60th second and below. FP sync is provided at speeds of 1/125 through 1/2000 second.

In the shop where I work we see a lot of the older Canon FT's and FX's as well as the Pellix models. We're now starting to see the FTb's and the F-1's. The particular camera which I am using for this article had the unfortunate experience of having its owner put his finger through the opening curtain! That brings up a very good caution to be observed when handling and working on a camera with titanium curtains. Watch out so you don't put excessive pressure on the curtains in any way. One slip with a pair of tweezers or your finger and you'll be installing a new

FIGURE 2 – LENS MOUNT FLANGE

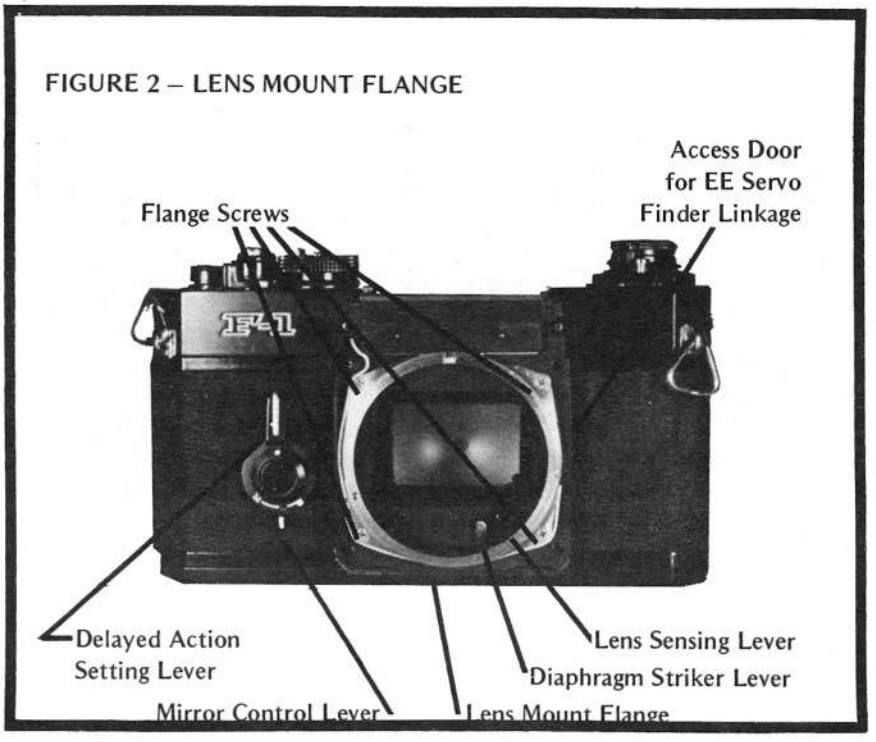
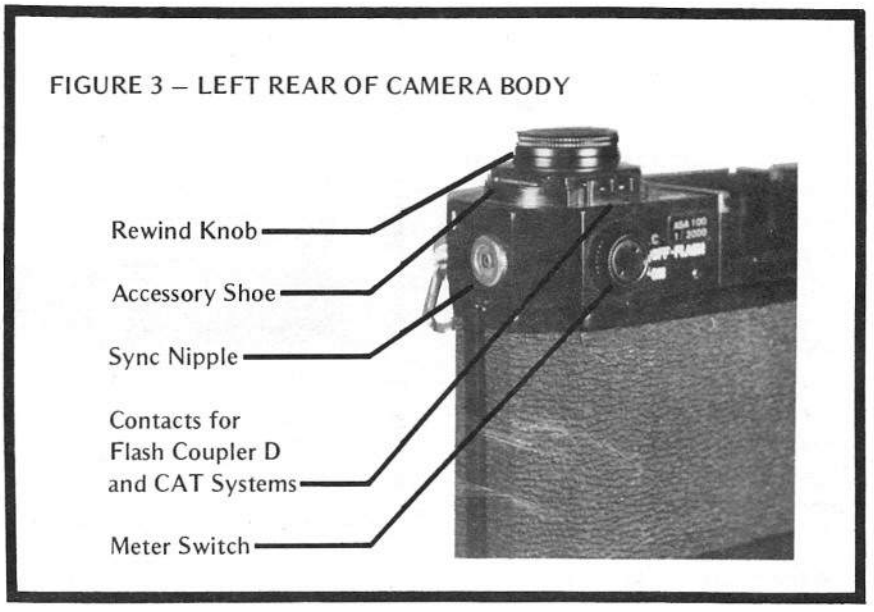


FIGURE 3 – LEFT REAR OF CAMERA BODY



curtain. The titanium curtains wrinkle easily and must be handled with care. Badly wrinkled curtains will not allow the shutter to deliver accurate high speeds.

Step number one in servicing any camera is to remove the strap. There is no quicker way to land a camera on the floor than to leave the strap dangling to catch your desk drawers, your test instruments or even your knee as you pull up to your work bench. Also remove the prism, the viewing screen and the lens. Now let's get down to business.

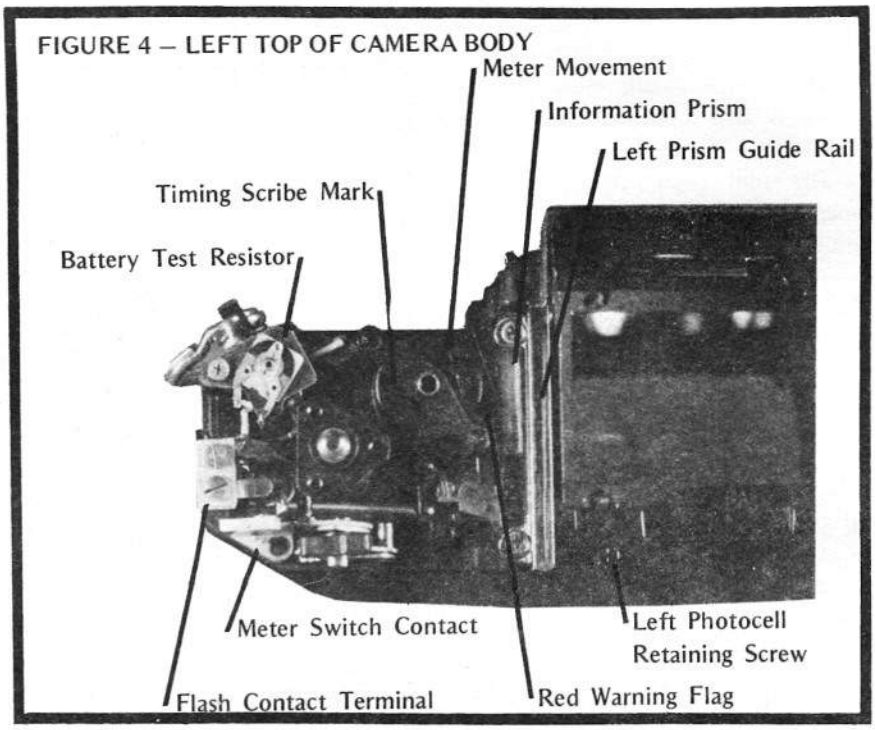
The Canon F-1 camera does not have a solid top cover. Thus it is necessary to remove the front apron in order to remove the two side top covers. The apron is held in place by four screws; one on each side and two at the top. As you remove the apron, note the little door on the left side of the lens mount housing. This opening provides a connection point between the Servo EE Finder and the lens diaphragm.

Body focus adjustments can be made by removing or adding washers behind the lens mount flange. The correct film plane to lens flange distance is 42.14 mm plus or minus 0.03 mm. Viewfinder focus can be adjusted in the same manner. Note that the viewing screen seat is secured by four screws.

Three types of Canon lenses can be used with the Canon F-1 camera. The FD lenses provide full aperture metering with automatic diaphragm action. The FD lenses are standard with the F-1. The Canon FL lenses provide stopped down metering with automatic diaphragm action. The Canon R series lenses feature stopped down metering and manual diaphragm operation.

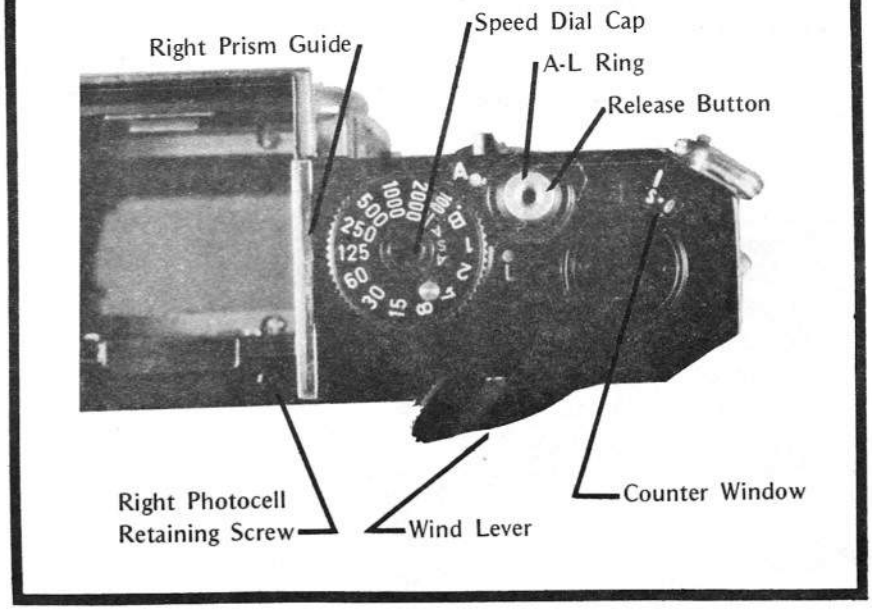
Begin removal of the left top cover by releasing the rewind shaft lock button and pulling up on the rewind knob to open the film compartment door. Wedge the rewind fork with a screwdriver and unscrew the rewind knob. I have seen several broken rewind forks. So watch the amount of pressure you use to unscrew the rewind knob. Take out the three screws in the accessory shoe and lift it off. Watch for shims under the accessory shoe. Note the two contacts at the rear of the accessory shoe. They provide connection points for the CAT (Canon Auto Tuning) System and the Canon Flash Coupler D system.

FIGURE 4 – LEFT TOP OF CAMERA BODY



Unscrew the dimpled retaining screw in the meter switch and take off the switch knob. Unscrew the PC sync outlet. I'm sure that Canon has a special tool for the job. I normally reach for a pliers with rubber lined jaws to do the job. Remove the screw in the front and the screw in the rear and lift off the left top cover.

FIGURE 5 – RIGHT TOP OF CAMERA BODY

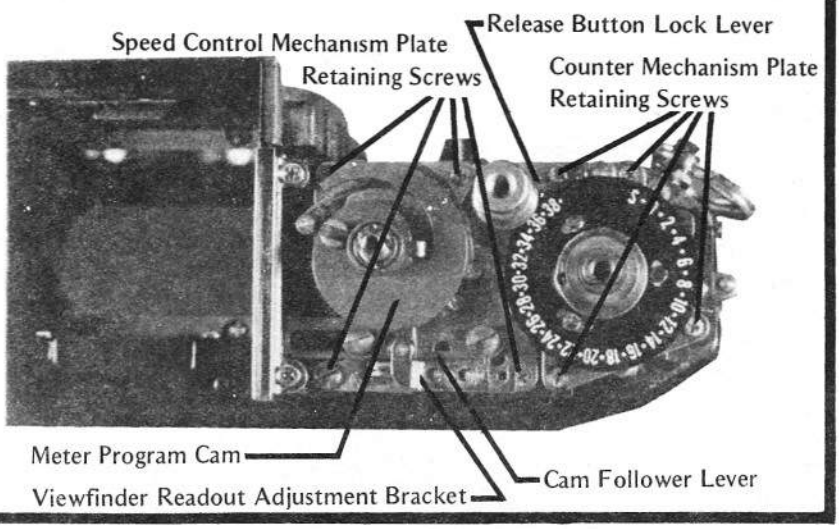


The exposure meter is now exposed for adjustment and calibration. Figure No. 4 shows the camera with the shutter speed dial set to ASA 100 and 1/125th second. Note the scribe mark on the meter housing. This mark gives you the correct mechanical position of the meter movement in relation to the shutter speed dial. Note the variable resistor which controls the battery test readout. Reset the shutter speed dial to 1/2 second (ASA 100) and note how the red warning flag covers the information prism. Set the shutter speed dial to 1/4 second and the flag uncovers the prism. The flag covers the information prism when the shutter speed dial setting exceeds the range of the exposure meter.

Reset the ASA to 25 and the shutter speed to 1/2000 second. Remove the cap from the top of the speed dial. I'm sure there must be a way to remove this cap without damaging it. So far I haven't discovered what it is. I carefully grasp the cap and turn it while lifting up. It's really glued down tight on most cameras. This process will mar the cap and it's a dead giveaway that someone has worked on the camera. So I, keep a supply of the caps on hand and simply install a new one before the camera leaves the shop. Setting the speed dial to ASA 25 and 1/2000 second releases most of the spring tension from the meter mechanism and makes installing the speed dial easier since the mechanism stays at that particular setting. Remove the screw from the speed dial and lift it off. Take out the dimpled retaining cap from the wind lever and lift it off. Loosen the three setscrews in the advance-lock (A-L) ring and take it off. Watch for the click stop ball in the A-L ring. Remove the three screws in the right top cover and lift it off. Note that the screw in the front is shorter than the other two.

Note the large circular cam which programs the ASA/shutter speed settings to the meter mechanism. Also visible is the string and adjustment

FIGURE 6 – METER PROGRAM CAM AND COUNTER



for the shutter speed readout in the viewfinder. The shutter release button will be locked when the A-L ring has been removed. One way to get around this is to remove the spring from the lock lever to prevent it from being held against the release plunger.

Remove the battery cap from the bottom of the camera body. Note that the bottom plate is now free from the camera body. Now exposed are the two internal cover plates and the tripod socket plate. Carefully remove the screws from the internal cover plates. Under each screw below the plate you will find a small bushing. If you're not careful, the bushings may fall into the camera body. Be sure to remove all seven bushings. (Not all Canon F-1 cameras have the bushings.) They usually have a little cement on them, but it doesn't hold them in place once the covers are removed.

Remove the tripod socket plate. My experience has been that the four screws in the tripod socket plate are the tightest screws in a Canon camera. If you don't have one, you'll be needing a good quality cross-point screwdriver to get them out. In fact, if you don't have one, I'm surprised you got this far!

FIGURE 7 – INTERNAL BOTTOM COVER PLATES

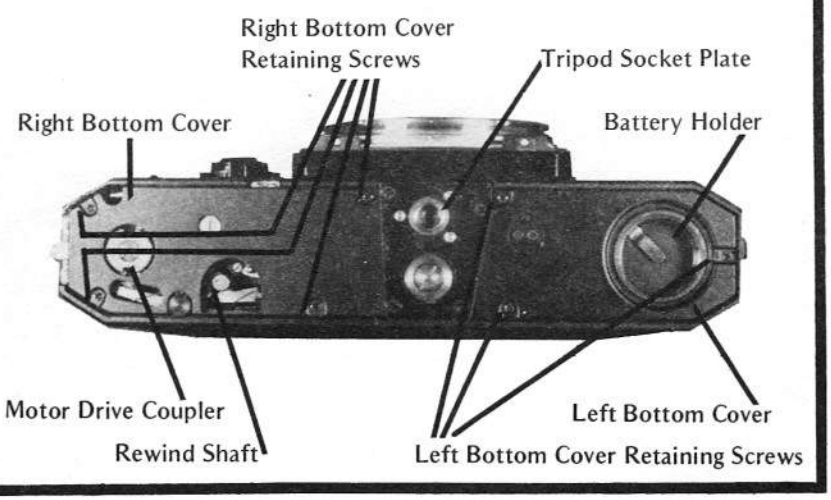


Figure No. 8 shows the bottom with the cover plates and tripod socket removed. The mechanism is shown in the released position. If you are not familiar with a Canon F-1 camera, right now would be a good time to install the shutter speed dial and the wind lever and study the action of the camera mechanism.

Operating the film advance lever one full stroke rotates the double cam gear one half turn. The cam cocks and tensions both the mirror cage and the diaphragm control mechanisms. The sprocket makes one full revolution and the shutter curtains are wound and latched in the cocked position via the shutter wind gear assembly. The entire camera mechanism is now tensioned and ready for an exposure.

Activating the shutter release frees the diaphragm mechanism latch lever from the tensioned diaphragm closing lever assembly. As the diaphragm closing lever assembly swings toward the right side (camera in the normal picture taking position) of the camera body, it allows the diaphragm to stop down to its pre-selected position. The diaphragm closing lever assembly strikes its latch lever, and the latch lever disengages the wind pawl on the shutter wind gear from the cam on the shutter wind gear shaft. Now the shutter is free from the transport mechanism. As the diaphragm closing lever assembly completes its travel, it trips the mirror tensioning lever latch which frees the mirror allowing it to travel upward. The mirror control lever closes the FP sync contact and just as it completes its travel, it trips the opening curtain latch. The opening curtain begins its travel across the film format area. The closing curtain remains latched until it is released by the cam surface on the opening curtain wind gear and the opening curtain latch.

If the shutter is set to a high speed, the closing curtain will be released almost immediately. If it is set to a retard speed, the opening curtain will complete its travel as its wind gear runs into the curtain brake. This slows the curtain to a gentle stop and prevents it from bouncing back into the film format area. At the same time, the opening curtain brake lever closes the X sync contact.

The closing curtain (if set to a slow speed) pulls through the slow speed gear train and is then free to travel across the film format area. As it completes its travel, its wind gear runs into the closing curtain brake lever and is also slowed to a gentle stop. The closing curtain brake lever runs into the pallet control lever and disengages the pallet from the slow speed gear train. The mirror trip gear (meshed with the closing curtain tension roller) trips the mirror release lever which in turn trips the mirror allowing it to return to the viewing position. The diaphragm opening trip lever, keyed to the mirror trip gear, also swings around and trips the diaphragm opening lever latch allowing the diaphragm striker lever to move back toward the left side (the camera in the normal picture taking position) of the camera body and thus opening the diaphragm for viewing. That, in a nutshell is one complete cycle of the Canon F-1 camera. You might want to refer back to this section as you come across the various parts which I have mentioned. That will help refresh your memory plus review the cycle of operation for the camera body.

Cock the delayed action and the shutter mechanism. Remove the dim-

FIGURE 8 – CAMERA BOTTOM MECHANISM

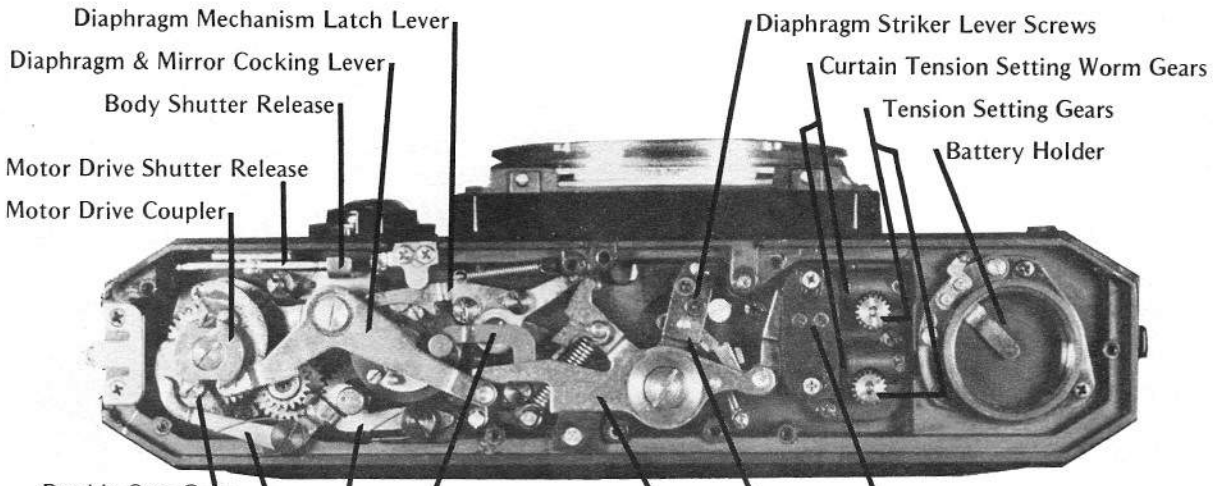
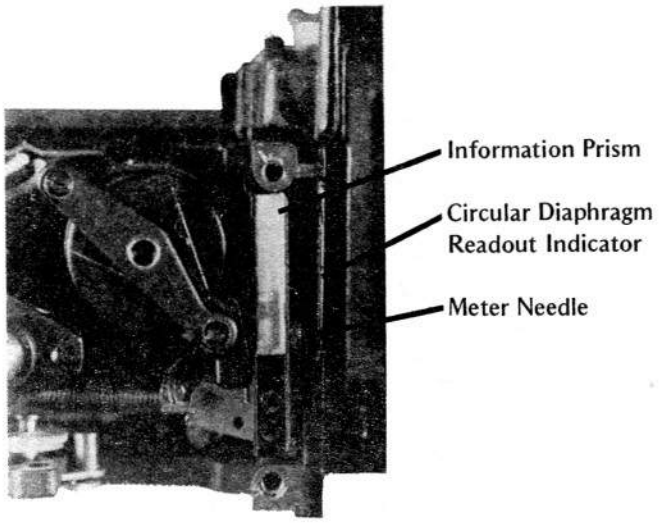


FIGURE 9 – DIAPHRAGM INDICATOR POINTER



pled cap screw from the delayed action setting lever. Also remove the delay indicator cap, the delay setting lever, the mirror control lever and the delay limiting lever. Watch for shim washers in this mechanism. Push the shutter release button and allow the delayed action to run through and trip the shutter. Completely remove the leatherette from the front of the camera body. I remove the delay setting lever assembly from the camera body so that I can easily remove the leatherette. If you like to peel the leatherette from under the delay setting lever, you don't have to remove it (the lever) in order to pull the front plate/mirror cage assembly.

Remove the left prism guide rail (see Figure No. 4). Look into the opening between the viewfinder prism readout and the information prism. Note the meter needle and the circular diaphragm indicator.

Figure No. 10 shows the technique to be used in removal of the circular diaphragm indicator. Reach into the area between the meter housing and the viewfinder prism housing and locate the small hole in the diaphragm pointer. Carefully insert a pointed tweezers into the hole in the pointer and pry upward freeing the pointer from its mount. It clips in place and is secured with a drop of cement. If you do not remove the pointer at this time, it will be bent during removal of the mirror cage. The diaphragm indicator is more accessible if the meter assembly is removed. However, you do not need to remove the meter assembly and lose the viewfinder/shutter speed readout timing and the meter timing in order to remove the mirror cage.

Remove the two screws in the diaphragm striker lever (Figure No. 8) and remove the striker lever. Unsolder the white wire from the X sync contact. Unsolder the other end of the white wire from the sync nipple terminal. Take out the six front plate/mirror cage retaining screws. Slowly cock the shutter as you lift the front plate/mirror cage from the camera body. Pull the white wire from the PC terminal through its opening in the camera body and free the front assembly from the camera body. Immediately remove the coupler and delayed action setting pinion from either the front plate or the delayed action mechanism. These two parts have a way of falling out at unexpected times and they are easily lost if you are not familiar with the camera.

FIGURE 10 – DIAPHRAGM INDICATOR REMOVAL

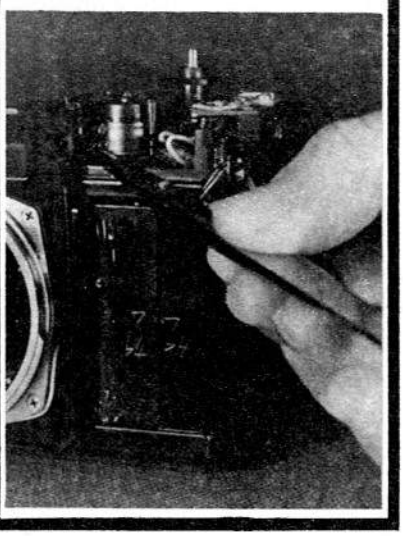
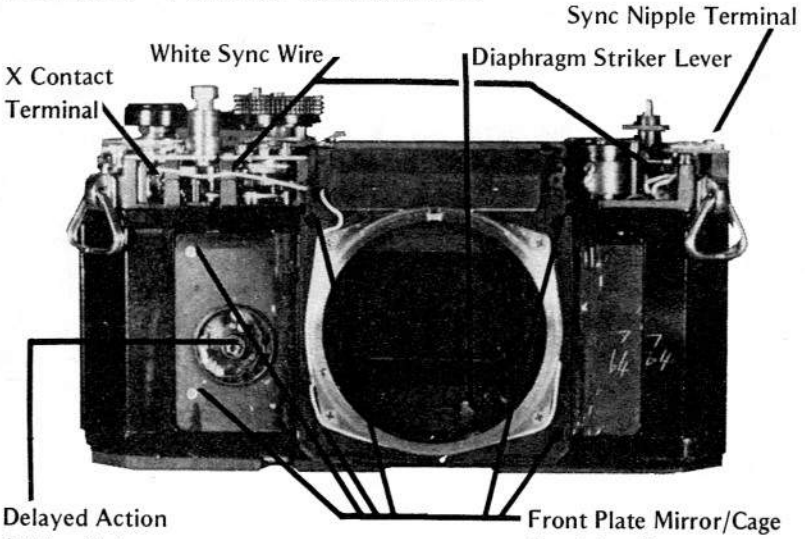


FIGURE 11 – FRONT OF CAMERA BODY



Take a minute to examine the mirror cage assembly. Note that the mirror cage and front plate are one solid casting. They cannot be separated into two assemblies as on a Nikon or an SRT-101. Also note that the mirror is riveted to the mirror carrier. This requires removal of the mirror cage/front plate assembly in order to replace the mirror. Keep that in mind should you be called on to replace a mirror.

The mirror cage is shown in the normal viewing position. The mirror is down and the diaphragm linkage is positioned so that the diaphragm would be full open. Note the diaphragm control link along the bottom of the mirror cage. The L shaped lever near the center contacts the diaphragm striker lever and the cam surface on the far end contacts the diaphragm indicator lever for the viewfinder.

As in many other SLR cameras, the FP sync contact is closed via the mirror mechanism. Canon lists the FP sync delay as being from 10.5 to 13.5 milliseconds to the opening edge of the film format area. The mirror tensioning mechanism in the bottom of the camera tensions the mirror control lever toward the front of the mirror cage as the shutter is cocked. Pushing the shutter release frees the shutter from the transport via the shutter wind gear pawl and cam. It also trips the mirror tensioning lever latch. The mirror control lever swings toward the rear of the mirror cage carrying the mirror upward and tripping the opening curtain latch. The closing curtain completes its travel and through the action of the mirror trip gear and lever below the mirror cage (Figure No. 26) trips the mirror release latch. This allows the mirror to return to its at rest viewing position.

The first Canon F-1 which I worked on had a broken spring on the mirror release latch. The camera was jammed so I started disassembly, checking everything as I went. After removal of the mirror cage I found the shutter to be working OK. That narrowed my search to the mirror cage where I found the broken spring. That kind

FIGURE 12 – MIRROR CAGE/FRONT PLATE ASSEMBLY

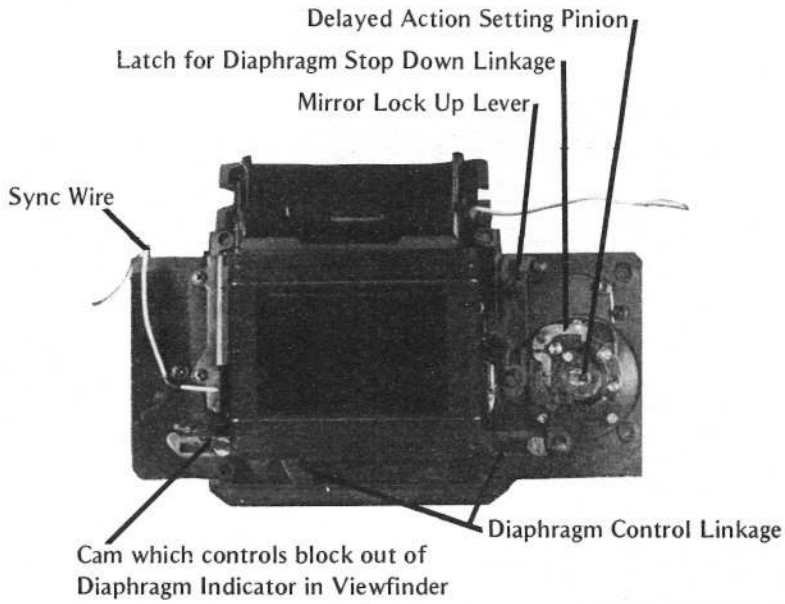


FIGURE 13 – RIGHT SIDE OF MIRROR CAGE

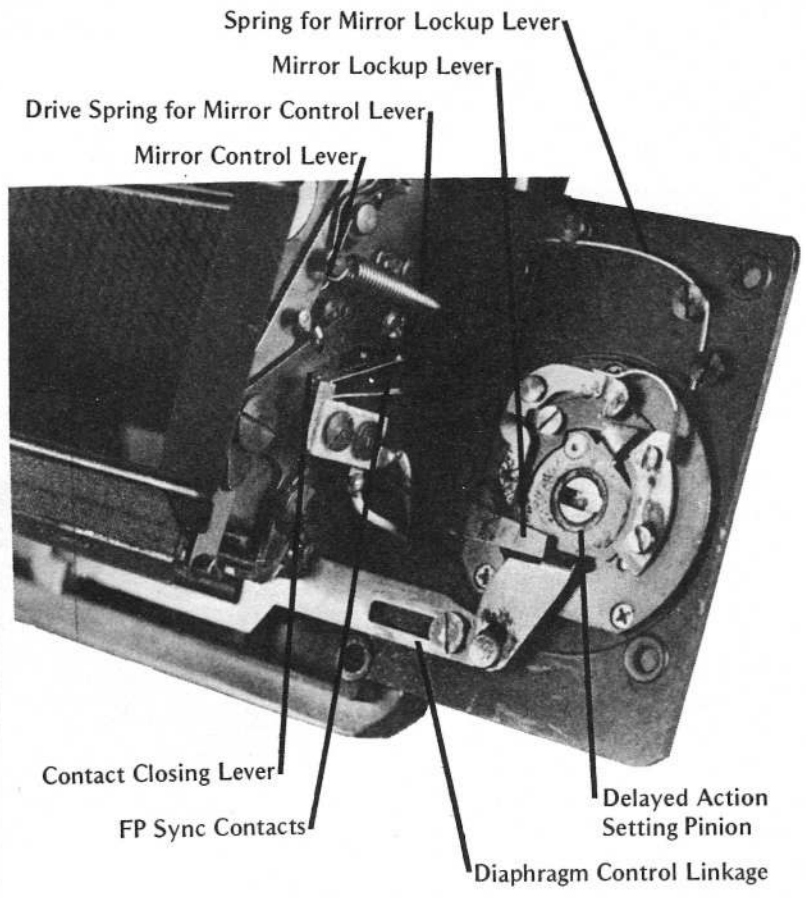
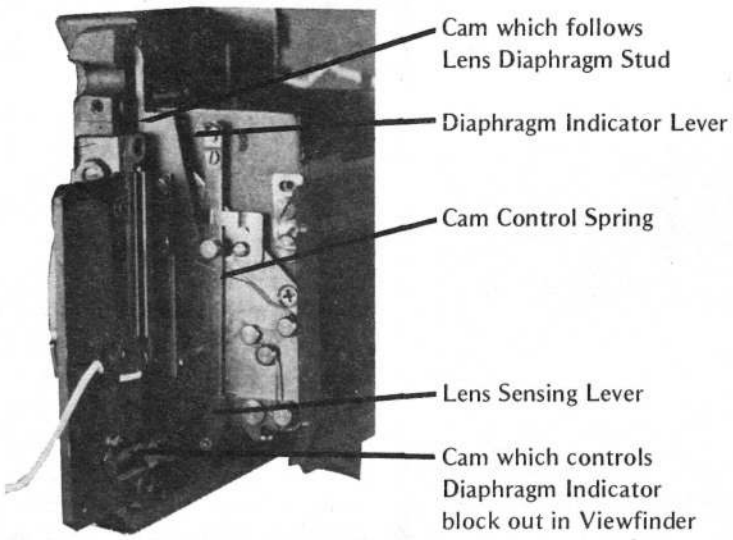


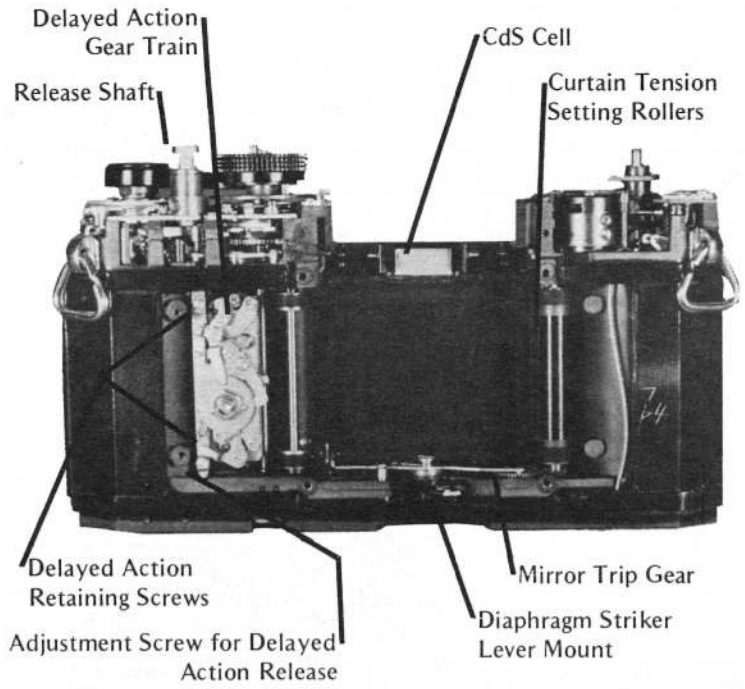
FIGURE 14 – LEFT SIDE OF MIRROR CAGE



of a repair always reminds me of the customer who asks what was wrong with his camera. "A broken spring on the mirror cage." "Oh, I'm glad it was something simple!" he replies with that "It'll only be a couple dollars" ring in his voice. I don't know about you, but the amount of disassembly and retiming required to repair a mirror cage on a Canon F-1 is certainly more than a simple repair charge. This is an example of a situation where we as technicians can use the opportunity to let our customers know the complexities of their equipment. This not only helps the customer to understand our charges but hopefully will teach him respect for his equipment.

Figure No. 14 shows the cam which links to the lens diaphragm and moves the indicator in the viewfinder. Note that the bottom pivot point for the indicator lever is movable and spring-loaded toward the front of the mirror cage. This is the lens sensing lever which tells the meter which Canon FD lens has been mounted to the body. Note the spring clip at the top of the indicator lever from which we removed the circular readout indicator a few minutes ago. The control cam and indicator lever must be clean and free to move easily. Otherwise the indicator lever will not follow the cam under spring tension and the viewfinder readout will not function properly. Note the cam on the diaphragm control link which cams the pointer out of the viewfinder when the lens diaphragm is stopped down. Remember that you must remove the front plate/mirror cage assembly from the camera body in order to adjust this cam if the viewfinder pointer fails to disappear from the viewing area when the lens is stopped down.

FIGURE 15 – CAMERA BODY WITH MIRROR CAGE REMOVED

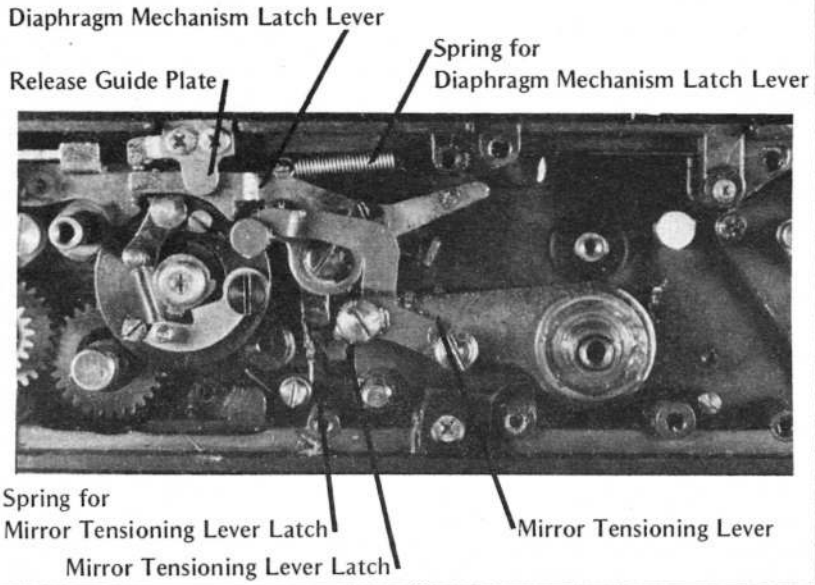


The camera body can be operated at this point if you trip the opening curtain latch. Set the camera body to the Bulb position and cock the shutter. Trip the shutter and scribe a timing line along the edge of the opening curtain on the casting at the rear of the camera body. Scribe another timing line along the edge of the closing curtain (being held in the Bulb position). These two timing marks will be used as reference points during reassembly. Take out the two screws in the delayed action gear train. Note the adjustment on the lower end of the release shaft which can be adjusted for proper delayed action release of the shutter.

You now have a clear view of the CdS photocell located at the rear of the viewing screen area. Prism assemblies can be interchanged without disturbing the meter, since the beam splitter in the viewing screen reflects light onto the photocell. Also note the mirror trip gear and lever at the bottom of the mirror cage cavity. This lever trips the mirror mechanism after the closing curtain completes its travel.

Continue disassembly of the camera body by removing the motor drive

FIGURE 16 – MIRROR TENSIONING LEVER MECHANISM



electrical contact (Figure No. 8) from the bottom of the camera body. Unhook the springs from the rewind shaft latch lever and the rewind latch lever release lever. Remove their retaining screws and lift out the levers and springs. Watch for the brass bushing and washer under the rewind latch lever.

Take out the diaphragm and mirror cocking lever. Unhook the large tension spring from the diaphragm closing lever assembly and the small tension spring from the diaphragm opening lever assembly. Remove the screw from the diaphragm closing lever pivot point and carefully lift the assembly out of the camera body. The diaphragm opening lever assembly may come off at the same time because the two parts share a common pivot.

Now you can see the mirror tensioning lever which is positioned below the diaphragm control levers. Figure No. 16 shows it in the latched position. If the mirror cage were in the camera body, it would be tensioned and ready to be released by the latch for the diaphragm closing lever assembly. Remove the mirror tensioning lever.

Take off the release guide plate and its spacers. Unhook the spring from the diaphragm mechanism latch lever and take it out. Directly below this latch is the mirror tensioning lever latch. Unhook and remove its spring as well as the latch. Carefully watch for washers when removing any of these parts. Sometimes the washers stick to the grease in the body and other times they stay with the lever. Make a note of where they go, as you'll want to be sure they are correctly positioned during reassembly.

Remove the four screws from the counter mechanism plate (Figure No. 6). The counter mechanism plate and wind lever return spring assembly come off as a complete assembly. Carefully lift the front of the counter mechanism and shift it forward to clear the X sync contact which is also part of the assembly.

Reset the shutter speed dial to ASA 25 and 1/30 second. Figure No. 17 shows the screw which connects the speed control mechanism cam follower to the link which passes across the rear of the camera to the exposure meter. This is the linkage which we talked about with the timing of the meter in Figure No. 4. Hold the meter movement and remove this screw. Then allow the meter to move to its rest position under its spring tension. Reset the shutter speed dial to ASA 25 and 1/2000 second. Remove the shutter speed dial.

Lift off the exposure meter/speed dial program cam (Figure No. 6). While holding the readout string, carefully loosen the string from the shutter speed dial pivot. Slowly allow the shutter speed readout dial to unwind while holding the string. There are about two turns of tension on the readout dial. Remove the two screws from the shutter speed readout dial adjustment bracket and take it off. Also remove the shutter speed dial cam follower and its two screws. In case you're wondering, we just lost the timing of the meter and the shutter speed readout! But don't

FIGURE 17 – SHUTTER SPEED DIAL/METER LINKAGE SCREW

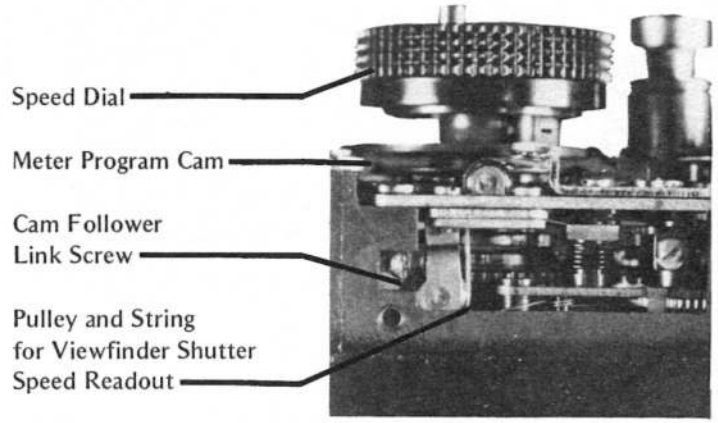
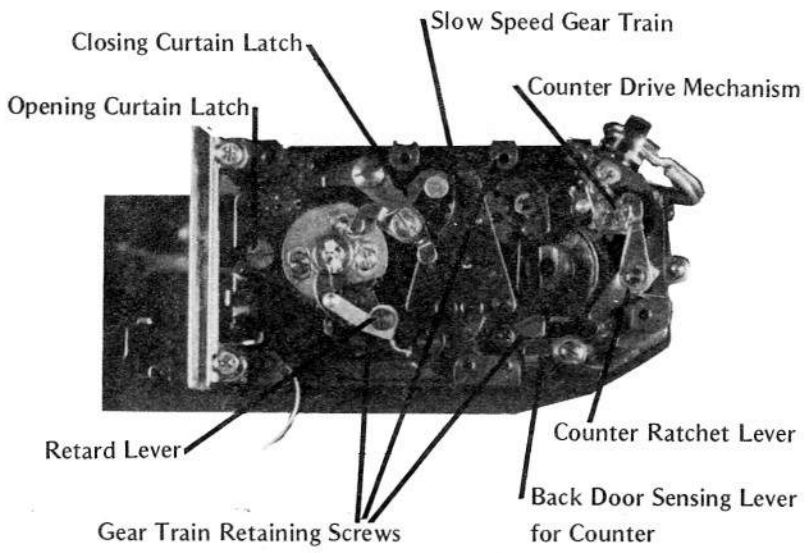


FIGURE 18 – SLOW SPEED GEAR TRAIN AND COUNTER DRIVE



worry, we'll cover the timing during reassembly.

Remove the four screws from the shutter speed control mechanism plate. Carefully work the plate toward the front of the camera body and lift it off. Watch so you don't force anything. The speed cam followers ride the cam surfaces between thin washers. Careless removal of the cam assembly could damage the washers and prevent the followers from tracking properly when the camera is reassembled.

Remove the three cross-point screws in the slow speed gear train. Pull the retard lever toward the rear of the camera body and lift out the gear train. Unhook the spring, remove the screw and lift out the back door sensing lever for the counter. Remove the "C" ring from atop the counter ratchet lever. Unhook its spring and lift off the counter ratchet lever. Unscrew the special flat sided screw from atop the counter drive mechanism and lift off the counter drive assembly. Remove the opening curtain latch and spring. Unhook the spring from the closing curtain latch, remove its screw and take out the closing curtain latch.

Remove the screw in the mounting board for the battery test variable resistor. Unhook the spring, remove the screw and take off the rewind shaft lock lever. Take out the two screws in the flash terminal assembly and pull the assembly out to the front of the camera. Remove the single cross-point screw from the plastic meter switch contact plate. Be careful so you don't damage the contact lever while removing the screw. Unsolder the small red CdS wire from the base of the meter switch contact plate. Carefully pull the wiring and the resistors out to the front of the camera body.

Put a drop of solvent on the two screws which retain the information prism. Remove the two screws and lift out the prism. Turn the screw in the shutter speed/meter program link as shown in Figure No. 19. Carefully work the link free of the spring-loaded slide mechanism. Remove the tension spring from the meter mechanism. Remove the three screws from the meter mechanism plate and lift out the meter mechanism. This takes a little careful doing, but it will come out if you lift the information prism end of the assembly out first.

Unsolder the black CdS wire from the common point between the two fixed resistors and the green CdS wire from the resistor (it's the only wire attached to that one). Feed the viewfinder shutter speed readout string through the passageway behind the photocell, and the meter is free of the camera body. If you like, you can unsolder each of the electrical components as you remove them from the camera body. I prefer to leave the meter as an assembly and unsolder only the wires from their connection points in the camera body. It is possible to remove the meter from the camera body by removing only the left top cover assembly (and front apron) in order to replace or repair the meter. This requires removing the movement from the meter mechanism

FIGURE 19 – METER ASSEMBLY

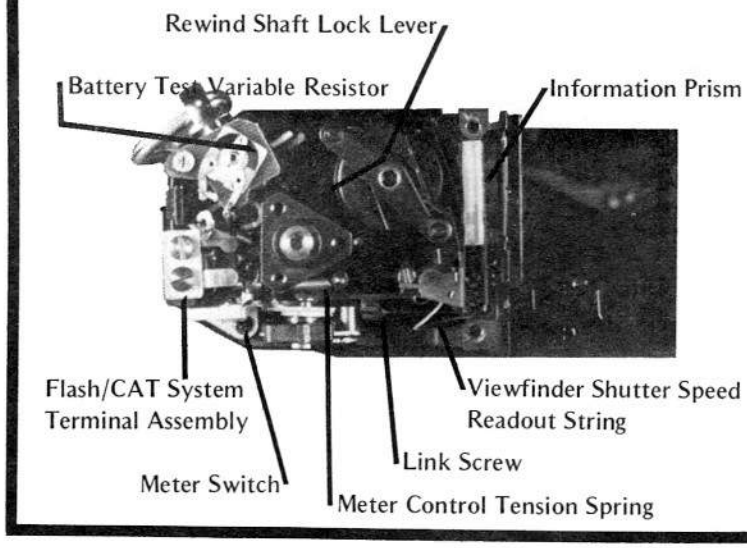


plate to avoid disturbing the viewfinder shutter speed readout.

We had a Canon F-1 in the shop the other day which the owner had dropped on its rewind knob. In addition to damaging the knob and shaft, he also bent the rewind shaft housing. Replacement of the rewind shaft housing requires removal of both top covers and the meter mechanism plate. So what appears to be a simple job turns out to involve removal and retiming of the meter and shutter speed readout systems. The rewind shaft housing also has to come out if you need to replace the meter switch assembly.

Note the ball bearing click stop for the rewind shaft. Usually the ball will fall out if the rewind shaft is removed. To replace it, simply position the ball in its cutout with a dab of grease. Insert the rewind shaft from the bottom and carefully push the ball bearing aside as you push up on the rewind shaft. This saves you the trouble of removing the left top cover to replace the click stop ball when no other repair is required.

Remove the two screws from the CdS cell mounting bracket (Figures No. 4 and 5) and lift out the photocell. I'm sure that this must be one of the most accessible SLR photocells in the industry. Pull the shutter speed dial/meter program link out to the right side of the camera body.

Remove the closing curtain mirror trip lever. Also take out the light baffle at the rear of the mirror cage compartment. The mirror trip gear is keyed to the trip lever for the diaphragm opening mechanism in the bottom of the camera body. The gear will be removed along with the tension roller assembly mechanism plate.

Apply a drop of solvent to the lock screws on the tension setting worm gears. Release all of the tension from the curtain tension setting rollers. With the shutter in the released position, the closing curtain normally will have about 1/2 turn of tension. (That is 1/2 turn of the main tension setting shaft and not of the worm gear.) Hold the tension shaft gear and unscrew the worm gear. Also remove the tension from the opening curtain. Normally

FIGURE 20 – REWIND SHAFT HOUSING

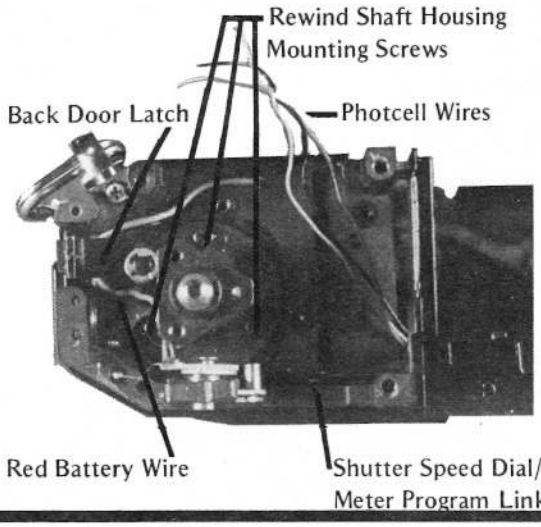


FIGURE 21 – MIRROR TRIP MECHANISM

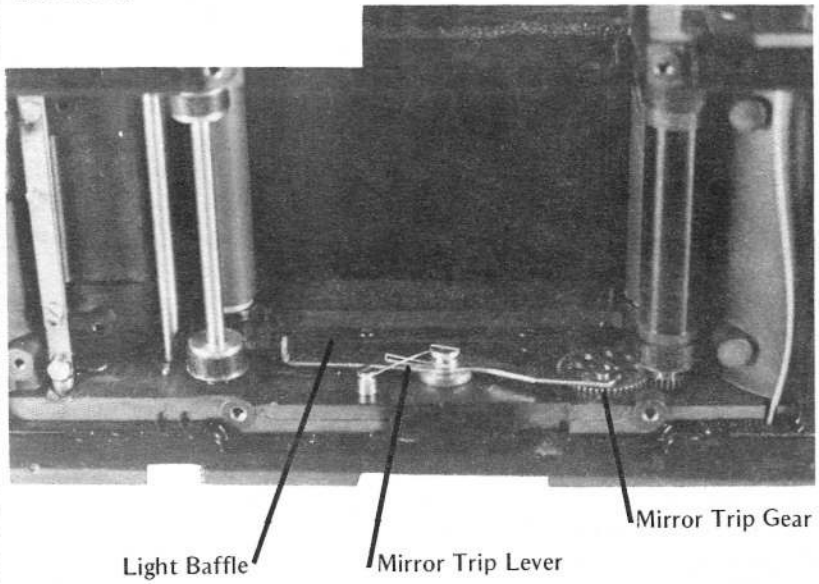


FIGURE 22 – CURTAIN TENSION SETTING MECHANISM PLATE

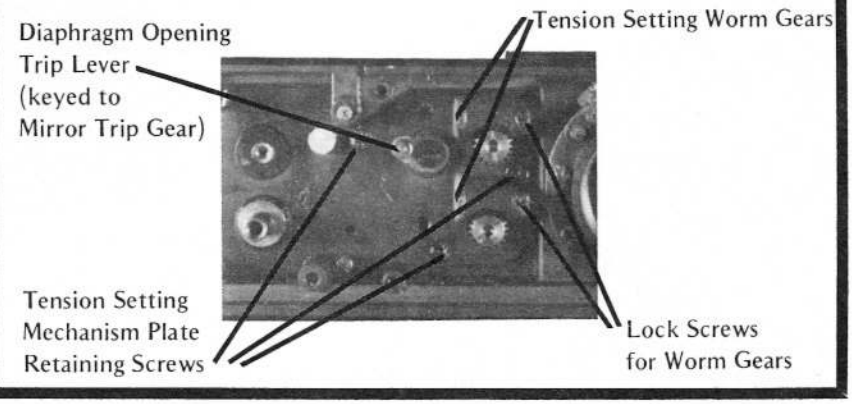
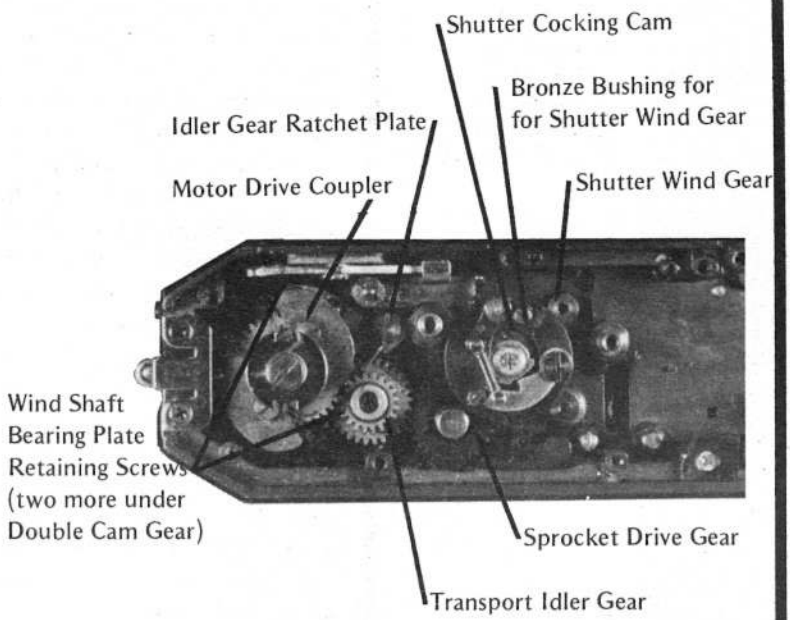


FIGURE 23 – SHUTTER WIND GEAR ASSEMBLY



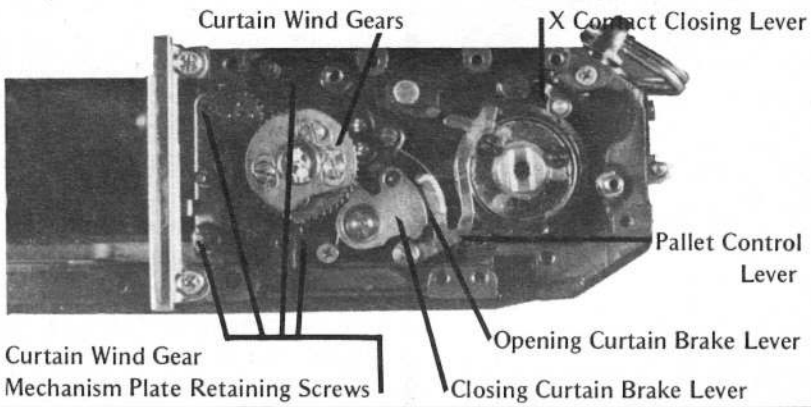
it will have about 3½ turns of tension. The titanium curtains have a tendency to unwind, so it's a little difficult to measure exactly the amount or number of turns of tension. Also remove the worm gear from the opening curtain.

Remove the three screws from the curtain tension setting plate. Pull the tension roller assembly down far enough to gain access to the upper end of the tension setting shafts. Carefully hold the upper end of the tension setting shaft and unscrew the gear (which engages the worm gear) from the bottom of the shaft. The gears have left-hand threads, and they are normally very tight. You'll need to use care so as not to damage the upper ends of the shafts. A pin vise or pliers with rubber lined jaws work pretty well. Watch for washers.

Remove the cross-point screw from the bottom of the shutter wind gear shaft. Also remove the shutter cocking cam.

Remove the screw in the pallet control lever and take it out. Take out the X contact closing lever. Remove the three cross-point screws and the one slotted screw from the curtain wind gear mechanism plate. The curtain wind gears and the mechanism plate are one riveted assembly. Remove the screw from the curtain brakes. Carefully pull upward on the curtain wind gear mechanism plate while lifting the closing curtain brake lever. As soon as the mechanism plate has been raised about 1/8 inch, the closing curtain brake lever can be worked free and removed. Rotate the opening curtain brake lever counter-clockwise (toward the front of the camera body). Carefully continue to work the gear plate assembly upward and out of the camera body. Figure No. 25 gives you a little idea of what's involved.

FIGURE 24 – CURTAIN WIND GEARS AND BRAKE ASSEMBLIES



It helps if you roll up the closing curtain before you pull the mechanism plate up and out of the body. Then roll up the opening curtain and slip it through the opening in the body and finally slip the closing curtain tension roller through the cutout. If you wanted to, you could cut or remove the opening curtain tapes and the closing curtain from their rollers and then pull the mechanism plate and shafts up and out of the camera body. That way you wouldn't have to feed the tension rollers up through the cutout, too. But then you wouldn't be able to compare curtain and tape lengths as easily.

I guess it would be possible, but it would require a lot of skillful work to install new curtains without removing the curtain wind gear mechanism plate. The big problem as I see it would be proper alignment of the tapes and curtain so they would be parallel.

Figure No. 26 shows the shutter assembly with the curtains and tapes still attached to their mounting points. Note that the opening curtain is in back of the closing curtain (next to the film). Also note the washers and their positions. The Canon Service Manual mentions again and again that proper clearance between parts is obtained through the use of numerous washers of the correct size.

Note the ball bearings on the curtain roller shafts above the wind gear mechanism plate. There are ten ball bearings on each roller shaft. There is a single screw in each of the opening curtain tape rollers and the closing cur-

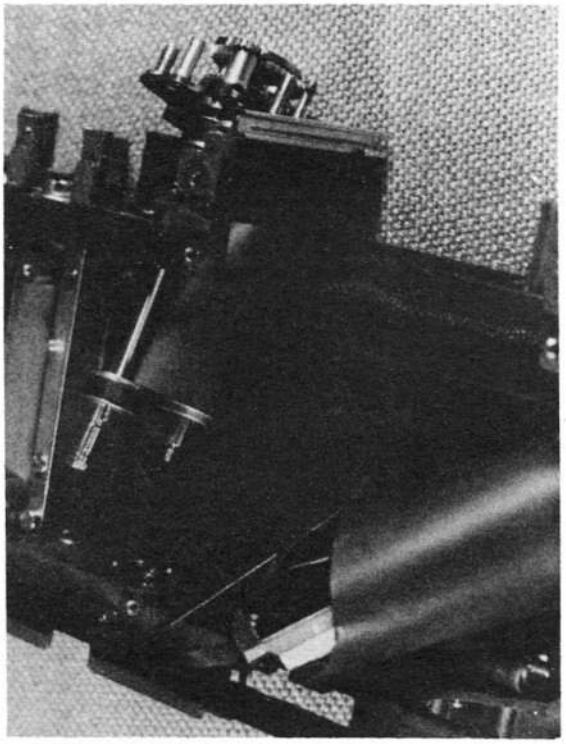


FIGURE 25
CURTAIN
WIND GEAR
MECHANISM
PLATE REMOVAL

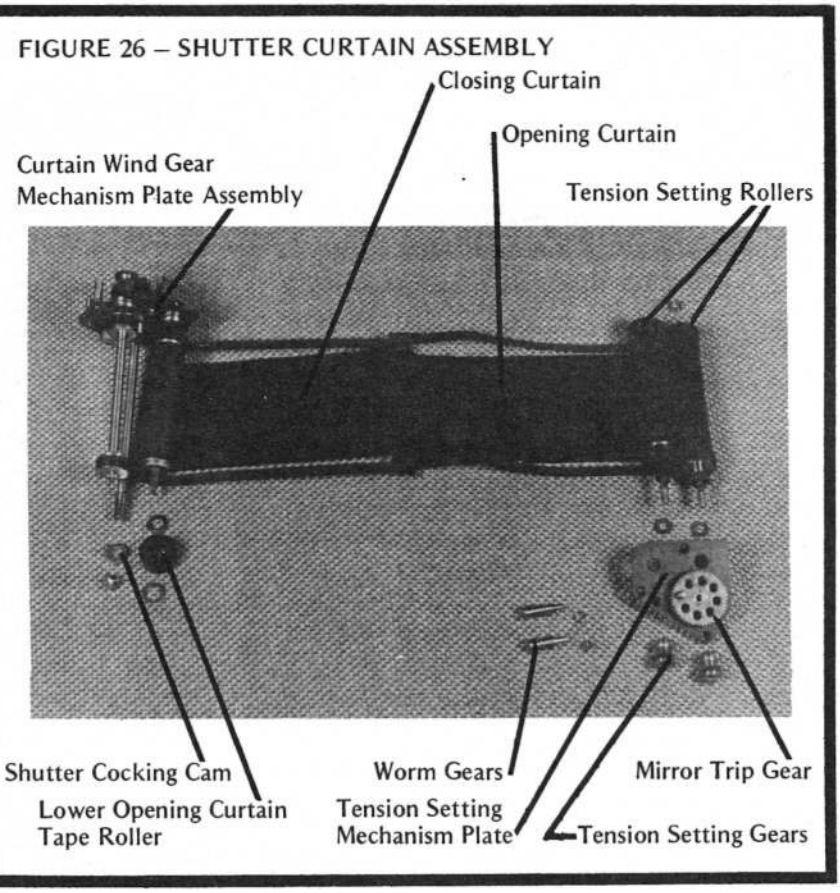


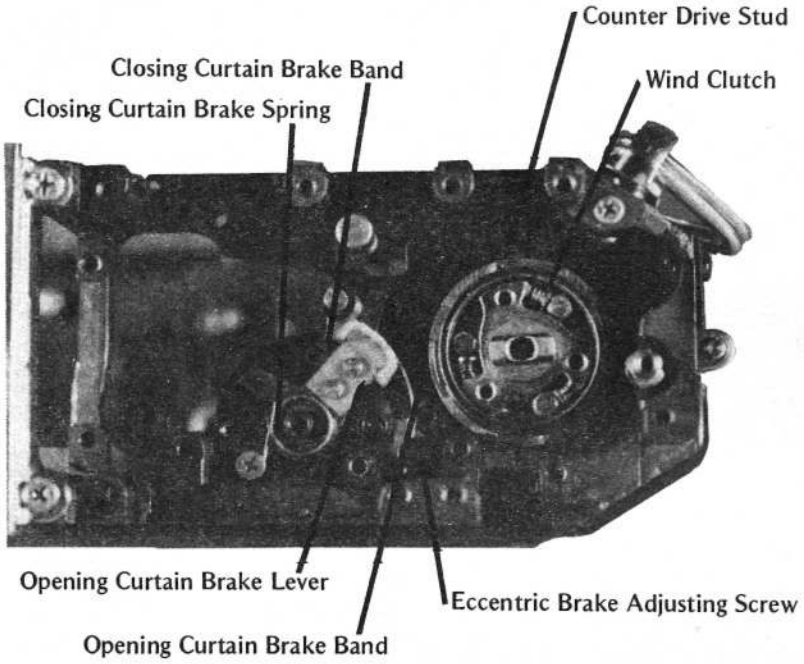
FIGURE 26 – SHUTTER CURTAIN ASSEMBLY

tain roller. You can unwind the tapes and the curtain and remove these screws. You would then be able to pull the roller shafts up and out of the curtain wind gear mechanism plate. All twenty ball bearings would then be loose. Perhaps it would be easier for you to pull the shafts and leave the curtain wind gear mechanism plate and curtain brakes in the camera body. So far I have found it easier to pull the curtain wind gear mechanism plate as an assembly and re-cement the new curtains to the rollers without any further disassembly of the gear mechanism plate.

Remove the closing curtain brake lever clutch spring and its cross-point screw. Also take out the closing curtain brake band and its cross-point screw. You may need to move the opening curtain brake lever and pad all of the way counter-clockwise in order to remove the bronze brake band. Then move the opening curtain brake lever and pad all of the way clockwise. Take out the two cross-point screws in the mounting bracket for the opening curtain brake band. Carefully work the brake band up and out of the camera body. Note that the slotted screw at the rear of the body, against which the brake band rests, is an eccentric screw which is used to adjust the opening curtain brake tension.

Figure No. 27 also shows the main wind shaft clutch assembly (with cover plate removed). This clutch frees the wind lever assembly from the wind shaft so that the camera body can be driven by the motor drive mechanism which attaches to the bottom of the camera body. But note that the counter drive studs on the outer circumference of the clutch are not disengaged when the motor drive is used. With the motor drive the counter is operated independently of the wind lever. The main wind shaft makes one half turn each time the film is advanced. The action of the wind lever is transferred to the wind shaft via the clutch assembly. This clutch would be the first place to look for trouble if you came across a camera which required irregular double strokes to

FIGURE 27 – WIND CLUTCH & CURTAIN BRAKE



advance the film or cock the shutter. The outer housing of the wind clutch is part of the main wind shaft.

Figure No. 23 shows the single slotted screw in the base of the main wind shaft. The screw is cemented in place and is very tight. It has right-hand threads. The keyed collar under the screw is the coupler for the motor drive unit. Carefully remove the keyed collar and the double cam gear while holding the wind shaft into the camera body from the top of the camera. Under the double cam gear are 15 ball bearings! And on the other end of the wind shaft, under the one way clutch housing, are 15 more ball bearings! And, they are different sizes so you must keep them apart. After you remove the 15 ball bearings from the bottom (count 'em), turn the camera over and pull the wind lever shaft/clutch assembly out of the camera body. If you are lucky, there will be enough oil on the shaft to hold the bearings in place. If not, start counting! Unscrew the upper wind shaft bearing. Pull out the spool drive clutch mechanism and spool liner.

Return to the bottom of the camera body and take out the idler gear ratchet plate (Figure No. 23). Remove the four cross-point screws from the bottom of the main shaft bearing plate. Remove the plate and the clutch drive gear. Open the back of the camera and take out the spool. Figure No. 28 shows the take-up spool, clutch, shaft and related parts in their order of assembly.

Figure No. 23 shows the notched bearing for the lower end of the curtain wind gear shaft assembly. Unhook the spring from the drive pawls (for better access) and unscrew the bronze bushing. Lift out the shutter cocking drive gear assembly. Remove the cross-point screw in the idler gear (Figure No. 23). Carefully lift out the gear. It has 11 ball bearings on top and 11 ball bearings underneath! Open the back of the camera and turn the sprocket so that the two screws are visible in their cutouts in the sprocket. Take out the two screws and pull the rewind shaft out of the camera body.

Unscrew the top sprocket bearing (pivot for the curtain brake levers). Remove the sprocket from the camera body by tilting the top of the sprocket out first in order to clear the driver at the bottom. Hold the sprocket driver and unscrew the drive gear in the bottom of the camera body. Sprocket replacement requires major disassembly of the body. It wouldn't be so bad if you didn't disturb the shutter speed readout and the meter timing. The sprockets are metal, so hopefully we won't be replacing too many of them.

FIGURE 28 – WIND SHAFT AND TAKE-UP SPOOL COMPONENTS

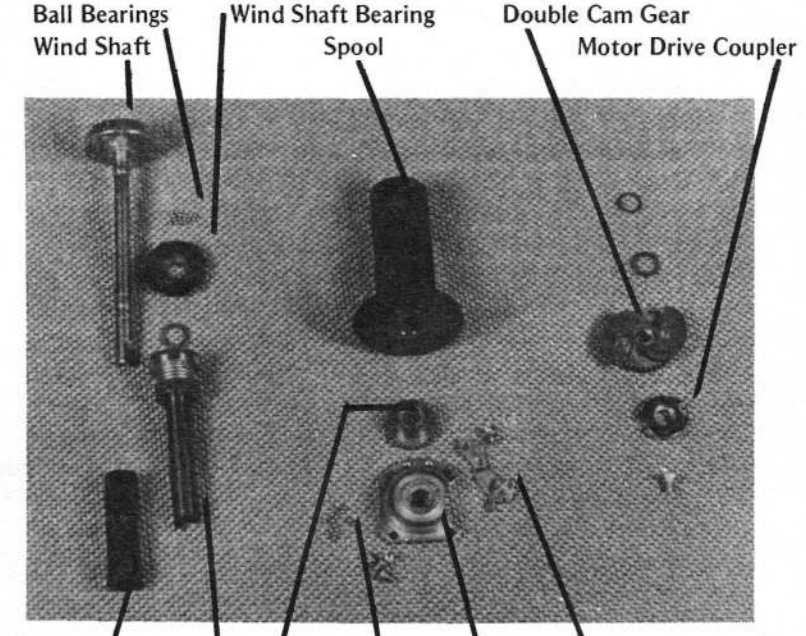


FIGURE 29 – SPROCKET COMPONENT PARTS

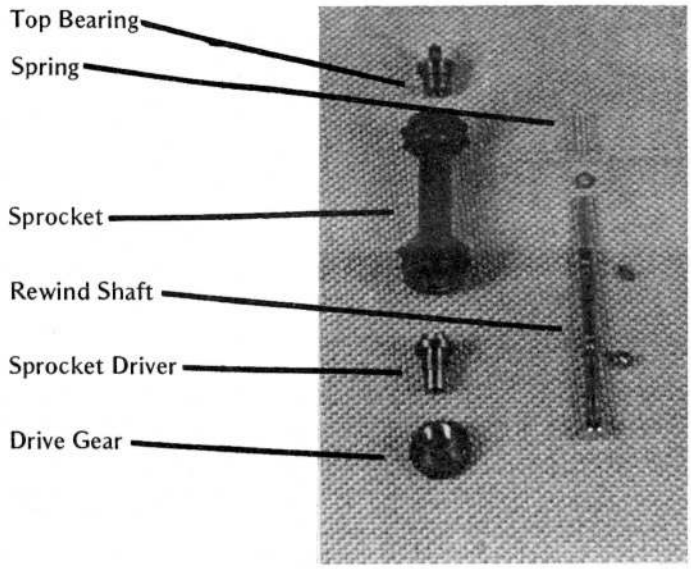


Figure No. 29 shows the sprocket components in their order of assembly.

For all practical purposes we have disassembled the Canon F-1 camera. A couple of bushings, the release shaft, rewind shaft housing, meter switch, battery holder and strap lugs are about all that remain on the main body casting. For those of you who like to count things, the Canon F-1 camera body and standard prism have about 860 parts plus washers which vary from one camera to another.

Begin reassembly of the Canon F-1 camera by installing the film drive sprocket. Install the sprocket driver and gear with a light coat of fine oil on all bearing surfaces. Slip the sprocket in place (with the spring and washer inside) and install the top sprocket bearing. Insert the rewind shaft and make sure that it slips through the washer and then through the spring inside of the sprocket. Install the two screws in the sprocket. Check the sprocket for smooth rotation and proper disengagement when the rewind shaft is pushed in.

Place a small drop of fine oil at the base of the mounting shaft for the transport idler gear. Replace the 11 ball bearings as shown in Figure No. 30. The oil will hold the balls in place during reassembly. Install the gear, the remaining 11 ball bearings, the retaining washer and screw. Install the shutter wind gear with its bronze bushing.

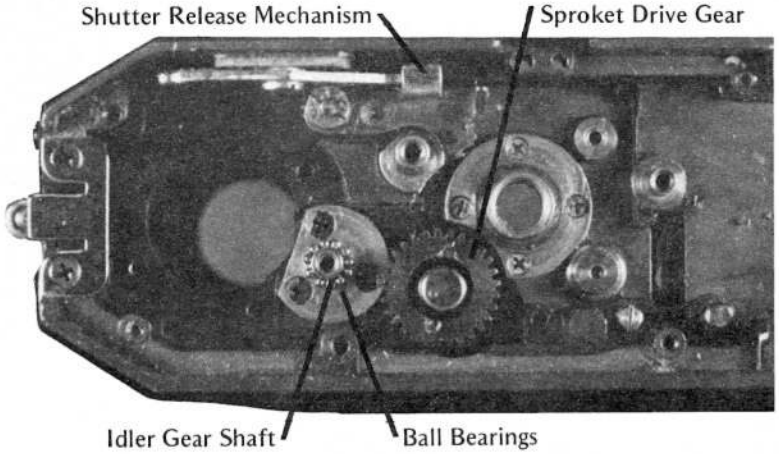
Examine the take-up spool and its drive mechanism. Note the clutch mechanism on the top end of the spool driver. The collar below the spring has a setscrew in it. The tension of the take-up spool can be increased by loosening the setscrew and adjusting the notched collar. Increasing the tension on the clutch spring will increase the spool take-up tension. Note that you must remove the spool in order to adjust the take-up tension. Place the spool into the camera body and then insert the spool liner and the spool clutch assembly from the top. Make sure that the clutch tabs fit into the spool cutouts so the clutch assembly seats properly. Install the upper wind shaft bearing.

Turn the camera over and install the clutch drive gear and bearing plate. Also install the idler gear ratchet plate. Engage the idler gear spring with the ratchet pawl.

This might be a good place to mention screw tightness. I think that working on SLR's requires a little more care than the repair of leaf type shutters. An SLR, due to its design, has a higher vibration rate than the usual rangefinder type camera. When putting a camera like this back together, always make sure that every screw in each assembly or part is properly tightened before going on to the next job. As with the wind shaft bearing plate, it is not always possible to come back later and tighten or check the screws. So make sure they are tight before going on.

Turn the wind shaft upside-down and place a drop of fine oil on the base of the shaft where it meets

FIGURE 30 – TRANSPORT IDLER GEAR INSTALLATION



the clutch housing. Install the 15 ball bearings. Invert the camera body and slip the wind shaft/clutch assembly up into the body. Watch so you don't dislodge any of the ball bearings. Position the clutch housing as shown in Figure No. 31. Hold the wind shaft into the camera body. Install the 15 ball bearings around the wind shaft on the lower bearing plate. Install the double cam gear and the motor drive coupler. Don't overlook any of the washers that you found in this area of the camera.

Check the position and timing of the wind shaft clutch (Figure No. 31) and the double cam gear assembly (Figure No. 32). Then check the position of the idler gear pawl, the shutter cocking gear cutout and the release shaft plate. It may be necessary to remove the shutter cocking gear and re-position it so that the timing is correct. The action of the spool and sprocket can be checked by operating the transport via the motor drive coupler. Rotate the mechanism one-half turn at a time and check the timing and operation of the various parts.

Install the opening curtain brake lever and pad. Slip the brake band between the brake lever pad and the adjusting screw. Secure the mounting bracket for the brake band with its two cross-point screws. Careful so you don't scratch the band or get oil on it. It must be smooth, clean and dry. Install the closing curtain brake band and clutch spring. Also install the X contact closing lever with its spring and mounting screws. Note that the opening curtain brake adjusting screw is accessible from the film compartment. The other end of the eccentric screw is accessible via a small hole just to the right at the top of the film drive sprocket (Figure No. 33). This allows for opening curtain brake adjustments without disassembly of the camera.

Figure No. 34 shows the shutter curtain wind gear mechanism plate with the curtains removed. The photo shows the setscrews in the closing curtain roller and the opening curtain tape rollers which can be removed in order to disassemble the mechanism. However, I don't recommend disassembly unless it has a particular malfunction which requires parts replacement. When replacing curtains, I carefully peel back the curtain until the end of the existing curtain is exposed. I scribe a timing mark on the roller where the end of the curtain is cemented to the roller. Then I remove the curtain from the roller and carefully compare it to the new curtain. If necessary, I trim the new curtain so that they are both exactly the same length. Then the new curtain is cemented to the roller according to the timing line. I use the same procedure for the tapes on the opening curtain rollers. If this is done carefully, the new curtains will be in exactly the same position as the old curtains and the gear timing on the shutter curtain wind gear mechanism plate will not need to be changed. Note that changing the gear timing would require removal of the ball bearings in the roller shafts as well as leaving the tapes and curtain loose enough so that you could get to the setscrews in the rollers.

The closing curtain is about ¼" longer than the opening curtain. The

FIGURE 31 – WIND SHAFT CLUTCH TIMING

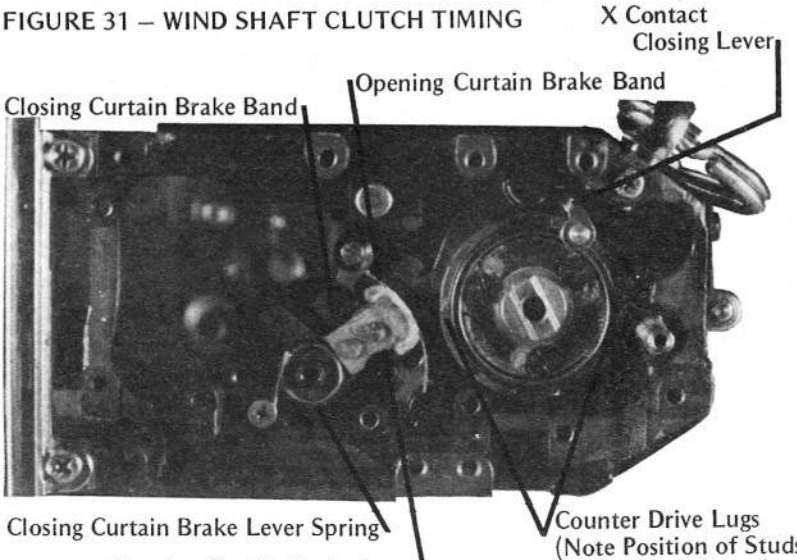


FIGURE 32 – DOUBLE CAM GEAR AND SHUTTER WIND GEAR TIMING

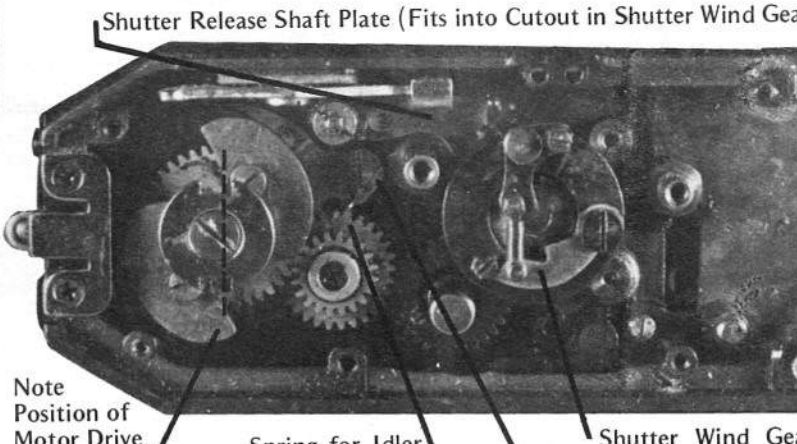
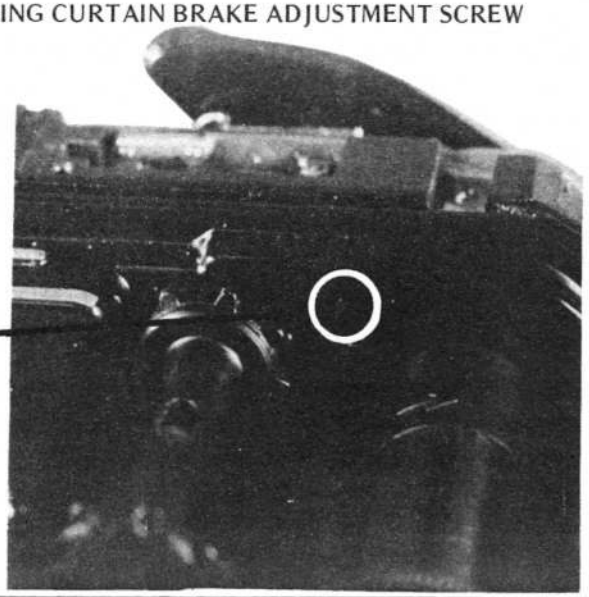


FIGURE 33 – OPENING CURTAIN BRAKE ADJUSTMENT SCREW



curtains are available by themselves at a cost of less than $4.00 a pair including postage. That's quite a saving over some manufacturers who force you to buy the tension setting rollers and curtains as an assembly at nearly three times the price.

Carefully flush clean the curtain wind gear mechanism plate assembly and blow it dry with compressed air. Apply a small touch of fine oil to each of the pivots as well as the ball bearings.

Lay out the new curtains and the old ones. Check to make sure the new curtains are correct. Trim the tapes (if necessary) so that they can be cemented in place according to the scribe marks.

Cement the closing curtain to the wind roller, making doubly sure that it is square with the roller. Carefully roll up the whole curtain and see how it winds. If it winds crooked, loosen the curtain and realign it before the cement has a chance to set. Cement the closing curtain tapes to their mounting rollers. About the only way you can check for squareness at this point is to make sure that both tapes are exactly the same length and that they are cemented to the rollers in exactly the same position. Careful work at this point can save you a lot of re-doing later.

Cement the opening curtain to the tension setting roller. Again, watch carefully so that the curtain is square with the roller and that it winds straight. My experience has been that if you pull a titanium curtain loose from its mounting place, it is never really the same again. Removing them seems to wrinkle the material and that makes alignment and re-cementing more difficult. Cement the closing curtain tapes to the tension setting roller being very careful to get them square. Oh, watch so you don't cement the tension rollers on upside-down!

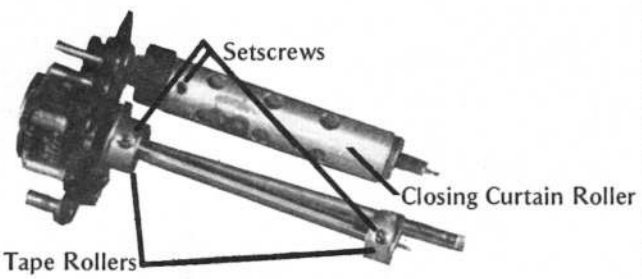
Your completed curtain assembly should look similar to Figure No. 26. Note that the opening curtain is in back of the closing curtain. Also, the smooth sides of the curtain bars are next to each other. The little tabs on the ends of the bars which are folded over the tapes are away from each other. Clean any cement from the curtains and tapes which might have accidentally gotten onto them.

Roll the opening curtain onto the tension setting roller and slip it through the body cut-out. Do the same with the closing curtain tapes. Then roll up the closing curtain and slip the curtain wind gear assembly into the camera body. Install the lower opening curtain tape roller and washers. Put just a touch of fine oil on all of the curtain pivots as you assemble the shutter mechanism. Work the opening curtain brake assembly back and forth as necessary to obtain proper clearance in order to seat the curtain wind gear mechanism plate. Be sure to install the closing curtain brake and spring as you seat the curtain wind gear mechanism plate. The lug on the brake lever must fit under the closing curtain gear. Loosely install the curtain wind gear mechanism plate retaining screws to hold it in place. Figure No. 35 shows the curtain wind gear assembly seated into the camera body.

Roll up the opening curtain, install the upper closing curtain tape roller and washer, and slip the opening curtain tension setting roller shaft into its upper mounting hole in the camera body. Do the same with the closing curtain tension setting roller. Install the washers on the bottom of the curtain tension setting rollers. Slip the tension setting roller mechanism plate in place and secure it with a screw or two. Install the tension setting shaft gears and worm gears. For the moment we are going to ignore the timing of the mirror trip gear.

Put about one-half turn of tension on the closing curtain and about one-and-one-half to two turns of tension on the opening curtain. Carefully wind the curtains, using your finger on

FIGURE 34 – CURTAIN WIND GEAR MECHANISM PLATE



the top curtain wind gear. Allow the curtains to wind and unwind several times so the tapes wind smoothly on the rollers. Watch for squareness of the curtains. The curtains should overlap each other by exactly three-fourths of the width of the curtain bars. If not, loosen the tapes on the wind side of the opening curtain and re-cement them in the correct position. Tighten the screws in the curtain tension setting mechanism plate and the curtain wind gear mechanism plate. Check each of the tension shafts and curtain wind shafts for slight up and down play. If none exists, double check your washer placement. If the play is more than 0.5mm check for omitted washers.

Install the drive cam on the bottom of the curtain wind gear shaft. Hook the spring between the two pawls and cock the shutter via the motor drive coupler. Double check the curtain overlap as you do this. Release the curtains via the pawl and cam on the curtain wind gear shaft. If any part of the camera fails to function properly, correct it now before going on.

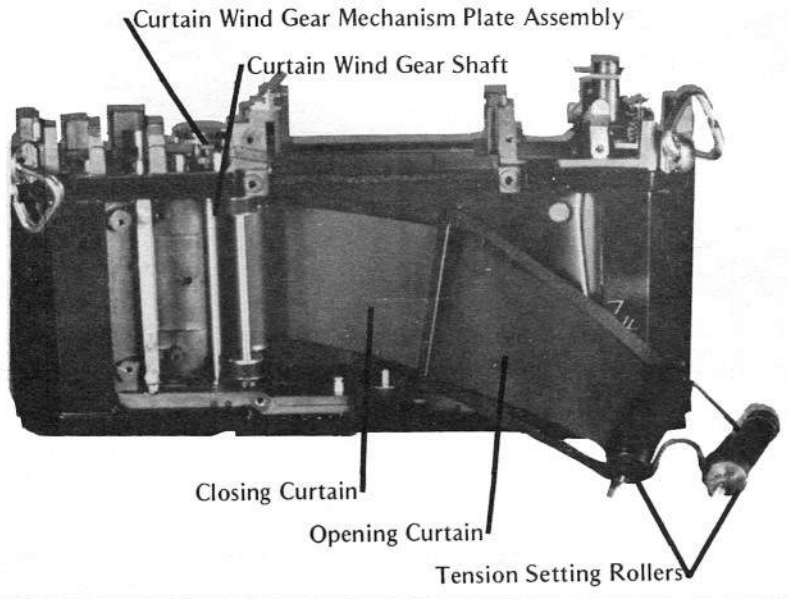
Install the pallet release lever, the opening curtain latch, and the closing curtain latch assembly. Make sure that both curtain latch assemblies move freely under their spring tension without any binding or hesitation. Cock the shutter via the motor drive coupler. Push the shutter release and hold the closing curtain latch against the closing curtain gear. Trip the pawl on the shutter wind gear and then trip the opening curtain. Watch the action of the opening curtain as it crosses the film format area. Check the point at which it stops. You may need to help the curtain the last little way since we haven't set the curtain travel time. Correct curtain tension would overcome the action of the opening curtain brake and allow the curtain to stop very near the correct point. The curtain should stop on the timing line we scribed on the camera body during disassembly. Also check the position of the closing curtain which is being held open. It, too, should be positioned according to the scribe line we made during disassembly.

Install the counter drive mechanism, the pawl and back door sensing lever. As you install the slow speed gear train, note that the pallet release lever disengages the pallet as the closing curtain comes to a stop and moves the closing curtain brake lever toward the rear of the camera body. The retard should be installed with the pallet disengaged (unless the shutter is cocked). It's also interesting to note that the retard is positioned by two countersunk screws which prevents any movement or adjustment of the retard itself. Figure No. 37 shows the parts which we have assembled so far.

Install the speed control mechanism plate. It, too, has two countersunk screws which prevents any movement of the mechanism plate. Be sure to pull the retard lever to the rear of the camera body and the closing curtain latch assembly forward while seating the speed control mechanism plate.

Install the counter mechanism plate aligning the keyway in the wind shaft with the clutch mechanism. Also make sure that the X sync shorting lever is on the speed dial side of the contact on the bottom of the counter mechanism plate. You'll have an easier time installing the counter mechanism plate if the speed control mechanism plate is set to the Bulb position and the shutter is cocked. Make sure that the X contact on the counter mechanism plate is between the contact closing lever and the camera body. If you mount it on the other side, the contact will remain closed and you won't have any X sync. The sync circuit in this camera is very simple. The FP sync contact is closed when the mirror reaches the up position. If the speed dial is set from 1/125 second to 1/2000 second, the camera will deliver FP sync because the cam on the speed control mechanism plate has grounded the X sync contact via the X sync shorting lever. If the speed dial is set from 1 second to 1/60 second, the X sync shorting switch (Figure No. 40) on the speed control mechanism plate is open. The mirror comes up, closing the FP contact but the circuit is not complete until the opening curtain completes its travel and closes the X contact via the contact closing lever. The X sync closing lever is activated by the opening curtain brake.

FIGURE 35 – CURTAIN WIND GEAR MECHANISM PLATE INSTALLATION



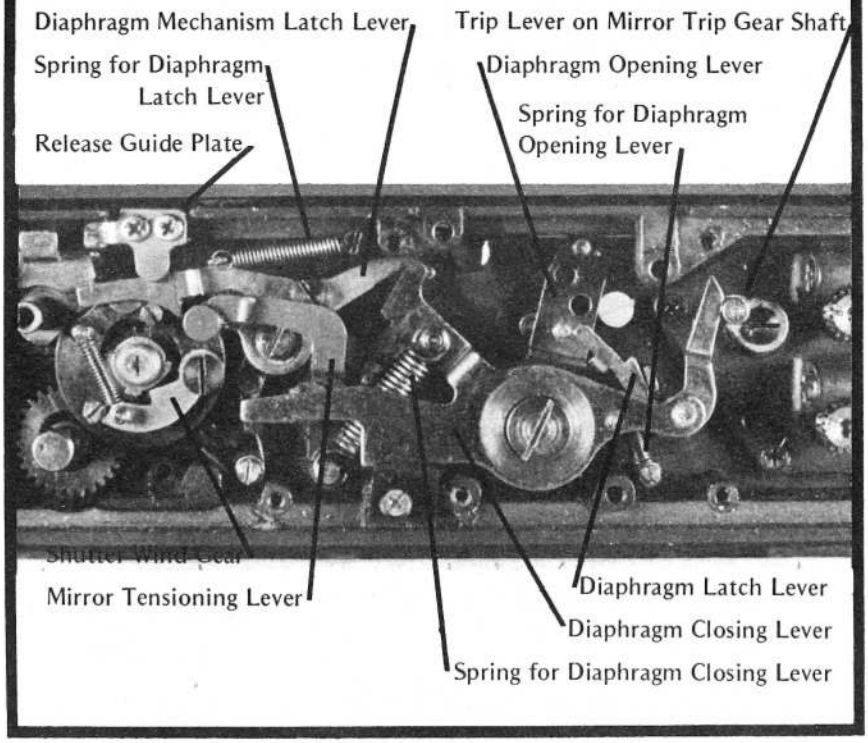
Now let's return to the bottom of the camera body and install the diaphragm and mirror control mechanisms. Install the mirror tensioning lever latch and spring. Then the diaphragm mechanism latch lever and spring. Also replace the release guide plate and spacers for the diaphragm latch lever. Install the mirror tensioning lever. Replace the diaphragm control lever assembly and connect its two tension-type springs. Also hook the spring and position the diaphragm latch lever which is activated by the mirror trip gear lever. If you haven't already done so, check the timing of the mirror trip gear (which engages the closing curtain tension roller). The pin on the gear should be to the front of the camera body (Figure No. 21) and the lever in the bottom of the camera should point toward 10 o'clock as shown in Figure No. 36.

Figure No. 36 shows the diaphragm and mirror control mechanisms in the released positions. Double check your timing and spring positions. Install the diaphragm and mirror cocking lever. Carefully cock the shutter via the wind lever and watch the action of the levers in the bottom of the camera. If everything has been timed correctly, the diaphragm mechanism should tension and latch in place. The mirror mechanism should also be properly tensioned and latched. Push the shutter release and the diaphragm closing lever should move across the camera body, allowing the diaphragm to stop down. At the same time the mirror tensioning lever latch should be released. Also, the curtain wind gear shaft cam should be free from the shutter wind gear. Reach into the top of the camera body and trip the opening curtain latch which will allow the opening curtain to cross the film format area. Remove your finger from the shutter release and the closing curtain should travel across the film format (if the speed control was set to the Bulb position), tripping the diaphragm control mechanism allowing the diaphragm to open. Before going any further, coat each of the contact points in the bottom of the camera with a light coat of Moly Lube grease. This is very important in order for the camera to release smoothly and for the shutter / mirror / diaphragm mechanisms to cock without a rough feeling.

Install the sprocket latch lever and the sprocket latch lever release lever. Check Figure No. 8 if you have any question as to their position. Install the light baffle at the rear of the mirror cage area. Replace the mirror trip lever and its spring. Install the delayed action mechanism. It's interesting to note that I had the delayed action gear train laid out on a paper towel on my desk for several days while I wrote and photographed this article. When I went to install the gear train I noticed that the paper towel had soaked up about a 2" circle of oil from the gear train. This camera had not been serviced before and it was almost new. So it looks like it was assembled with a generous amount of oil in the gear train.

Check the curtains, both front and rear, for any fingerprints or oil stains. Make sure they are clean before going any further. Slip the coupling pinion for the delayed action into the front plate with a little grease to hold it there. Slip the meter program link into the camera body cut-outs at the rear of the mirror cage area. Feed the white sync wire through the cut-out with the red battery wire and install the mirror cage/front plate assembly. There are several things to keep in mind when seating the mirror cage. The shutter mechanism and the mirror mechanism should both be in the released position. The mirror control lever which trips the opening curtain latch goes behind the opening curtain latch. So pull the opening curtain latch forward as you seat the mirror cage. Watch so you don't pinch the white sync wire. Rotate the delayed action coupler pinion to engage the delayed action gear train. Hold the mirror cage in position and carefully cock the shutter. Don't force the wind! If it jams, pull the mirror cage and take another look at things.

FIGURE 36 – DIAPHRAGM AND MIRROR CONTROL MECHANISMS



If it winds OK, trip the shutter and install the mounting screws. Also, install the diaphragm striker lever.

We've now assembled the camera to a point at which it can be operated in the normal manner. By that, I mean you don't have to reach in here or there and trip part of the mechanism with a pair of tweezers. Assembling a camera this far without setting the shutter speeds may be a little strange for some of you. All of the shutter speed adjustments on a Canon F-1 are accessible with the mirror cage installed. It is also a little difficult to trip the opening curtain latch with a pair of tweezers.

So it's almost a must to install the mirror cage so the shutter can be released in the normal manner. Besides, you are setting a 1/2000 second and I think everything should be as close to normal as possible.

Step number one in shutter speed adjustment is to set the curtain travel time. The curtain travel time is 12.5 to 13.5 milliseconds for the full film format area. Set the travel time of the opening curtain and match the closing curtain to it. Note that the electrical contact for the motor drive must be removed from the camera body in order to gain access to the tension setting worm gears. After the tension has been set, be sure to tighten the lock screws in the tension setting worm gears.

Next, check the 1/125 second. It can be adjusted via the eccentric nut on the opening curtain latch. See Figure No. 37. Check the 1/1000 second. With proper curtain tension and lubrication it should be within tolerance. If not, loosen the screws in the cam (Figure No. 37) and adjust the position of the cam. Moving the cam clockwise slows the high speed. Moving the cam counter-clockwise will shorten the high speed. Recheck the 1/125 second. In some cases it may be necessary to work back and forth between the 1/1000 second and the 1/125 second adjustments in order to get both within tolerance. Figure No. 38 shows the underside of the shutter speed control mechanism plate. The 1/2000 second can be adjusted via the slot in the speed cam. The 1/2000 second can be slowed by reducing the width of the slot and increased by widening the slot.

Check the 1/8 second. If it is not within tolerance, loosen the two screws in Figure No. 37 and adjust the 1/8 second adjusting screw. After adjustment, tighten the two lock screws. The two screws are accessible through the access hole in the shutter speed control mechanism plate. Finally, check the 1 second. It can be adjusted via the pallet adjustment shown in Figure No. 37. Don't be concerned about losing your speed adjustments by removing the speed control mechanism plate. I set up all of the speeds and then removed the speed control mechanism plate to take another picture. I reassembled the mechanism plate and the speeds didn't change at all.

The next step is to install the right front leatherette and the delayed action setting lever mechanism. Cock the shutter and carefully cock the delayed action. Careful so you don't over cock it. Install the delay limiting cam and release the shutter. After the delay runs down and trips the shutter you can install the balance of the control mechanism. Here again, washers play an important role in the operation of the camera. Check the operation of the delayed action, the mirror lock up and the diaphragm control mechanism. Re-cement the left front leatherette.

Solder the white sync wire to the X sync contact. Using a pair of alligator clips, connect the white sync wire on the left to your test equipment and check the sync circuit. The camera automatically delivers FP sync from 1/2000 second to 1/125 second and X sync from 1/60 second through the Bulb setting. Remove the speed dial (set at ASA 25 and 1/2000 second) and the wind lever from the camera body.

Temporarily install the left prism guide rail. Mount a standard f/1.4, 50mm FD lens to the camera body. Install the prism. Operate the diaphragm control ring and watch the diaphragm readout lever move on the left top of the mirror cage. Slip the circular diaphragm indicator onto the follower lever. Adjust the position of the pointer so that when the diaphragm control ring is set to f/16 the circular pointer visible in the viewfinder is the width of the circle

FIGURE 37 – SHUTTER SPEED ADJUSTMENTS

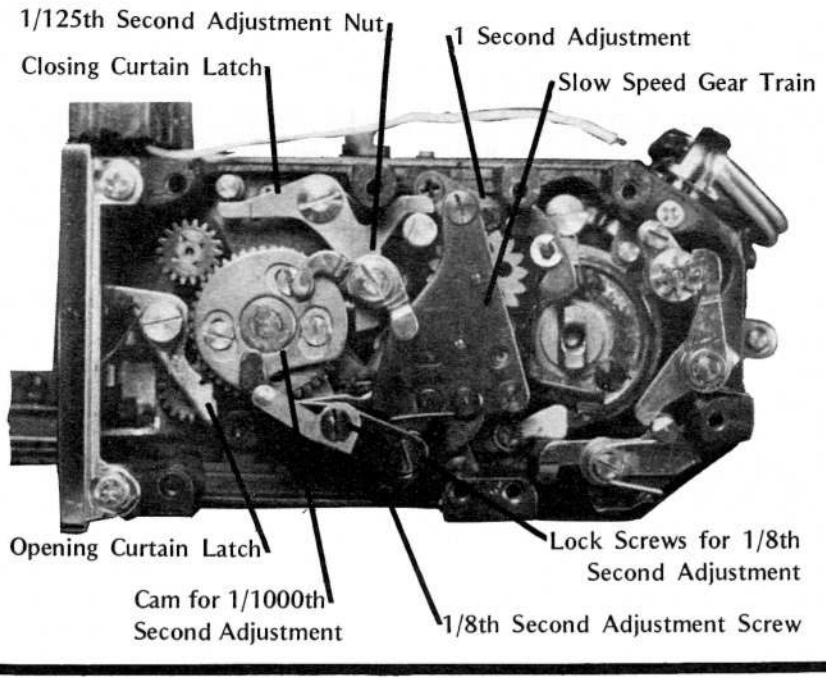
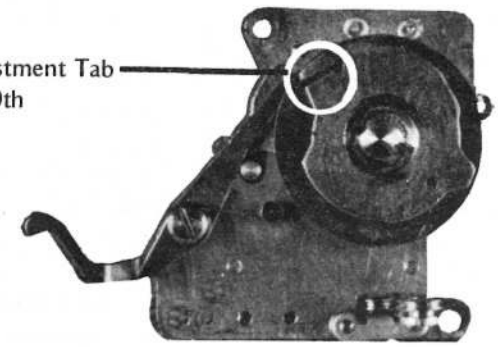


FIGURE 38 – 1/2000th SECOND SHUTTER SPEED ADJUSTMENT



indicator into the red area at the top of the viewfinder readout area. See Figure No. 39. At f/1.4 the pointer should be an equal distance into the red area at the bottom of the viewfinder readout area. Put a drop of rubber base cement on the base of the pointer when the adjustment is correct. Note that the readout pointer must disappear from the field of view when the diaphragm is stopped via the delay setting lever.

Remove the lens, prism and the left prism guide rail. Route the flash sync wire under the back door latch. Install the photocell mounting bracket at the rear of the prism opening. Watch so that you don't pinch one of the wires. Route the wires toward the front of the camera body across the area where the meter mechanism plate will be positioned. Make sure that the speed dial/meter link is free. Slip the meter movement mechanism plate into the camera body and secure it with its three mounting screws. Connect the speed dial/meter link and the tension spring between the meter arm and the camera body. Solder the white sync wire to the PC nipple contact and mount the terminal with its two screws. Install the meter switch contact plate and solder the red CdS wire to the top terminal. Install the rewind shaft lock lever and its spring. Mount the battery test variable resistor. Solder the green CdS wire to the single resistor and the black CdS wire to the junction point between the two resistors. Slip the spaghetti over the resistors and tuck them in below the battery test resistor. Also install the information prism, making sure that it is parallel with the main prism housing. Replace the left prism guide rail.

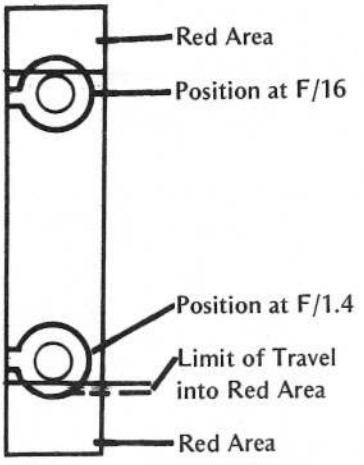
Remove the two screws from the CdS cell bracket and slip it forward in the prism area. Feed the shutter speed readout string through the openings at the rear of the prism area and up onto the shutter speed control mechanism plate. Replace the CdS cell bracket, being careful not to pinch the string. Install the speed dial cam follower for the speed dial/meter link. Also install the screw which connects the link with the cam follower. We'll adjust its position later.

Set the shutter speed control to about 1/60 second. Install the adjusting bracket for the viewfinder/shutter speed readout. Carefully add about two turns of tension to the shutter speed indicator wheel. Make sure that the string comes off of the bottom of the indicator wheel and around the pulley at the rear of the prism. Thread the string around the three pulleys (Figure No. 40) on the shutter speed control mechanism plate. Just watch out so you don't let go of the string! Wind the string halfway around the shutter speed knob shaft and slip the knot into the cut-out. Cement the knot in place, being careful not to use too much cement so the string sticks to the shaft surface.

Slip the prism in place and see what speed is indicated. Install the speed dial and run through the complete range of speeds, checking the viewfinder readout. Slide the string adjustment bracket back and forth until you can see each shutter speed number or letter completely in the viewfinder window. Tighten the bracket.

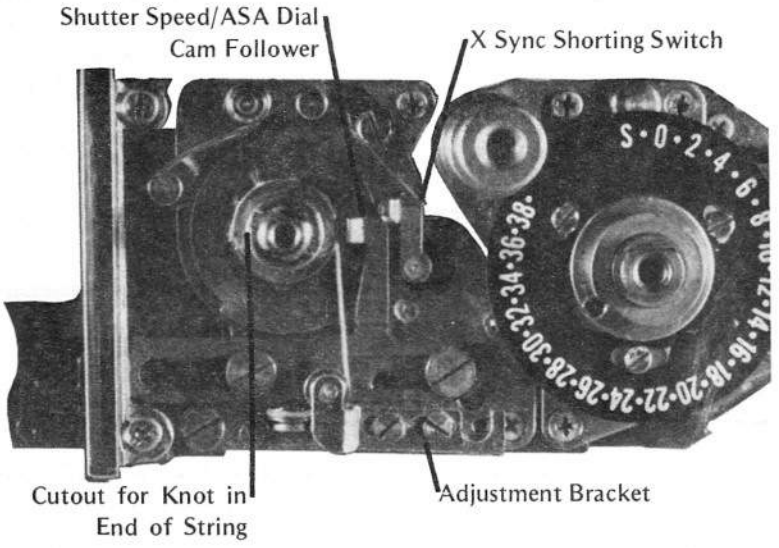
Reset the speed control mechanism to ASA 25 and 1/2000 second. Remove the speed dial and install the meter/speed dial cam. At this setting the follower is at the lowest point on the cam surface. Re-install the shutter speed dial and reset it to ASA 100 and 1/125 second. Check the scribe line on the top of the light meter housing. It should be parallel with the top mounting bracket. If not, adjust the screw in the link between the meter and the speed dial follower. Here's a little trick you can use to set the timing. Simply reset the ASA to 25 and the shutter speed to 1/30 second and you can reach the screw to make the adjustment. The meter is also parallel at this setting. Recheck your adjustment at ASA 100 and 1/125 second just to be sure.

FIGURE 39 – POSITION OF DIAPHRAGM INDICATOR IN VIEWFINDER



The next check point is the red warning flag which blocks out the information prism at 1/2 second at ASA 100. At 1/4 second it does not cover the information prism. Loosen the mounting screws in the flag bracket and shift the flag to correct the masking timing.

FIGURE 40 – VIEWFINDER SHUTTER SPEED READOUT STRING



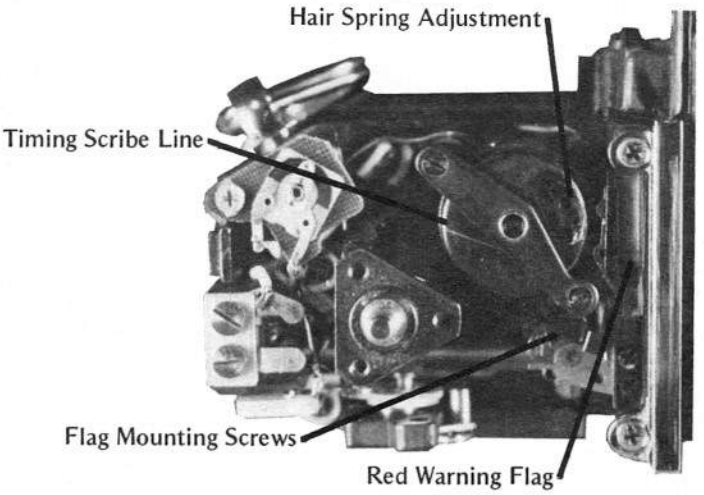
OK, we have the diaphragm readout aligned, the meter timed, the shutter speed readout correctly positioned, and the information prism flag set; now let's try to calibrate the light meter. Those of you who read my article on the Mamiya Sekor 500 TL camera (November/December 1973 **SPT Journal**) know that I feel that replacement components are necessary when an exposure meter is more than one f-stop out of calibration. That is very true with the Canon F-1 since there is really no way to adjust the exposure meter except to substitute fixed resistors in the circuit! The Canon service manual gives no real information on calibration except to say that all meter system components are matched and must be replaced as a unit. I've made some minor adjustments in Canon F-1 meters by adjusting the hair-spring position in the meter movement. The forked lever to which the upper hair-spring is attached is accessible via the half-moon cut-out in the top of the meter housing. Simply move the lever until correct calibration is obtained. But watch so you don't go too far, resulting in the meter failing to zero correctly or moving to the top of the scale in bright light situations. Always check the meter at as many light levels as you can after adjustment so that you can verify that the range of the meter has not been disturbed. If you have to go more than one f-stop, replace the meter assembly. Remember that the meter automatically sets itself to any one of the Canon FD lenses. So if the operation of the meter is marginal with one particular lens, it could just as easily be further off with another lens. And this could spell trouble for you if the customer has several lenses.

After adjusting the hair-spring you must check the battery test readout. Set the shutter speed dial to ASA 100 and 1/2000 second. Turn the switch to the test position. With 1.3 volts in the circuit, the meter should point to the center of the blue square in the viewfinder. If not, set the battery test variable resistor. Be sure to recheck the meter calibration after setting the battery test.

Install the tripod socket plate on the bottom of the camera. Cock the shutter and install the motor drive electrical switch assembly. Note that the switch is closed except when the camera is in operation during an exposure., Position the brass bottom plate spacers and carefully install the bottom plates. If one of the spacers falls into the camera body it will certainly jam the camera when your customer uses it – if not before. Install the bottom plate and the battery cap.

Check out the operation of the entire camera. Check all of the shutter speeds, sync, transport, rewind, meter, flag operation, viewfinder readout, etc. Make sure that everything is operating properly. Be sure to check for curtain bounce. Figure. No. 33 shows the

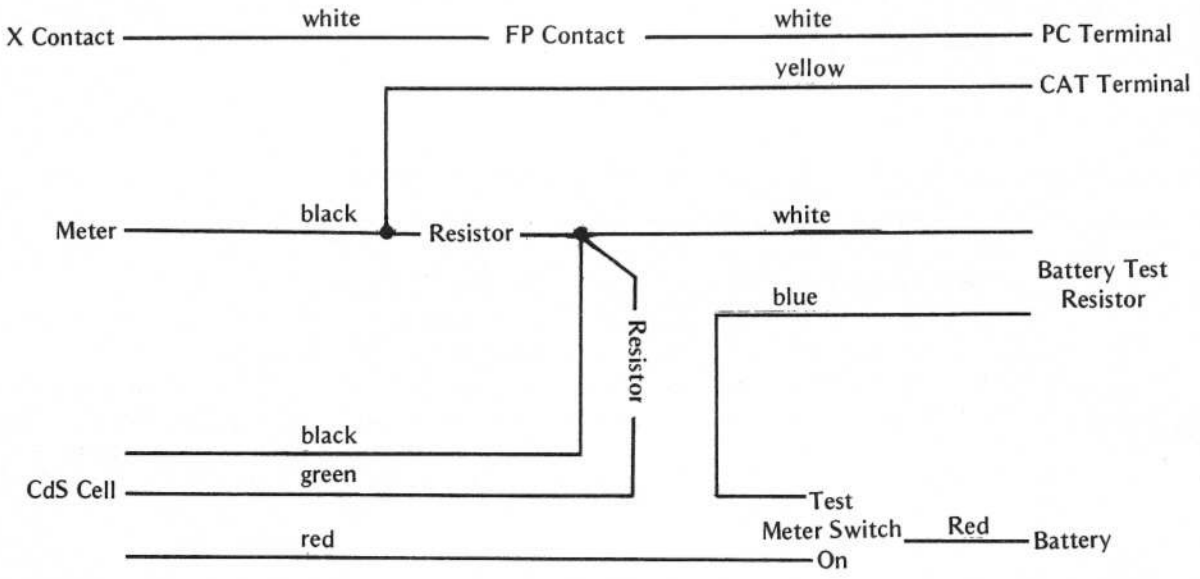
FIGURE 41 – WARNING FLAG AND METER POSITION



screw adjustment for the opening curtain brake. The service manual which I have shows two adjustment screws – one for the opening curtain brake and one for the closing curtain brake. However, none of the Canon F-1's which I have seen have the adjustment screw for the closing curtain. They all have only the opening curtain adjustment shown in Figure No. 33. Clean the information prism and warning flag. Install the right top cover, three setscrews. Then install the wind lever and the speed dial. Cement the screw cover to the top of the speed dial retaining screw. Clean any fingerprints and dust from the camera body and lens and you're all set to give the camera back to your customer.

In conclusion, I would like to make a few comments in regard to the Canon F-1 camera. I find the Canon F-1 to be an easy camera to service. There are a couple of things a camera in which you can set the shutter up right, from the highest speed right down to 1 second! That's the kind of camera I like to work on. But I am totally dumbfounded by the fact that there is little or no adjustment in the light meter circuit. All you can do is adjust the meter mechanically and then let the components take it from there. The Canon manual says that you can adjust the meter via the link screw

FIGURE 42 – CAMERA BODY WIRING SCHEMATIC



accessory shoe, and rewind knob. Don't forget the shim washers under the accessory shoe.

Set the shutter speed dial to ASA 25 and 1/2000 second and remove it. Also take off the wind lever and related parts. Install the release plunger lock lever spring which we removed at the beginning of our disassembly. Install the right top cover, being careful not to pinch the white sync wire. Install the A-L ring for the shutter release button. Watch for the very thin washer that fits up inside of the A-L ring. I usually place a small amount of grease inside of the A-L ring and then fit the washer into the ring. The grease holds the washer in place. Slip the A-L ring over the release button and position it so that you have click stop action at both the A and L positions. Tighten the – such as the diaphragm readout indicator in the viewfinder, and the riveted curtain wind gear assembly – which make some repairs take longer than necessary. Even though the camera contains some 73 ball bearings, it still isn't a camera to be afraid of. Once you know where the ball bearings are, you can watch for them and then they are just a part of the repair.

The opening curtain brake is adjustable without disassembly of the camera. The tension on the take-up clutch is adjustable instead of the haphazard addition or removal of washers to set tension, as some cameras have. The camera has 7 – count 'em – 7 shutter speed adjustments! That, of course, includes the two tension setting adjustments for the curtains. That makes the Canon F-1 shown in Figure No. 19. But this has little or no effect on the accuracy of the meter. My experience has shown that you can make minor adjustments via the meter hair-spring. But why didn't they put a variable resistor in the meter circuit like they used to in the battery test circuit? The older Canon SLR's had adjustable meters. The meter and photocell are very accessible and easy to get to.

All in all I think the Canon F-1 is a fine, attractive camera. It's heavier and larger than I like for my personal use, but it is a very repairable camera. Parts are readily available. It has good modular construction which allows for removal of sections of the camera at a time, exposing various areas for service. And from a technician's point of view, what more can we ask for?