

# TRAFFIC REGISTER CAMERAS

## KS-14776 L1 and L2

### REQUIREMENTS AND ADJUSTING PROCEDURES

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. REQUIREMENTS . . . . .	2
3. ADJUSTING PROCEDURES . . . . .	10
4. SUPPLEMENTARY INFORMATION . . . . .	18
4.01 Camera Circuit . . . . .	18
4.02 Identification and Correction of Troubles . . . . .	19
Table A—Troubles, Probable Causes, and Recommended Procedures for Correction . . . . .	21
Table B—Pictorial Trouble Guide . . . . .	26

#### 1. GENERAL

1.01 This section covers the KS-14776 L1 and L2 traffic register cameras, Fig. 6, both of which include the KS-16007 camera. This section also covers the new KS-19438 L3 electronic shutter, Fig. 11. The KS-14776 L1 camera is arranged for mounting on 19-inch mounting plates and the L2 camera on 23-inch mounting plates. Otherwise, the L1 and L2 cameras are the same.

1.02 This section is reissued to:

- Include the KS-19438 L3 electronic shutter
- Add new Fig. 3 and 11
- Add information on the new North American Philips motor
- Make minor changes as required.

1.03 Reference shall be made to Section 020-010-711 covering general requirements and definitions for additional information necessary for proper application of the requirements listed herein.

1.04 **Asterisk (\*):** Requirements are marked with an asterisk when to check for them would necessitate dismantling or dismounting of the apparatus or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons or its performance indicates such a check is advisable.

1.05 **One drop of KS-7470 oil** for the purpose of this section is the amount of oil discharged from the nozzle of the 486A oilcan when the sides of the can are depressed once and held depressed until the drop is released from the nozzle.

1.06 **KS-16338 Test Set:** The KS-16338 test set provides a means of operating the film advance mechanism and the shutter of the KS-16007 camera independently of the rest of the KS-14776 camera to facilitate checking the adjustments.

1.07 **Safety Precautions:** The following safety precautions should be observed. Reference should also be made to Section 010-111-010.

- (a) **KS-14776 Camera:** The camera should be equipped with a 4-conductor KS-16941 L1 cord connected as shown in Fig. 9 and 12. This provides a safety ground whenever the cord is plugged in, whether or not the camera hood is attached to the frame. Before doing any work on the KS-14776 camera which requires that the camera be connected to power, check the safety ground by connecting an ohmmeter between the frame and bare metal on the camera hood. This check should be made with the hood removed from the frame, with the power cord plugged in, but with the power switch turned off.

(b) **KS-16338 Test Set:** The KS-16338 test set is provided with a 3-conductor power cord which should be connected as shown in Fig. 1 to provide a safety ground. The test set should bear a KS-19764 L1 label, and the cautions on the label should be observed. The toggle switch on the test set should be designated FILM ADV MOTOR ON OFF; if it is not, check that the ground lead on the power cord is connected as shown in Fig. 1. When this is done, add KS-19764 L2 label. Before doing any work on the KS-16007 camera which requires the use of the KS-16338 test set, check the safety ground by connecting an ohmmeter between bare metal on the camera and on the test set with the camera connected to the test set as covered in 3.003.

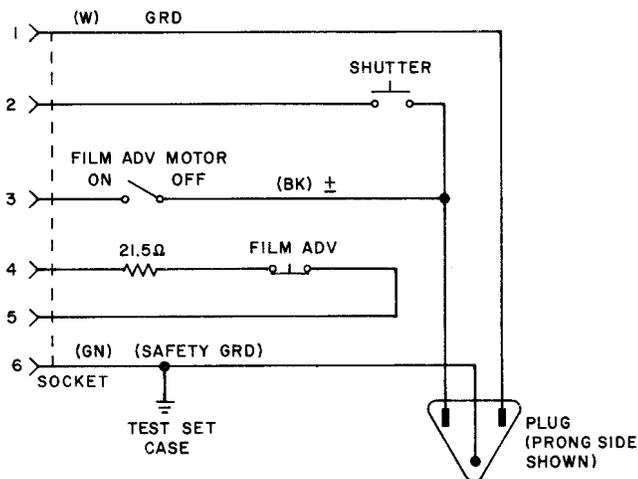


Fig. 1—KS-16338 Test Set Circuit Schematic

**1.08** In order to check requirements 2.05, 2.09, and 2.14, it is necessary to operate the camera by means of the START switch. To do this, proceed as follows. With power on the camera, depress the start switch button, hold it operated until the lamps in the hood light, and then release it. This will cause the camera to operate through one complete exposure cycle taking 5 seconds. If the START switch is released before the lamps light, it will be necessary to reoperate the switch to cause the starting switch on the KS-19408 timer to complete its operation.

**1.09** A 1-1/4 ampere Fustat is provided inside the hood near the top center to prevent

critical temperatures from developing within the camera hood. The Fustat will blow if the camera is operated through more than about eight consecutive cycles. If the Fustat blows, replace it.

**1.10** In order to check requirements 2.05 and 2.14, it is necessary to use a roll of KS-19555 film. Since part of the film in the cassette will be exposed to light, it is desirable to retain it for camera checking purposes and to mark the cassette so it can be identified as being for this use only. The exposed portion of the film may become brittle. If this occurs, cut off this portion. Then pull approximately 4 inches of film from the cassette. Trim this portion to provide a film leader as shown in Fig. 4.

**1.11 KS-19408 Timer:** The timer initially furnished on the KS-14776 camera has been superseded by the KS-19408 L1 timer. On the timer initially furnished, it was possible for the switch actuators to ride over on adjacent cams causing various troubles which are indicated in Part 4 of the section. The KS-19408 L1 timer has separators between the cams which prevented this kind of trouble. The KS-19408 L2 timer now supersedes both the original and the KS-19408 L1 timers. The new timer has been designed for long trouble-free service and should not be repaired or adjusted but replaced when necessary. Replace all defective timers with the KS-19408 L2 timer.

**1.12** Part 4 of this section, titled SUPPLEMENTARY INFORMATION, covers information relative to the camera circuit and analysis of possible operating troubles.

## 2. REQUIREMENTS

### 2.01 Cleaning

- (a) The contacts of the power relay shall be cleaned when necessary in accordance with Section 069-306-801.
- (b) Other parts of the camera shall be cleaned in accordance with approved procedures. (See *Note*.)

**Note:** Recommended cleaning intervals for specific parts of the camera are covered in the procedures for cleaning those parts.

**2.02 Lubrication:** The following parts shall be lubricated as specified below.

- (a) **Motor:** Fig. 2, (A)—The film advance motor of the KS-16007 camera shall be lubricated annually with one drop of KS-7470 oil in each of the three oil holes. The North American Philips motor does not require lubrication. Figure 3 shows the two motors used on the KS-16007 camera.
- (b) **Film Rewind Knob Bearing:** Fig. 2, (B)—The bearing of the film rewind knob shall be lubricated annually with one drop of KS-7470 oil at each end of the bearing.
- (c) **Sprocket Bearings:** Fig. 2, (C)—The sprocket bearings shall be lubricated annually with one drop of KS-7470 oil at each bearing.
- (d) **Take-Up Spool Bearings:** Fig. 2, (D)—The take-up spool bearings shall be lubricated annually with one drop of KS-7470 oil at each bearing.
- (e) **Idler Gear Bearing:** Fig. 2, (E)—The idler gear bearing shall be lubricated annually with one drop of KS-7470 oil.

(f) **Film Identifier (Clock) Initially Furnished:**

Fig. 4, (A)—The bearing at the dial end of the shaft shall be lubricated annually with one drop of KS-7470 oil.

(g) **KS-19177 L1 Clock Subsequently Furnished:**

Fig. 5—The KS-19177 L1 clock shall be lubricated annually with one drop of KS-7470 oil at each of the following points.

- (1) Fig. 5, (A)—Between main shaft and bearing.
- (2) Fig. 5, (B)—Between small dial and bearing.
- (3) Fig. 5, (C)—Between outboard gear and its shaft.

**2.03 Position of Lock Spring:** Fig. 6, (A)—With the cover closed, the hole in the lock spring shall engage the locking pin and hold the cover so that there is perceptible play between the cover and case at the end opposite the hinge.

Gauge by eye and feel.

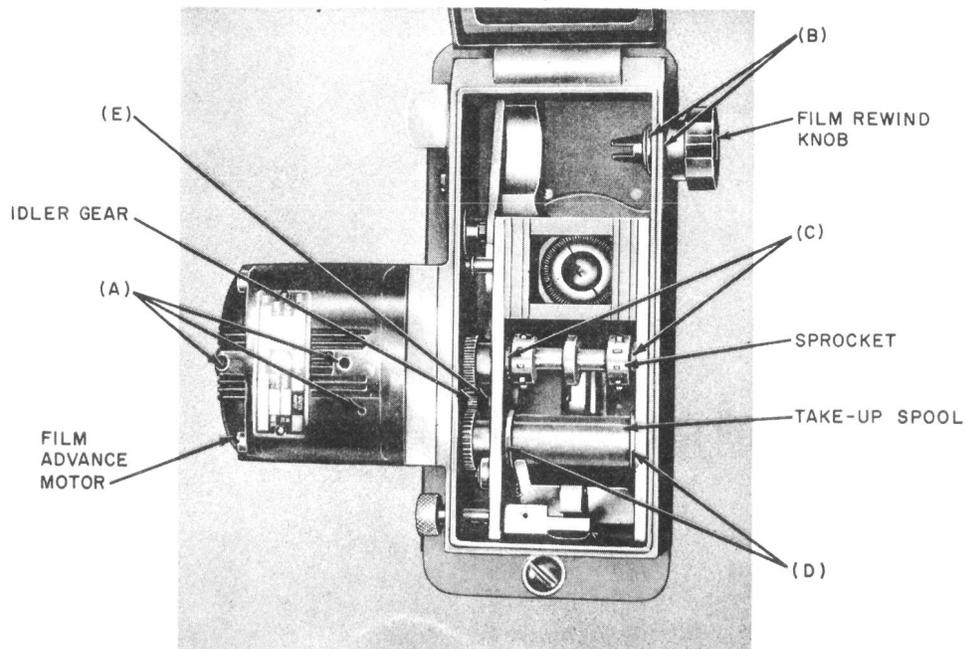


Fig. 2—KS-16007 Camera—Lubrication Points

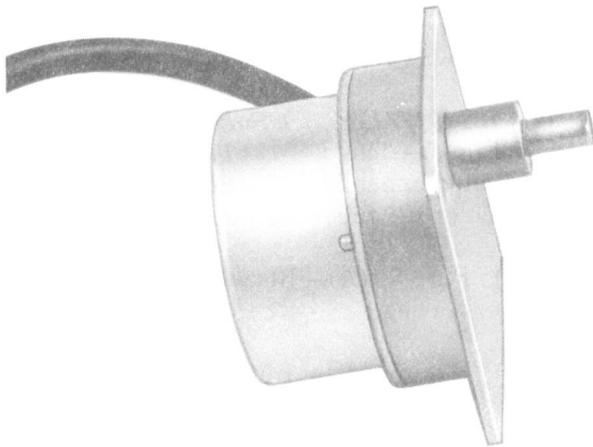


Fig. 3A—North American Philips No. 81412

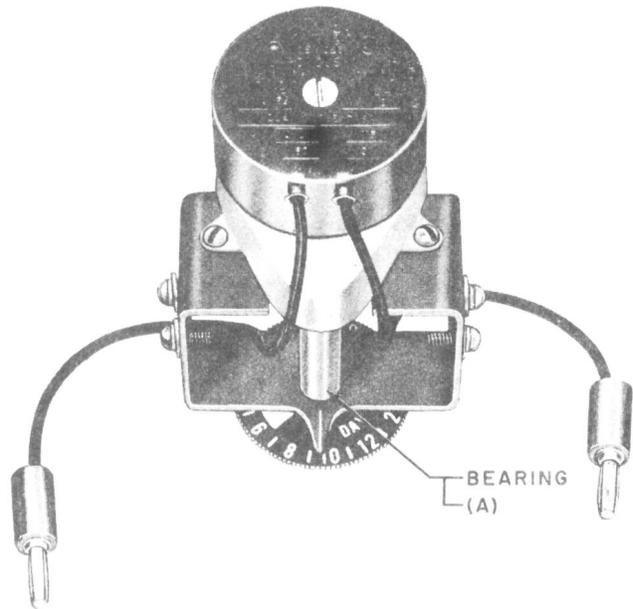


Fig. 4—Film Identifier Initially Furnished

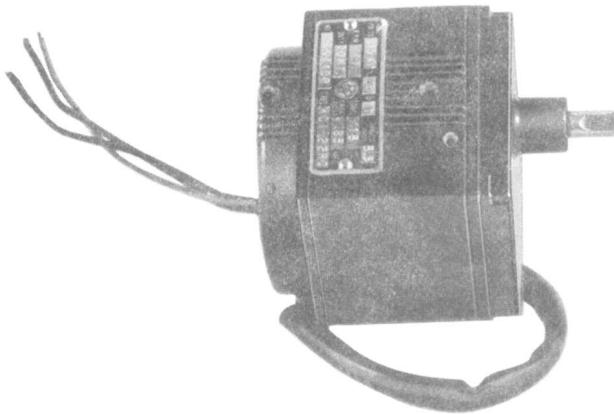


Fig. 3B—Bodine No. B-862EX-72C Type KC22C3

Fig. 3—Two Types of Camera Motors

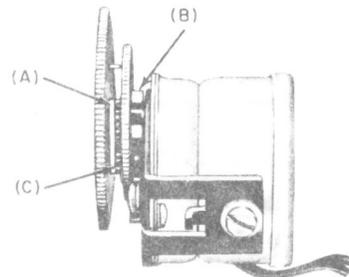


Fig. 5—KS-19177 L1 Clock

**2.04 Position of Pressure Plate:** Fig. 6, (B)—When released by a clockwise rotation of the lock knob, the cover shall be held partially open by the pressure plate.

Gauge by eye.

**2.05 Cover Latch Clearance:** Fig. 6, (C)

(a) With the cover held closed by the lock spring and with three layers of film wound on the spool, the cover latch shall clear the locking pin assembly to permit opening the cover when the lock knob is turned clockwise.

Check this requirement as covered in (d).

(b) With the cover held closed by the lock spring and with five layers of film wound on the spool, the cover latch shall engage the rectangular hole in the locking pin assembly to prevent the

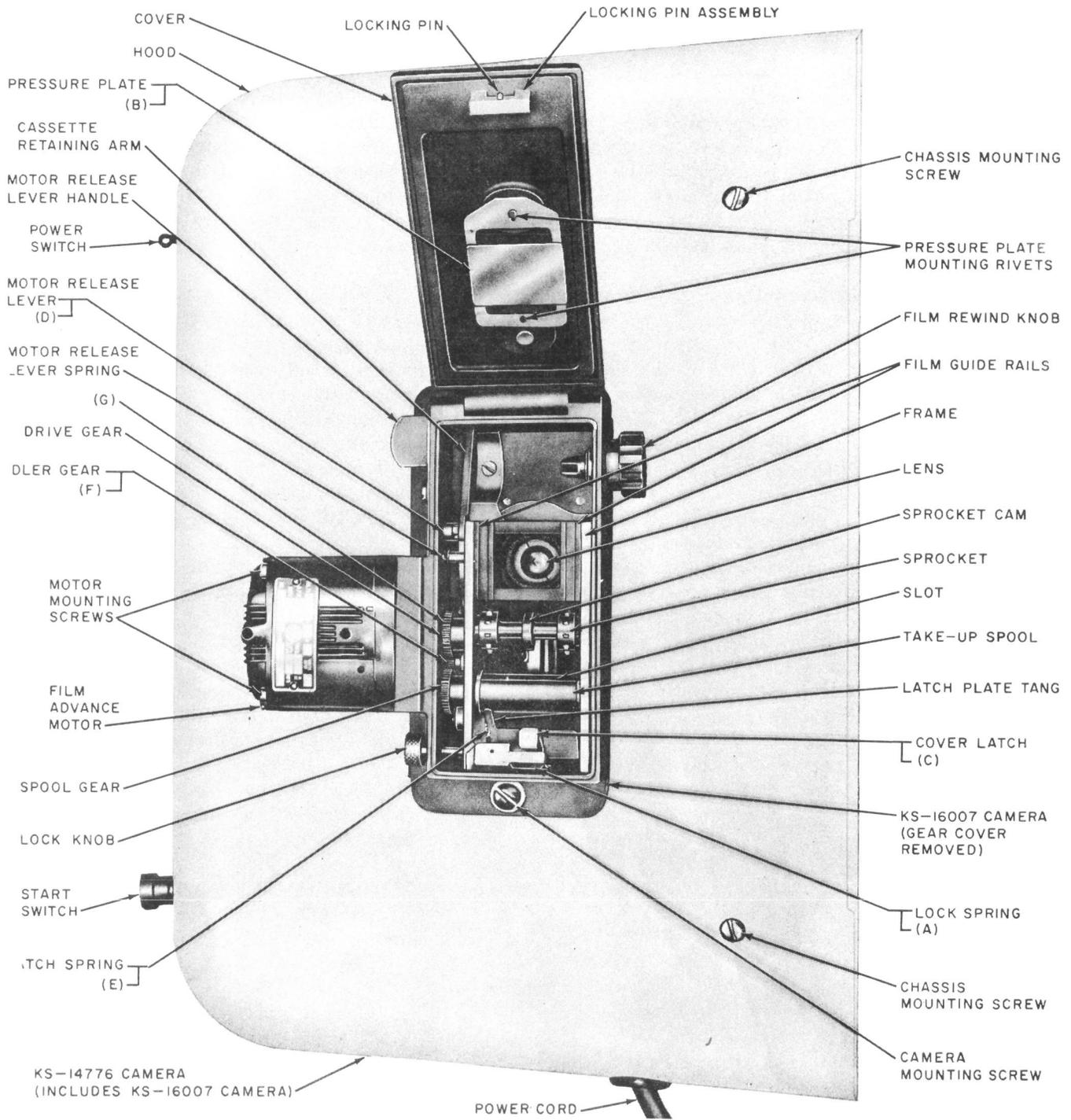


Fig. 6—KS-14776 Camera—View With KS-16007 Camera Open

cover from being opened when the lock knob is turned clockwise.

Check this requirement as covered in (d).

(c) With the cover held closed by the lock spring and with 20 layers of film wound on the spool, the cover latch shall not bind in the rectangular hole in the locking pin assembly.

Check this requirement as covered in (d).

(d) Check requirements (a), (b), and (c) as follows.

- (1) Plug the power cord of the KS-14776 camera into a suitable receptacle.
- (2) Open the KS-16007 camera by turning the lock knob clockwise.
- (3) Remove a cassette of film (Fig. 7) from its container (see 1.10), and straighten the film leader which extends from the cassette. Raise the cassette retaining in the camera so the key end of the cassette spool engages the slot in the film winder, turning the rewind knob as required to facilitate the operation. Lower the cassette retaining arm.

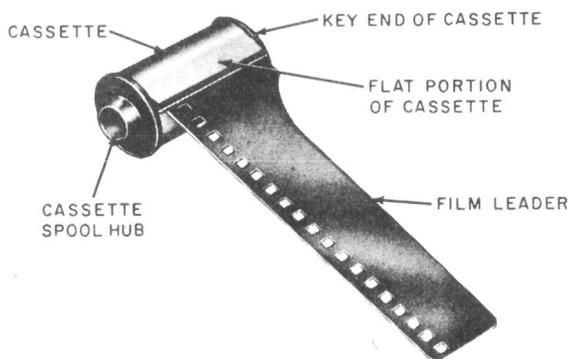


Fig. 7—Cassette With Film

(4) Lift the motor release lever handle, and rotate the take-up spool as required to bring the slot in the spool to the top. Insert the film leader into the slot to the full depth of the slot (about 3/8 inch), and position the leader so the perforated edge is against the adjacent flange of the take-up spool.

(5) Lift the motor release level handle, and manually rotate the take-up spool in a counterclockwise direction, viewed from the motor side of the camera, until the spool has made one complete revolution. This draws the film leader down between the sprocket and the take-up spool, under the spool, and back up to the top of the spool. Release the motor release lever handle, and make sure that the perforated edge of the leader is still against the adjacent flange of the spool.

(6) Holding the flat portion of the cassette so the slot faces directly toward the take-up spool, turn the rewind knob to take up any slack in the film, making sure that the sprocket engages the perforations in the film leader and that the film lies straight and flat between the guide rails. Using the rewind knob to maintain just enough tension on the film to keep it positioned as covered above, close the cover of the camera.

(7) Operate the power switch to the ON position. (See 1.07.)

(8) Operate the START switch on the hood four times. (See 1.08.)

(9) Turn the lock knob clockwise. If the cover opens, requirement 2.05(a) is met.

(10) Close the cover and operate the START switch on the hood four times. (See 1.08.)

(11) Turn the lock knob clockwise. If the cover does not open, requirement 2.05(b) is met.

(12) Operate the START switch on the hood 30 times. (See 1.08.) In order to prevent the Fustat from blowing (see 1.09), operate the START switch at intervals of 20 seconds minimum or remove the lamps, whichever is more convenient.

(13) Raise the motor release lever handle, and turn the rewind knob clockwise to rewind the film in the cassette. Continue turning the knob until a slight tug is felt. This indicates that the film except for the leader has been wound into the cassette.

**Caution:** Do not continue to turn the knob after the tug is felt since this would wind the film leader into the cassette.

- (14) Turn the lock knob clockwise. If the cover opens, requirement 2.05(c) is met.

**Note:** If the cover does not open, it will be necessary to remove the lockpin bracket to open the cover. Using the KS-6854 screwdriver, remove the two lockpin mounting screws holding the bracket to the cover. After opening the cover, remount the bracket.

- (15) Operate the power switch to the OFF position.

**2.06 Motor Release Lever Spring Tension:**

Fig. 6, (D)—The tension of the motor release lever spring measured at the end of the motor release lever shall be

Min 350 grams

Max 650 grams

Use the 79B gauge.

To check this requirement, turn the lock knob clockwise and open the cover. Push downward on the stud at the end of the lever with the 79B gauge until the lever leaves the spring stud. Allow the lever to return, and measure the tension just as the lever touches the stud.

**2.07 Cover Latch Spring Tension:** Fig. 1, (E)—The tension of the cover latch spring shall be sufficient to hold the latch plate tang against the spool with no film on the spool.

To check, turn the lock knob clockwise and open the cover.

Gauge by feel using the KS-6320 orange stick.

**2.08 Alignment of Spool Gear and Idler Gear:**

Fig. 6, (F)—The sides of the spool gear and idler gear shall be in alignment with each other within 0.010 inch.

Gauge by eye.

To check, turn the lock knob clockwise and open the cover, remove the gear cover screws using

the KS-6854 screwdriver, and remove the cover. In remounting the gear cover, hold the screws with the KS-8511 tweezers.

**2.09 Clearance Between Drive Gear and Case:**

Fig. 6, (G)—There shall be a clearance between the drive gear and case of

Min 0.002 inch

Max 0.010 inch

Use the KS-6909 gauge.

To check, turn the lock knob clockwise and open the cover, remove the gear cover screws using the KS-6854 screwdriver, and remove the cover. Operate the motor by operating the power switch to the ON position (see 1.07) and depressing the START switch immediately before checking the clearances. In remounting the cover, hold the screws with the KS-8511 tweezers. Operate the power switch to the OFF position.

**2.10 Operation of KS-19438 L2 Shutter Linkage:** Fig. 8

- (a) The shutter shall open and close before the solenoid plunger reaches its fully operated position.

Gauge by eye and ear.

Check this requirement as covered in (c).

- (b) With the solenoid plunger electrically operated, there shall be movement of the shutter lever in the direction of its operation of

Min 0.010 inch

Gauge by eye and feel.

Check this requirement as covered in (c).

- (c) Remove the KS-16007 camera from the hood using the 4-inch E screwdriver. Remove the plug on the camera cord from the socket in the hood. Remove the front cover from the camera using the 3-inch C screwdriver. Slowly operate the solenoid plunger manually, and note whether the shutter operates before the plunger reaches the end of its operating stroke. Connect the camera to the KS-16338 test set as covered in 3.003. Operate the solenoid by depressing

**SECTION 030-302-701**

the pushbutton designated SHUTTER. While holding the solenoid operated, use the KS-6320 orange stick to check the additional movement of the shutter lever in the direction of operation.

**\*2.11 Power Relay Requirements:** Fig. 9, (A)

- (a) With the relay in the unoperated position, the contact separation shall be

Min 0.035 inch

Use the 92K gauge.

To check this requirement and requirement (b), remove the chassis as described in 3.002.

- (b) With the relay in the operated position, the contacts shall make with a follow of

Min 0.010 inch

Gauge by eye while manually operating the relay.

**\*2.12 Operation of Timer Switches:** Fig. 9—The contacts of each switch shall operate when the switch actuator is

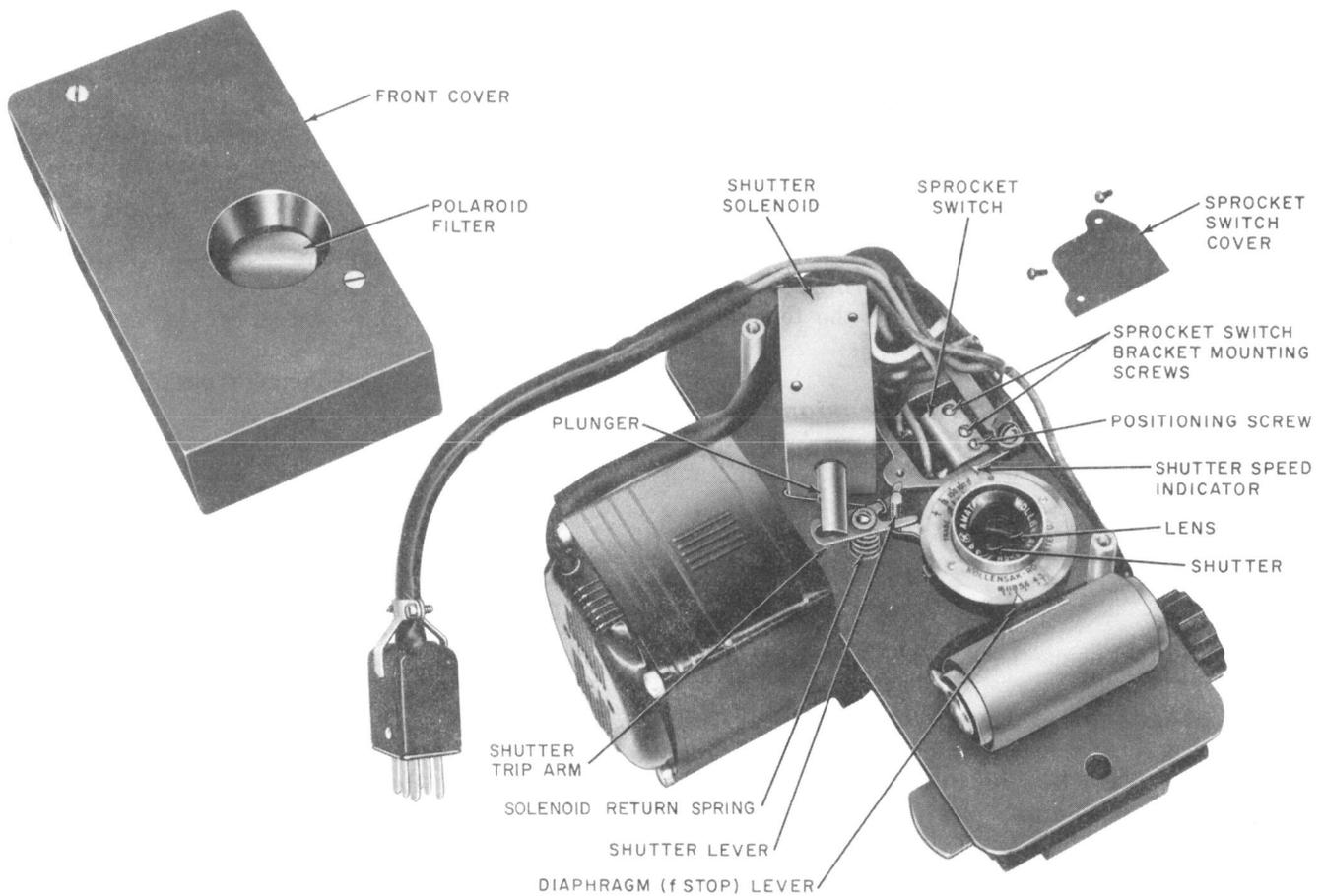
Min 1/64 inch

from the high surfaces and

Min 1/32 inch

from the low surface of the associated cam during the respective upward and downward movements of the actuator.

The actuator arms on the KS-19408 L2 timer do not require adjustments.



**Fig. 8—KS-16007 Camera—Front Cover and Sprocket Switch Cover Removed**

Gauge by eye and ear.

To check this requirement, remove the chassis as covered in 3.002. Manually rotate the camshaft until the switch actuator rests on the low surface of the cam near the step from the high surface. Using the KS-6320 orange stick, raise the actuator to the level of the high surface, and listen for the click as the contacts operate. Observe the position of the actuator when the contacts operate. Lower the actuator to the low surface of the cam, and again observe the position of the actuator when the contacts operate.

**2.13 Operation of Clock:** With the KS-14776 camera connected to the power source, the KS-19177 L1 clock (or the film identifier initially furnished) shall not gain or lose time over a period of 24 hours. See 3.13(1).

Gauge by eye.

Check this requirement by comparing the operation of the clock with a reliable time source controlled by the same power supply. The requirement is considered met if error due to variable backlash in the clock gears does not exceed approximately

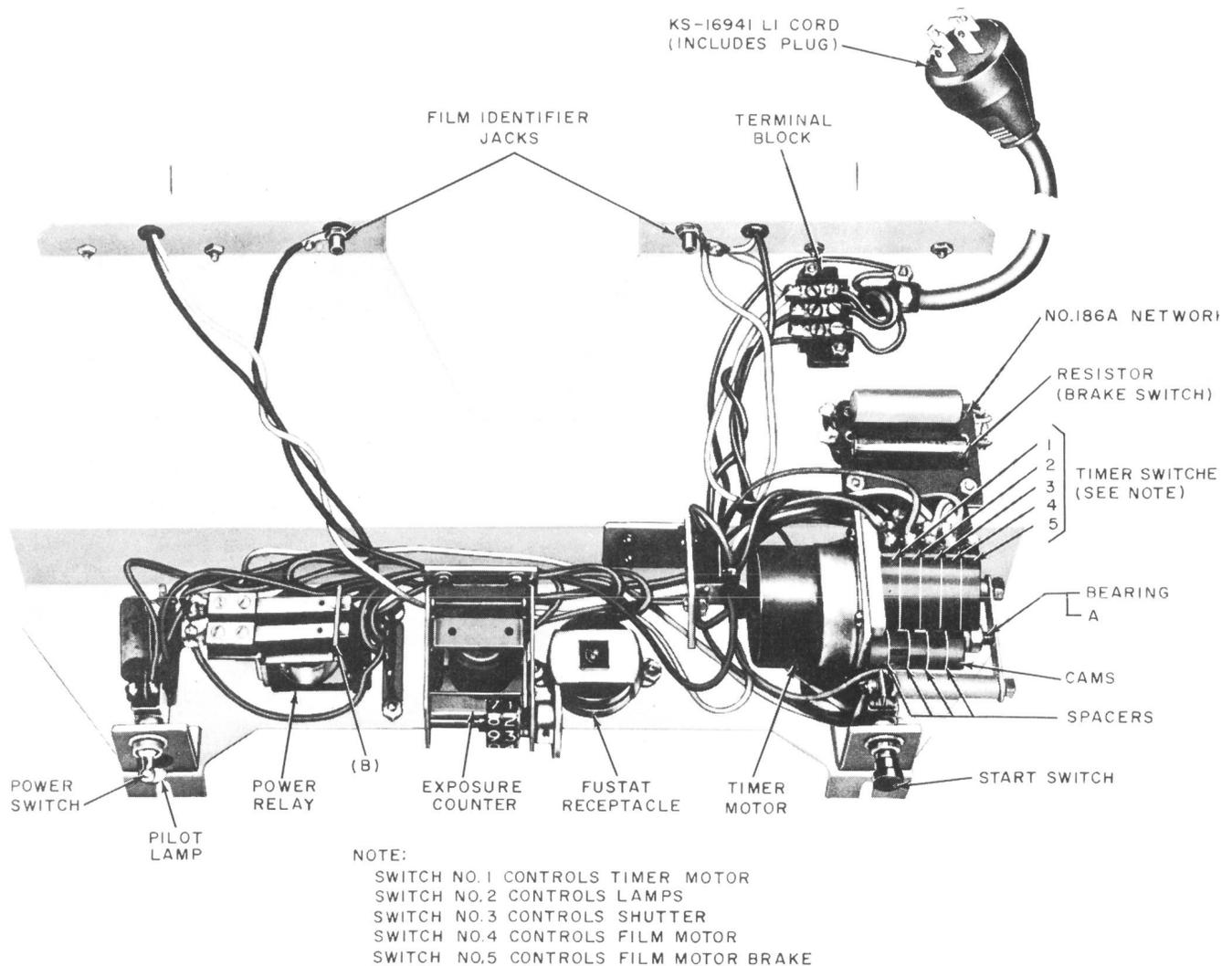


Fig. 9—KS-14776 Camera Chassis Removed From Hood

**SECTION 030-302-701**

plus or minus 5 minutes and error is not cumulative from day to day.

**2.14 Operation Test:** With the KS-14776 camera connected to the power source (see 1.07), the following requirements shall be met.

- (a) With the power switch in the ON position, the associated pilot lamp shall light.

Gauge by eye.

- (b) With the power switch in the ON position, operation of the START switch for about 1 second shall cause the following functions to occur.

- (1) The shutter shall open and close while the lamps in the hood are lighted.

Gauge by eye.

To check this requirement, open the back of the KS-16007 camera, and observe the operation of the shutter and lamps.

- (2) The exposure counter shall advance one digit.

Gauge by eye.

- (c) With film in the KS-16007 camera and the power switch in the ON position, momentary operation of the START switch shall cause the film motor to advance the film one frame (five perforations) and then stop.

To check this requirement, load the camera checking film (see 1.10) in the camera as described under requirement 2.05. Leave the camera cover open. Operate the start switch four times (see 1.08), allowing the motor to come to rest prior to each operation of the switch. Using a china marking pencil, mark the film where the perforation fully engages the sprocket tooth. Then mark the fifth and tenth perforations from this point. This will measure two frames. Operate the START switch two additional times allowing the motor to come to rest prior to each operation of the switch. Continue in this manner to mark the film, and operate the START switch until it is determined whether each operation of the switch advances the film exactly five perforations. Remove the film as covered in 2.05.

**3. ADJUSTING PROCEDURES**

**3.001 List of Tools, Gauges, Materials, and Test Apparatus**

CODE OR SPEC NO.	DESCRIPTION
<b>TOOLS</b>	
206	30-degree offset screwdriver
207	90-degree offset screwdriver
224	Adjuster
486A	Oilcan
534D	Spring adjuster
579A	Adjuster
♦AT-7860	B long-nose pliers♦
KS-6320	Orange stick
KS-6854	Screwdriver
KS-8511	Tweezers
R-1021	Brush, 1/2 inch flat
R-1102	Fiber spudger
R-2959	Allen socket screw wrench
—	3-inch C screwdriver
—	4-inch E screwdriver
—	5-inch E screwdriver
—	4-ounce riveting hammer
—	No. 2012 Stanley screwdriver
<b>GAUGES</b>	
79B	0-1000 gram push-pull tension gauge
92K	0.035-inch thickness gauge
KS-6909	Thickness gauge nest

CODE OR SPEC NO.	DESCRIPTION
<b>MATERIALS</b>	
KS-2423	Cloth
KS-7470	Oil
KS-7860	Petroleum spirits
KS-14666	Cloth
—	Guildcraft lens spray cleaner or equivalent (available from Distributing House or Griscomb Products, P.O. Box 1793, North Brunswick, N.J.)
—	Lens paper (obtain locally)
<b>TEST APPARATUS</b>	
B-125342	Cord assembly (part of KS-16338 test set)
KS-16338	Test set

**3.002 Removing Chassis From Hood of KS-14776 Camera:** Remove the chassis from the hood as follows.

- (1) Using the 5-inch E screwdriver, remove the two screws mounting the KS-16007 camera on the hood. Lift the camera from the hood, and remove the plug on the camera cord from the socket inside the hood. Place the KS-16007 camera where it will not be damaged.
- (2) Protect the mirror in the hood from damage by placing several layers of paper or cloth over it.
- (3) Remove the knob from the START switch plunger by pulling outward on it.
- (4) Using the 4-inch E screwdriver, remove the two chassis mounting screws and associated nuts and lockwashers at the front of the hood (Fig. 10). While holding the chassis in position, remove the two chassis mounting screws and associated nuts and washers at the top of the hood (Fig. 6). Gradually lower the chassis while pushing the power cord into the hood, and then remove the chassis from the hood. If it is desired to completely disassociate the chassis from the hood, disconnect the power cord from

the terminal block on the chassis using the 3-inch C screwdriver. Remove the power cord from the hood and, if parts on the chassis are to be operated electrically, reconnect the cord to the chassis terminal block.

**3.003 Method of Connecting KS-16338 Test Set in Connection With Adjustment of KS-16007 Camera:** Plug the power cord of the test set into a suitable receptacle. Plug the B-125342 cord assembly into the jack in the test set and plug the KS-16007 camera cord into the socket on the B-125342 cord assembly.

**Caution:** Before using the test set, refer to 1.07 covering safety precautions to be observed.

**3.004** The mounting of the mirror in the hood of the KS-14776 camera is adjusted with respect to the KS-16007 camera during manufacture and must not be disturbed. If adjustment of the mirror appears necessary, refer the matter to the supervisor since consideration should be given to returning the camera to the Western Electric Company.

**3.01 Cleaning:** (Reqt 2.01)

- (1) **General:** In cleaning parts of the camera, it is recommended that the indicated intervals be observed. This is especially important in the case of the mirror, both to ensure satisfactory photographs and to facilitate keeping the mirror clean. It should be noted that local conditions may be such that more frequent cleaning is necessary.
- (2) **Power Relay Contacts** (As Required): Clean the contacts of the power relay in accordance with Section 069-306-801.
- (3) **Mirror** (Weekly): Wipe the mirror with a clean, dry KS-14666 cloth, taking care not to touch the surface of the mirror with the fingers.
- (4) **Mirror** (Monthly): Clean the mirror by spraying with Guildcraft lens spray cleaner or equivalent.
- (5) **Inside of Hood** (Monthly): Wipe the inside surfaces of the hood (not including mirror

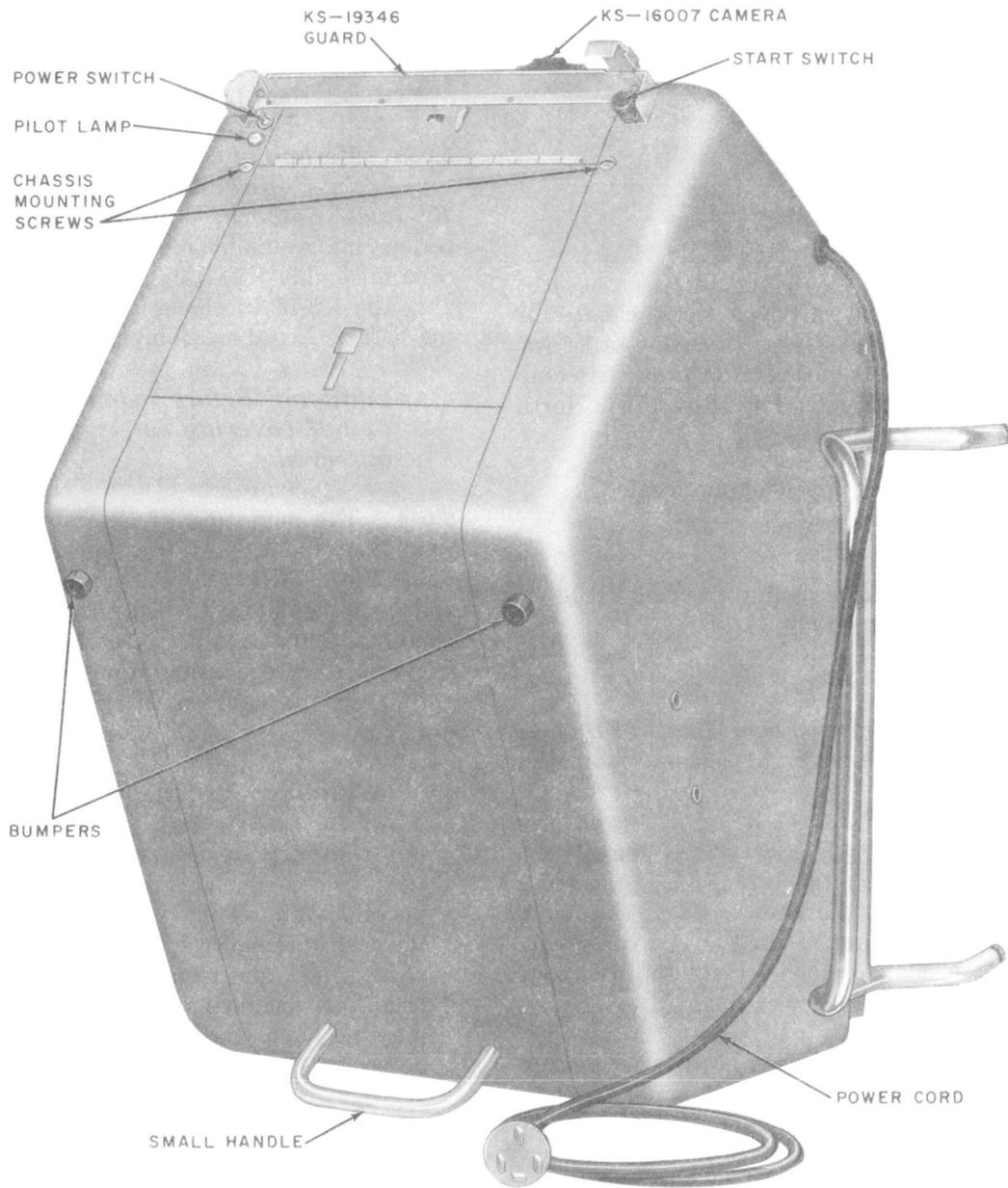


Fig. 10—KS-14776 Camera—General View

and polaroid filters) with a slightly dampened KS-14666 cloth.

(6) **Lamps, Lamp Reflectors and Filters, and Lens Filter** (Every 3 Months): Clean the lamps, lamp reflectors and filters, and the outside of the filter over the lens with a clean KS-14666

cloth slightly dampened with the lens spray cleaner. Wipe with a dry cloth.

(7) **KS-19438 L2 Shutter Solenoid** (Every 6 Months): Clean the shutter solenoid plunger and the inside of the solenoid sleeve using the KS-7860 petroleum spirits and a clean KS-2423 cloth. To do this, remove the shutter trip arm

as covered in 3.10(2) and remove the solenoid plunger. After cleaning, reassemble the parts in reverse order of removal.

**Caution:** Do not lubricate the solenoid plunger.

(8) **Lens and Lens Filter** (As Required): Clean the lens and inside surface of the filter over the lens using the lens paper. To do this, remove the front cover using the 3-inch C screwdriver. Obtain access to the rear of the lens by opening the hinged cover of the camera. Guildcraft lens spray cleaner or equivalent may also be used.

(9) **KS-16007 Camera** (As Required): Clean the interior of the KS-16007 camera using the R-1021 brush.

**Note:** Do not permit brush bristles to come in contact with rear lens element.

(10) **Chassis** (As Required): Clean the parts mounted on the side of the chassis opposite the lamps with the R-1021 brush and, if available, compressed air at a maximum pressure of 20 pounds per square inch. In order to do this, remove the chassis from the hood as described in 3.002.

**3.02 Lubrication:** (Reqt 2.02)—Lubricate parts as specified in 2.02 using the 486A oilcan, taking care not to exceed the specified quantities nor to allow any oil to remain where it might contact film in the camera or creep into the camera shutter.

**3.03 Position of Lock Spring:** (Reqt 2.03)—If the requirement is not met, loosen the lock spring mounting screws using the KS-6854 screwdriver, and shift the position of the lock spring as required. Tighten the mounting screws and recheck the requirement.

**3.04 Position of Pressure Plate:** (Reqt 2.04)—If the requirement is not met, proceed as follows. Open the camera cover. Using the 330B adjuster applied to the legs of the pressure plate spring, adjust as required to ensure that the pressure surface of the plate is approximately 1/8 inch from and parallel to the surface of the cover on which the plate is mounted. Take care not to

produce any sharp bends or kinks in the legs of the pressure plate spring.

**3.05 Cover Latch Clearance:** (Reqt 2.05)

(1) If requirement 2.05(a) or (b) is not met, apply the 534D spring adjuster to the base of the latch plate tang. While holding the **B** long-nose pliers as close as possible to the spring adjuster, bend the tang as required. Bend the tang toward the spool to decrease the cover latch clearance and away from the spool to increase the clearance.

(2) If requirement 2.05(c) is not met, slightly loosen the screws mounting the cover latch plate using the 206 and 207 offset screwdrivers. Shift the position of the latch as required, and securely tighten the screws. Recheck requirements 2.05(a) and (b).

(3) If difficulty is experienced in gaining access to the latch mounting screws as covered in (2), remove the film driving mechanism from the camera case as follows.

(a) Rewind the film into the cassette and remove the cassette.

(b) Remove the gear cover with the KS-6854 screwdriver.

(c) If the drive gear setscrew is not accessible, apply the R-1102 fiber spudger to a gear tooth, and rotate the gear until the setscrew is accessible. Loosen the setscrew with the proper size Allen wrench.

(d) Loosen the lock knob assembly setscrew with the proper size Allen wrench, and remove the lock knob spindle from the associated block. Remove the block.

(e) Using the 4-inch E screwdriver, remove the motor release lever handle. Remove the washer between the inside of the case and the motor release lever with the KS-8511 tweezers.

(f) Back off the two motor mounting screws at the top of the motor with the 4-inch E screwdriver, and remove the motor and drive gear.

- (g) Using the 3-inch C screwdriver, remove the two film driving mechanism mounting screws on the outside of the case and the one mounting screw inside the case.
- (h) Lift the film driving mechanism from the case.
- (i) Using the KS-6854 screwdriver, slightly loosen the cover latch mounting screws, and shift the latch as required.
- (j) To remount the film driving mechanism, first lubricate as indicated in 2.02 and then proceed as follows. Position the film driving mechanism in the camera case. If the mounting screws on the outside of the case are flathead countersunk screws, securely tighten these screws first and then tighten the inside mounting screw at the cassette end. If the mounting screws on the outside of the case are buttonhead screws located in a counterbored recess, tighten the inside mounting screw at the cassette end first. Then while holding the latch end of the film driving mechanism firmly against the bottom of the camera case, securely tighten the mounting screws on the outside of the case. Remount other parts in the reverse order of removal as covered in (a) through (h).

**3.06 Motor Release Lever Spring Tension:**

(Reqt 2.06)—If the requirement is not met, remove the film driving mechanism as described in 3.05. Remove the spring from the studs using the **B** long-nose pliers. If the spring tension is above the maximum limit, place the loop at one end of the spring in a rise. Grasp the other end of the spring with the **B** long-nose pliers and stretch the spring slightly. If the spring tension is below the minimum limit, replace the spring. Recheck the requirement. Remount the parts in the reverse order of removal.

**3.07 Cover Latch Spring Tension:** (Reqt 2.07)—If the requirement is not met, remove the film driving mechanism as described in 3.05. Using the KS-8511 tweezers, remove the latch spring and replace it. Remount the parts in the reverse order of removal.

**3.08 Alignment of Spool Gear and Idler Gear:**

(Reqt 2.08)—If the requirement is not met, remove the gear cover with the KS-6854 screwdriver

and loosen the spool gear setscrew with the proper size Allen wrench. If the setscrew is not accessible, lift the motor release lever and turn the spool. Position the gear to meet the requirement and securely tighten the setscrew. Remount the gear cover.

**3.09 Clearance Between Drive Gear and Case:**

(Reqt 2.09)—If the requirement is not met, remove the gear cover with the KS-6854 screwdriver and loosen the gear setscrew with the proper size Allen wrench. If the setscrew is not accessible, turn the gear by pressing against a gear tooth with the R-1102 fiber spudger. Position the gear to meet the requirement, and securely tighten the setscrew. Remount the gear cover.

**3.10 Operation of **KS-19438 L2** Shutter Linkage:** (Reqt 2.10)—If the requirement is not met, proceed as follows.

- (1) First ascertain if the shutter release arm is vertical. If arm is cocked to one side or the other, use the **B** long-nose pliers to straighten arm until shutter pin stands vertically.
- (2) Remove the KS-16007 camera from the hood using the 4-inch E screwdriver. Remove the front cover using the 3-inch C screwdriver. Remove the shutter trip arm mounting screw and washer using the 3-inch C screwdriver. Remove the trip arm.
- (3) Clamp the trip arm in a vise with only the tines of the arm protruding from the jaws of the vise. Using the 4-ounce riveting hammer with a piece of brass to cushion the blow, tap the curved tine of the trip arm toward or away from the straight tine as follows. If there is no movement of the solenoid plunger after the shutter operates or if the shutter does not operate, bend the curved tine toward the straight leg. If there is no additional movement of the shutter lever with the solenoid plunger in the fully operated position, bend the curved tine away from the straight tine.
- (4) Remount the parts and recheck the requirement.
- (5) Check for a loose pin in the solenoid plunger, and make sure the washer associated with the trip arm mounting screw is not deformed. If either part is defective, replace it. If the shutter lever is bent, straighten it, holding the

flat portion with the **B** long-nose pliers to avoid twisting it. Clean the solenoid as covered in 3.01(7). Before making final assembly and adjustment of shutter trip arm, add B-139946 solenoid plunger return spring (obtained from Bulova Watch Company, Woodside, New York). Remount the shutter trip arm and check requirement 2.10 covering operation of shutter linkage and make adjustments if required.

**3.11 Power Relay Requirements:** (Reqt 2.11)—If the requirements are not met, proceed as follows.

- (1) If the contact separation is less than the minimum allowable, adjust the backstop as required with the **B** long-nose pliers.
- (2) If the contact follow is less than the minimum allowable, adjust the stationary contact spring as required with the 579A adjuster.

**3.12 Operation of Timer Switches:** (Reqt 2.12)

- (1) If the requirement is not met (see 1.11), rotate the camshaft until the actuator at the right of the one to be adjusted (as viewed from the START switch side of the chassis) rests on the low surface of its cam. Raise the actuator to be adjusted, apply the 224 adjuster about midway along the long straight portion of the actuator, and slightly adjust the actuator as required. Take care not to disturb the preformed bends in the actuator. Also take care not to introduce any sharp bends or kinks in the actuator when making this adjustment.
- (2) If the switch is defective (see 1.11), replace the switch, the assembly of which it is a part, or the timer as covered in Section 030-302-801.

**3.13 Operation of Clock:** (Reqt 2.13)

- (1) **KS-19177 L1 Clock:** If the requirement is not met, examine the electrical connections. If they are satisfactory, check for clearance between the head of the screw at the back of the hour dial and the adjacent surface of the hood. If the clearance is not at least 1/64 inch, loosen the clock mounting screws using the No. 2012 Stanley screwdriver, position the clock to obtain the clearance, and tighten the screws. If the requirement is still not met, replace the

clock motor. If the day wheel does not line up properly, replace the clock.

(2) **Resetting of Clock:** To reset clock, adjust hour dial on the hour or half-hour. Do not reset clock between 23:00 and 01:00 hours. Turn hour dial clockwise only.

(3) **Film Identifier Initially Furnished:** If the requirement is not met, check the electrical connections and the dial mounting screw clearance as covered in (1). If the requirement is still not met, replace the film identifier with a KS-19177 L1 clock.

**3.14 Operation Test:** (Reqt 2.14)

- (1) Failure to meet this requirement may be due to one or more of the following conditions:
  - (a) Failure of the pilot lamp to light
  - (b) Failure of the timer motor to start
  - (c) Failure of all lamps to light
  - (d) Failure of the shutter to operate
  - (e) Failure of the exposure counter to operate
  - (f) Failure of the motor to advance the film one frame and stop.

Procedures for correcting each of these conditions are covered below in (2) through (8). Reference should be made to 4.01 and Fig. 12 in connection with these procedures.

(2) **Failure of the Pilot Lamp to Light:** Check the Fustat and the lamp and replace if defective. If the Fustat and lamp are satisfactory, remove the chassis as covered in 3.002. Check the wiring and the resistor in series with the lamp. If the resistor is defective, replace it.

(3) **Failure of the Timer Motor to Start:** Remove the chassis as covered in 3.002. Check the wiring, the START switch, and the timer motor switch. (See *Note*.) Check requirement 2.12 covering the timer motor switch. If the wiring and switches are satisfactory and requirement 2.12 is met, the timer motor is defective. Make adjustments and replace parts and/or motor as required. (Also see 1.11.)

**Note:** Check the START switch for satisfactory operation of both normally open and normally closed contacts. This is important because, while the camera may meet the requirement when operated manually, it will not operate under control of the control circuit if the normally closed contacts are defective.

(4) **Failure of the Lamps to Light:** Remove the chassis as covered in 3.002. Check the wiring, the lamp switch, the lamps, and the power relay. Check requirement 2.12 covering the lamp switch and requirement 2.11. (Also see 1.11.) Make adjustments or replace defective parts as required.

(5) **Failure of the  $\blacklozenge$ KS-19438 L2 $\blacklozenge$  Shutter to Operate:** If the shutter fails to operate properly, proceed as follows.

(a) Remove the KS-16007 camera from the hood using the 4-inch E screwdriver. Remove the front cover from the camera using the 3-inch C screwdriver. Remove the shutter trip arm mounting screw and washer using the 3-inch C screwdriver. Remove the shutter trip arm and the solenoid plunger.

(b) Set the shutter speed indicator at 10 (1/10 second). (Use 1/25 second if camera is not equipped with 1/10-second shutter speed.) Open the back cover of the camera and, while looking through the lens, slowly operate the shutter lever manually about 25 times. Do this with the camera lens pointing first upward and then downward. If there is any observable irregularity in the operation of the shutter, the KS-16007 camera should be returned to the Western Electric Company or Bulova Watch Company, Woodside, New York, for replacement of the lens and shutter assembly.  $\blacklozenge$ When the L2 shutter fails, it should be replaced by the new L3 electronic shutter. (See Fig. 11.) $\blacklozenge$  When returning a camera for repair, include sample of exposed film from the camera to aid in identifying the malfunction.

(c) Connect the camera to the KS-16338 test set as covered in 3.003. Operate the shutter electrically by means of the test set. If the solenoid fails to operate, check the solenoid and the wiring to it. Correct the wiring or replace the solenoid as required.

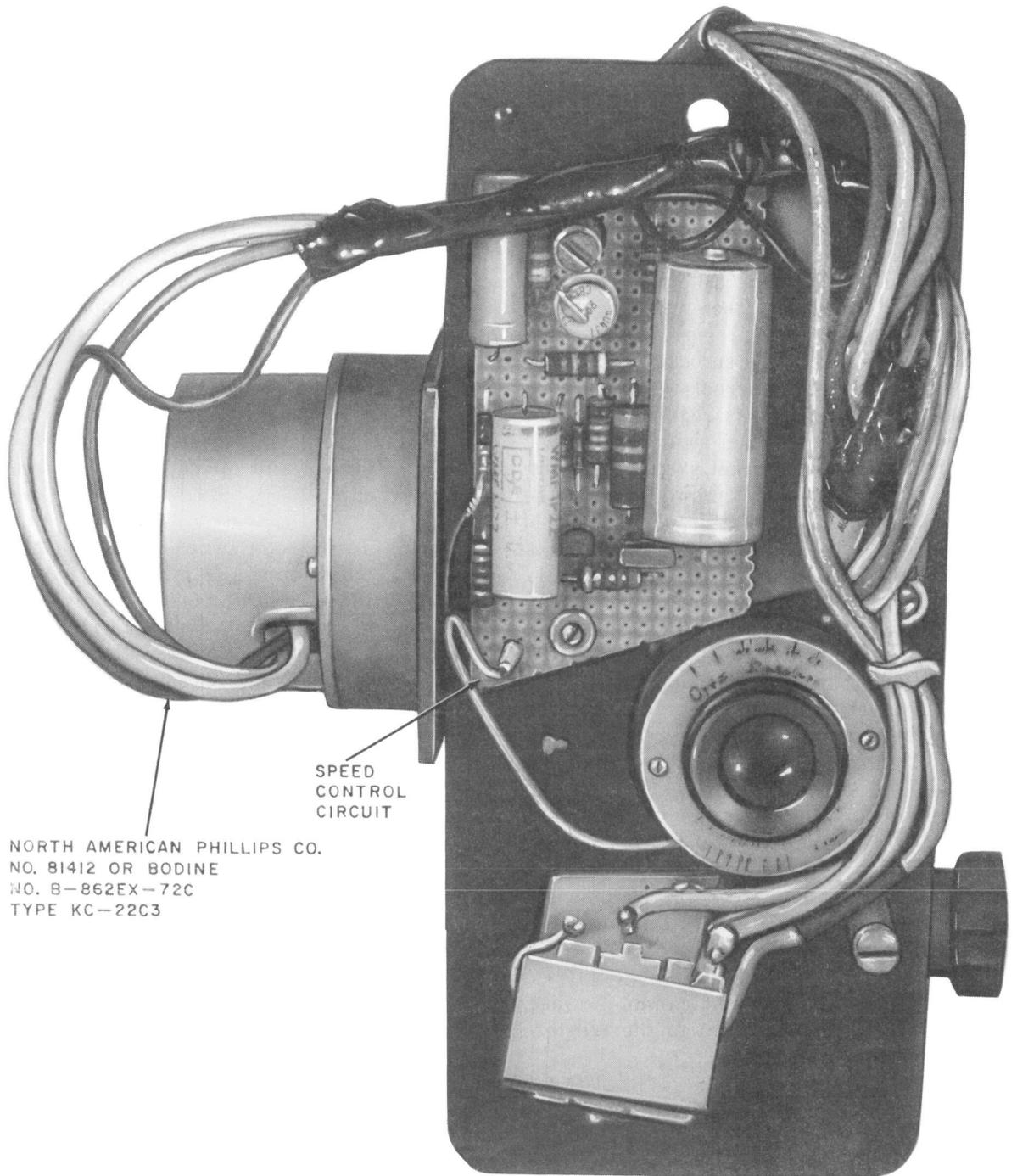
(d) While looking through the lens, operate the shutter electrically by means of the test set about 25 times, first with the lens pointing upward and then with it pointing downward. If there is any observable irregularity in shutter operation, the camera should be returned for repair as covered in (b). If the shutter operates on backstroke, readjust linkage as covered in 3.10; otherwise, proceed as covered in (e).

(e) Reset the shutter speed indicator to the setting of f8 and 1/25 second. Remount the front cover and remount the KS-16007 camera on the hood. Recheck the operation test requirement (2.14). If the requirement is still not met because of failure of the shutter to operate, remove the chassis as covered in 3.002. Check requirement 2.12 covering the shutter switch. (Also see 1.11.) Check the switch and the wiring associated with it. Make adjustments or replace defective parts as required.

(6)  **$\blacklozenge$ Failure of the KS-19438 L3 Shutter to Operate:** If the KS-19438 L3 shutter fails to operate properly, replacement of the shutter in the field should not be attempted. The camera should be returned to the Western Electric Company or Bulova Watch Company Woodside, New York. $\blacklozenge$

(7) **Failure of the Exposure Counter to Operate:** Remove the chassis as covered in 3.002. Check requirement 2.12 covering the shutter switch. Also check the switch and the wiring to the switch and the exposure counter. If the requirement is met and the switch and wiring are satisfactory, the exposure counter is probably defective. Make adjustments or replace the switch or counter as required.

(8) **Failure of the Motor to Advance the Film One Frame and Stop:** Remove the KS-16007 camera from the hood using the 4-inch E screwdriver. Connect the camera to the KS-16338 test set as covered in 3.003. With film in the camera and the cover open as covered in 2.14(c), proceed as follows. Operate the FILM ADV MOTOR ON OFF switch to the ON position. [If the motor starts and runs continuously when this is done, proceed as covered in (b).] Operate the FILM ADV switch momentarily, and check whether the film advances as required. If the



NORTH AMERICAN PHILLIPS CO.  
NO. 81412 OR BODINE  
NO. B-862EX-72C  
TYPE KC-22C3

SPEED  
CONTROL  
CIRCUIT

Fig. 11—KS-16007 Camera With KS-19438 L3 Shutter

film advances as required, proceed as covered in (c). If the film does not advance as required, proceed as covered in (a) and (b).

(a) **Defective Motor or Capacitor:** If the motor failed to start when checked in (8) above, check the wiring to the motor and capacitor. If the wiring is satisfactory, the motor or the capacitor is probably defective. Correct the wiring or replace defective parts as required. If there is any indication of oil on terminals of capacitor, replace it.

(b) **Improperly Adjusted or Defective Sprocket Switch:** Remove the front cover using the 3-inch C screwdriver. Using the KS-6854 screwdriver, remove the sprocket switch cover. Check the sprocket switch and associated wiring. Correct the wiring or replace defective parts as required. Adjust the position of the sprocket switch as follows. Slightly loosen the sprocket switch mounting screws with the KS-6854 screwdriver. If the film advanced less than one frame or if, when checked in (8) above, the motor ran only as long as the FILM ADV switch was held operated, turn the sprocket switch positioning screw slightly (30 degrees or less) clockwise. Recheck the film advance as covered in (8), and readjust the sprocket switch positioning screw until the film advances exactly one frame (five perforations) as required. (See **Note**.) Tighten the sprocket switch mounting screws, and make a final recheck of the adjustment by operating the film advance mechanism approximately 20 times, allowing the motor to come to rest prior to each reoperation. Remount the sprocket switch cover and the front cover. Remount the KS-16007 camera on the hood.

**Note:** If the requirement cannot be met, return the KS-16007 camera to the Western Electric Company for repair.

(c) **Defective or Improperly Adjusted Film Motor Switch or Film Motor Brake Switch:** If the film advanced properly when checked in (8), remove the chassis as covered in 3.002. Check requirement 2.12 covering the film motor switch and the film motor brake switch. Check the wiring, the switches, and the brake switch resistor. Make adjustments or replace defective parts as required.

#### 4. SUPPLEMENTARY INFORMATION

##### 4.01 Camera Circuit

(1) Figure 12 shows a schematic of the circuit of the KS-14776 camera. As shown in the figure, the circuit terminates in a 4-conductor cord. Two conductors of this cord are connected to the 120-volt, 60-cycle power supply. The third conductor carries a 3-second ground pulse which is sent out from the control panel when a photograph of the registers is to be taken. The fourth conductor provides a safety ground.

(2) Referring to Fig. 12, the following outline indicates the sequence of operation of the various parts of the camera after the cycle is started by the ground pulse. One cycle is completed in 5 seconds.

(a) Timer motor starts, causing the cams to rotate and operate the various timer switches.

(b) Timer motor switch operates and transfers motor circuit from ground pulse lead to grounded side of power supply. Motor is now connected across power supply.

(c) Lamp switch operates and closes circuit to power relay. Power relay operates and closes circuit to the six 100-watt lamps. The lamps illuminate the registers for photographing.

(d) Shutter switch operates and closes circuit to solenoid of KS-16007 camera which operates shutter. Shutter switch also closes circuit to exposure counter which advances the dial one digit. Shutter switch releases immediately. The self-resetting shutter restores the solenoid plunger to unoperated position.

(e) Lamp switch restores to normal, extinguishing the lamps.

(f) Film motor switch operates, closing circuit to film motor of KS-16007 camera. Film motor advances film causing sprocket to rotate. At start of rotation, sprocket cam operates associated switch, opening contacts.

(g) Film motor brake switch operates, closing its contacts.

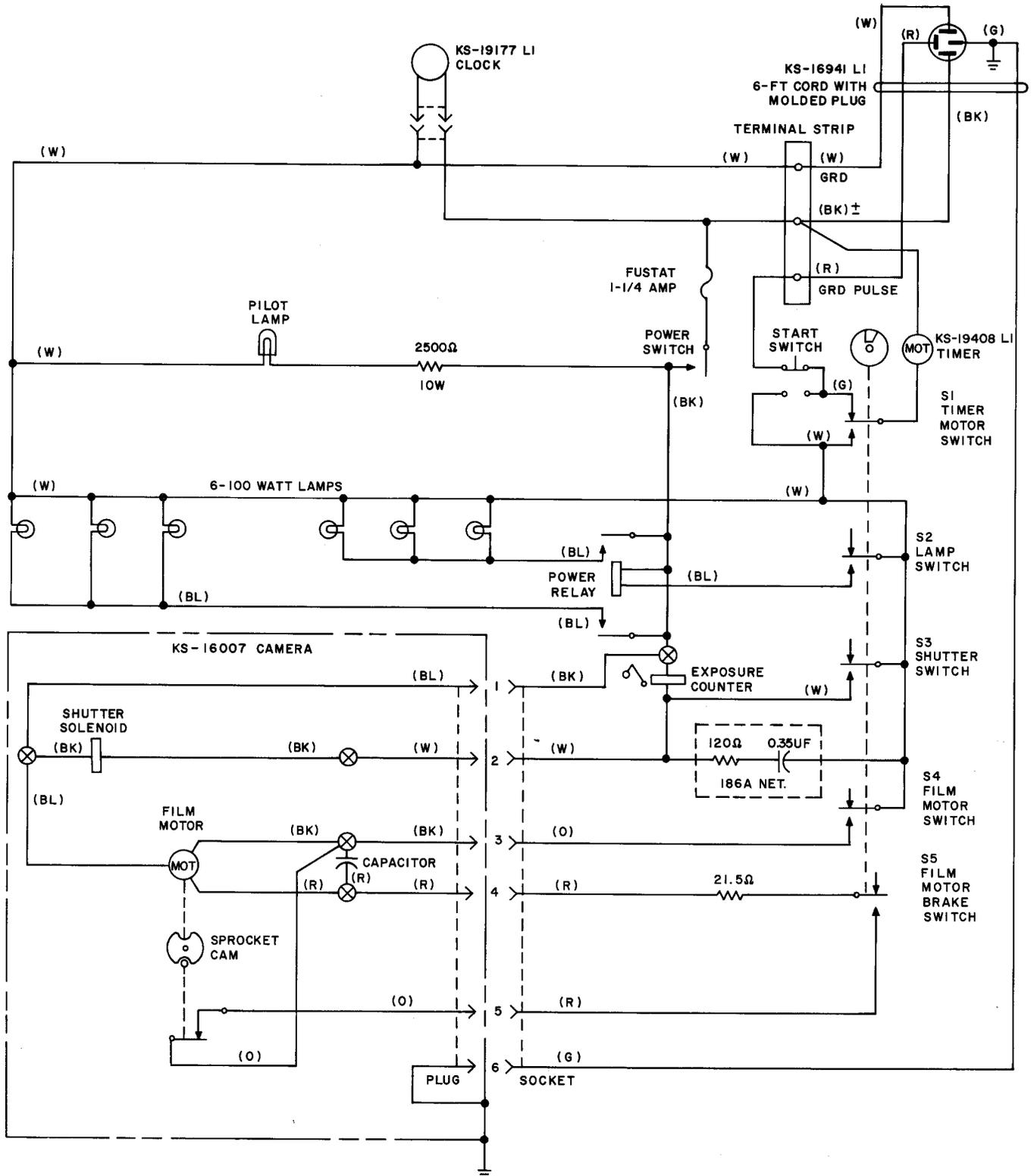


Fig. 12—KS-14776 Camera—Circuit Schematic

## SECTION 030-302-701

- (h) After film has advanced one frame, sprocket switch contacts close. Closure of brake switch and sprocket switch completes a short circuit across capacitor terminals, thus stopping motor.
- (i) Film motor switch releases, opening film motor circuit.
- (j) Brake switch releases, opening short circuit across film motor capacitor which will permit the motor to start for the next cycle.
- (k) Timer motor switch releases, stopping timer motor and transferring motor circuit to ground pulse lead.
- (l) The sequence outlined above is completed in one half revolution of the camshaft, and constitutes one camera operating cycle.

### 4.02 Identification and Correction of Troubles

(1) **General:** The identification and correction of troubles which result in reports of missing or unsatisfactory photographs will be facilitated by reference to the table of troubles, probable causes, and recommended procedures covered in 4.03. Wherever possible, a first-hand examination should be made of the film or films on which trouble indications appear. While a KS-16789 film reader can be used to examine films, a more detailed examination can usually be made by using a good quality magnifying glass such as a 5X jeweler's loupe. Where trouble in the camera control circuit is indicated (for example, duplicate or interpolated pictures), reference should be made, if possible, to films made at the same time by other cameras operated by the same circuit. If it is uncertain whether the trouble is in the KS-16007 camera or in the hood, the KS-16007 camera should be checked before making checks which require removal of the chassis from the hood. Intermittent troubles may be isolated by selecting another KS-14776 camera known to be in good working order and interchanging the two KS-16007 cameras.

(2) **Defective L2 or L3 Shutter or Lens:** If either the shutter or lens is defective, it will be necessary to return the KS-16007 camera to the Western Electric Company or Bulova Watch Company, Woodside, New York.

(3) **Incorrect Exposure:** Normally, the shutter speed indicator is set at 25 (1/25 second) and the diaphragm lever at 8 (f8). Where there is evidence that an entire film has been incorrectly exposed, check for these settings. Also make sure that film development is correct. (See Section 030-302-301.) If the settings have not been changed and the film has been properly developed, it is possible that the shutter is defective. Check the shutter as covered in 3.14(5). If the shutter is not defective, the condition can be corrected by referring to trouble guide 4.03.

(4) **Test Films:** If test films are made in the course of locating or correcting troubles, care should be taken to follow the procedures covered in Section 030-302-301.

(5) **Other Factors Affecting Overall Quality of Films:** In addition to the condition of the camera, other factors may affect the overall quality and readability of the film. These include proper storage, handling, and loading of unexposed film; reliability of ground pulses from the camera control circuit; careful adherence to recommendations on film development; and proper maintenance of the KS-16789 viewers in which the films are read. Reference should, therefore, be made to Section 030-302-301 covering the operation of the camera. If the KS-16789 film reader is used for viewing the film, refer to Section 034-338-701 covering requirements and adjusting procedures for the reader. In any case where a film reader is used, the cleanliness of all optical surfaces is essential for good performance.

**4.03** Table A covers the common troubles that may occur during camera operation. Table B, a pictorial trouble guide, is provided as a guide to identify those troubles.

TABLE A – TROUBLES, POSSIBLE CAUSES, AND RECOMMENDED PROCEDURES FOR CORRECTION

TROUBLE SYMPTOM	SECONDARY SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
1. Entire film blank.	A. On all cameras.	Traffic usage recorder (TUR) inoperative.	Check TUR schedule.
	B. On one camera.	Film leader not securely attached to take-up spool.	See Section 030-302-301 for proper loading procedure.
		Defective shutter or S3 on timer defective (shutter fails to operate).	See 2.12 and 3.14(5).
		S1 on timer defective (timer motor fails to operate).	See 2.12 and 3.14(3).
		S4 on timer defective (film advance motor fails to operate).	See 2.12 and 3.14(7).
	Safety Fustat on camera hood open.	Check fuse.	
2. Blank space(s)—with loss of picture(s).	A. None	Defective shutter or S3 on timer defective.	See 2.12 and 3.14(5).
3. Blank space(s)—without loss of picture(s).	A. Space width less than one frame.	Variation in spacing due to failure of S5 on timer to close.	See 2.12 and 3.14(7)(c).
	B. Space width one full frame alternating consecutively with an exposed frame.	Cam idents on sprocket switch unequal in depth.	Readjust switch or replace sprocket. Check per 3.14(7)(b).
4. Missing picture(s)—no blank space(s) between exposures.	A. Picture(s) missing on film from all cameras.	No ground signal from TUR or other camera control circuit.	Check cam B microswitch on CS timer in TUR or check control circuit.
		TUR inoperative.	Check TUR schedule.
	B. Picture(s) missing on film from one camera only.	S1 on timer defective. Camera accidentally turned off or 100-Vac plug disconnected.	See 2.12 and 3.14(3). Restore camera to operating condition.

TABLE A (Cont)

TROUBLE SYMPTOM	SECONDARY SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
5. Duplicate pictures.	A. On film from one camera only.	S1 on timer out of adjustment.	See 2.12 and 3.14(3).
	B. On films from all cameras.	Defective cam B switch on CS timer in TUR circuit.	Check switch.
6. Unscheduled pictures.	A. On film from one camera only.	Accidental operation of start switch.	Check if occurs more than once.
	B. On films from all cameras.	Off-schedule ground signal on control lead.	Check if occurs more than once.
7. Overlapping exposures.	A. Partial advance of film.	S4 on timer fails to stay closed.	See 2.12 and 3.14(7).
8. Superimposed exposures.	A. No advance of film.	S4 on timer fails to close or S5 on timer fails to open.	See 2.12 and 3.14(7)(c).
	B. On last frame only (possible partial advance of film).	Exposed film not removed from camera.	Check exposure counter and remove film earlier.
9. Occasional dark exposure (not superimposed).	A. Check for blurred numerals.	Defective shutter.	See 4.02(2).
		Shutter operates on solenoid backstroke.	See 2.10(a).
10. Occasional light exposure.	A. None.	Defective shutter.	See 4.02(2).
		S2 on timer defective or power relay contacts out of adjustment.	See 2.12 and 3.14(4).
11. All exposures too dark.	A. Picture area only.	Overdevelopment (processing error).	See Note 1 and Section 030-302-301 for proper development procedure.
		Overexposure.	See 4.02(3).
		Dirty mirror.	See 3.01(3).
		Shutter operates on solenoid backstroke.	See 2.10(a).
		Polaroid filter(s) missing on lamp housing or over camera lens.	Replace filter(s).

TABLE A (Cont)

TROUBLE SYMPTOM	SECONDARY SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
12. All exposures too light.	A. Film leader transparent when held toward a light.	Underdevelopment of film.	See Notes 1 and 2 and Section 030-302-301 to check for proper development.
	B. Film leader not transparent.	Burned-out lamp(s).	Replace lamps.
		Weak lamp(s).	Check and replace if loose particles are present in lamp.
		Underexposure.	See 4.02(3).
		Defective shutter.	See 4.02(2).
13. Poor focus over entire picture.	A. On all exposures.	Dirty lens.	See 3.01(2).
		Very dirty mirror.	See 3.01(4).
		Front lens element loose.	Tighten turn clockwise.
14. Repetitive cloudy, spotty, or streaked pictures.	A. Same place on all exposures.	Dirty mirror.	See 3.01(3)(4).
15. Dark spots or "crows feet".	A. Any place on film.	Extremely low humidity — caused by electrostatic discharges.	Difficult to control. Always rewind film slowly back into cassette. May also occur during processing.
16. Dark streaks across or along edge of film.	A. Any place on film.	Cassette leaking light.	If end caps of cassette are loose, do not use. Return for credit.
17. Background of film dense (fogged).	A. Including sprocket hole areas.	Due to exposure to heat before development and/or improper development procedures.	See Note 3.

TABLE A (Cont)

TROUBLE SYMPTOM	SECONDARY SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
18. Peculiar patterns of light leakage.	A. Over entire length of exposed film.	Missing screw on cover or body of camera or cover latch not properly adjusted.	Check for missing screws or light leakage in camera case. Also see Section 030-302-301.
19. Troubles peculiar to same register(s) or register areas on <i>all</i> exposures.	A. Poor focus at top or bottom of picture area.	Film riding on film guide rails.	See Section 030-302-301 for proper loading procedure.
	B. Top row, left and/or right column of registers dark.	Excessive external light (such as sunlight or overhead lamps) entering camera field.	See Section 030-302-301 (placing camera in service).
	C. Multiple images on lower half of frame only.	Film overexposed (too dark).	See 4.02(3).
	D. Light reflecting at top or bottom of frame.	Black tape covering top or bottom of mirror is missing.	Replace with nonglossy tape.
	E. Weak corner registers only.	Exposure may be too light.	Check exposure time and camera setting—replace register if above is correct.
	F. Highlights around register readings near center of picture.	Polaroid filter(s) over lamps or lens missing.	Replace filter(s).
	G. Shadows over register(s) readings.	Window not removed from register cover.	Remove window(s).
	H. Thin or clipped register readings.	Register cover not fully seated.	Seat register cover fully.
	I. Weak register readings.	Faded or discolored register wheels.	Replace register(s).
	J. Illegible register readings (especially units and tens digits).	Dirty register wheels.	Clean per Section 069-360-801.

TABLE A (Cont)

TROUBLE SYMPTOM	SECONDARY SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
20. Troubles peculiar to film breakage or rewinding difficulties.	A. Film breaks at slot in take-up spool while being loaded.	Brittle film.	Do not use brittle film.
	B. Film cannot be rewound into cassette.	Film separated from cassette spool inside the camera.	Remove rear cover latch screws per Section 030-302-301 (special procedures for unloading film).
	C. Film is difficult to rewind back into cassette.	Take-up spool binding.	Lubricate per 2.02(d).
Rewind knob binding.		Lubricate per 2.02(b).	
		Cassette improperly positioned when loaded and film slack not taken up (film will have length-wise pressure streak).	See Section 030-302-301 for proper loading procedure.

**Note 1:** If several films processed at the same time appear to be too dark or exhibit poor contrast, the trouble may be improper processing. (This could be a change in the developer, excessive temperature, or agitation.) After checking the lens setting (f8, 1/25) and cleanliness of the mirrors, make test exposures in two or three cameras and have the films developed by a different processor. Be sure to request the special development specified in Section 030-302-301.

**Note 2:** If this condition exists, it is likely to affect films from all cameras in the office. Check with processor to ensure he is providing the special development referred to in Note 1.

**Note 3:** (a) Fogging may be caused by deterioration of the film prior to exposure, due to adverse storage conditions, such as storage near steam pipes, radiators, direct sunlight, or where excessive temperatures prevail.

(b) Where possible, the following storage temperatures should not be exceeded:

For storage periods up to:	2 Months	6 Months	12 Months
Keep film below:	70° F	60° F	50° F

TABLE B – PICTORIAL TROUBLE GUIDE

(See Note.)

FILM DESCRIPTION REFER TO TABLE A

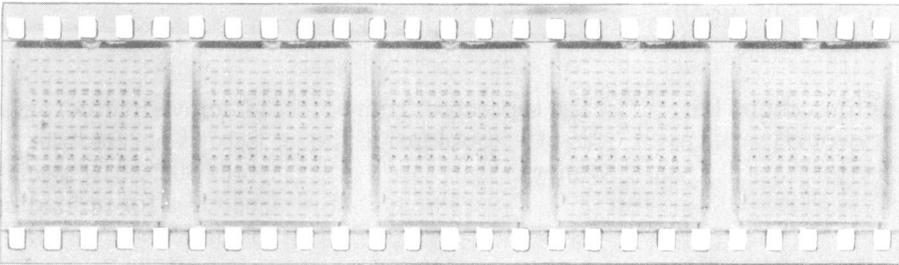
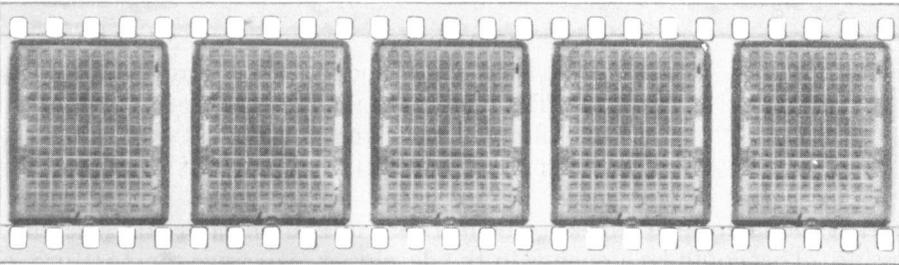
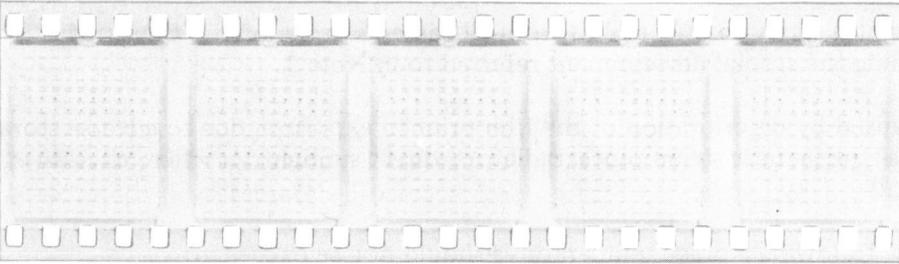
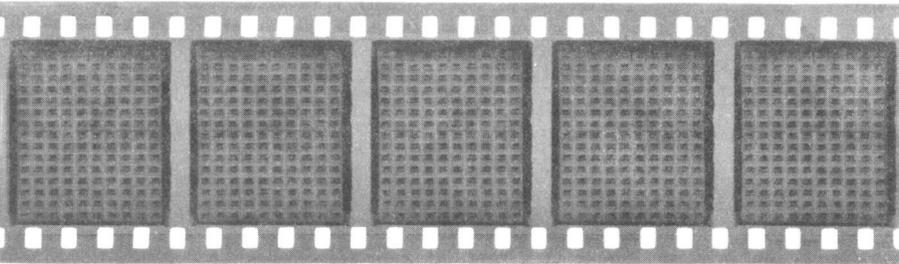
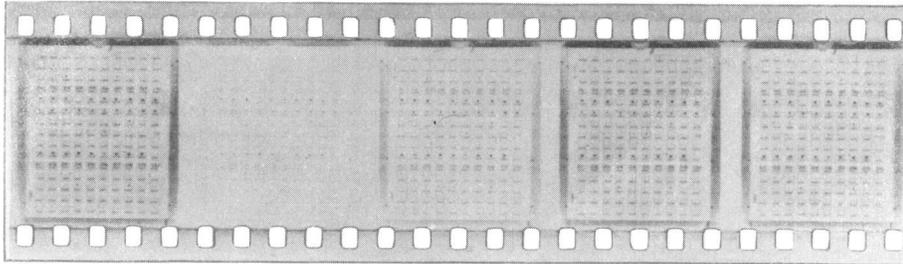
1.		<p>Correct Exposure Correct Develop- ment</p>	—
2.		<p>All Exposures Too Dark Excluding Sprocket Hole Areas</p>	11A
3.		<p>All Exposures Too Light</p>	12A, 12B
4.		<p>Fogged or Dense Film</p>	17A

TABLE B (Cont)

FILM DESCRIPTION

REFER TO  
TABLE A

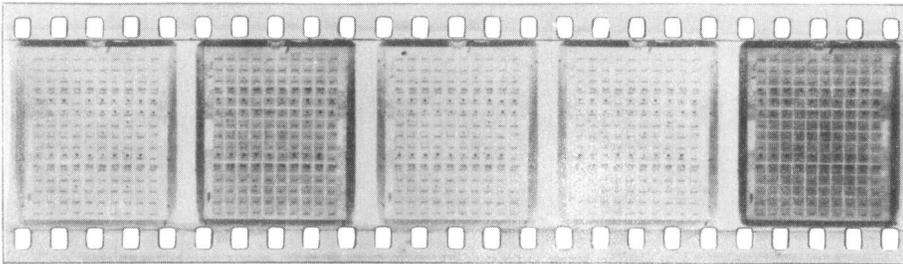
5.



Occasional Light  
Exposure

10A

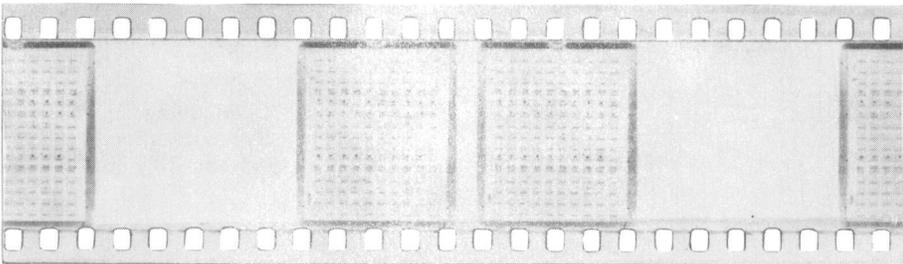
6.



Occasional Dark  
Exposure

9A

7.



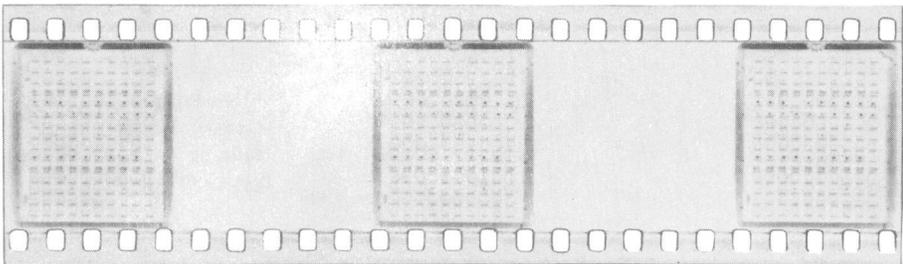
Occasional Blank  
Space With Loss  
of Picture

2A

Without Loss of  
Picture

3A

8.

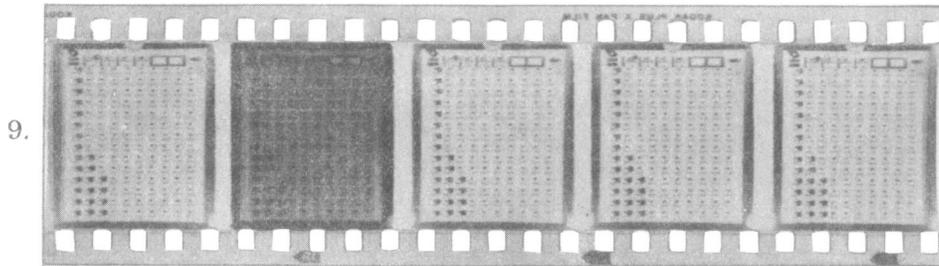


Alternating Blank  
Spaces Without  
Loss of Pictures

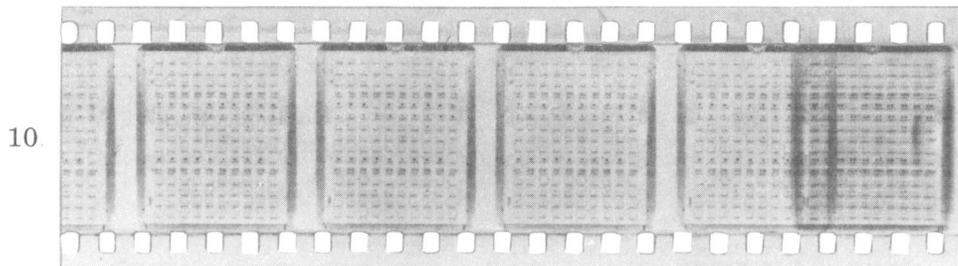
3B

TABLE B (Cont)

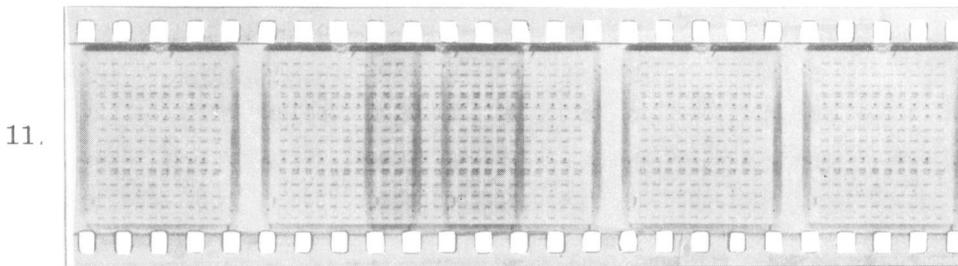
FILM DESCRIPTION REFER TO TABLE A



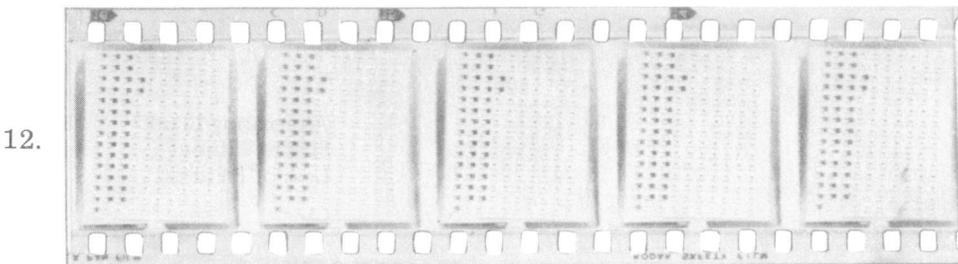
Superimposed Exposures (No Advance of Film) 8A



Overlapping Exposures (Last Frame Only) 8B



Overlapping Exposures (Partial Advance of Film) 7A



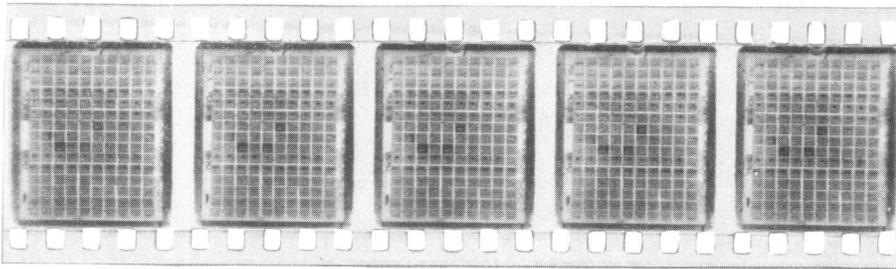
Tilted Picture (Camera Hood Hanging Incorrectly) —

TABLE B (Cont)

FILM DESCRIPTION

REFER TO  
TABLE A

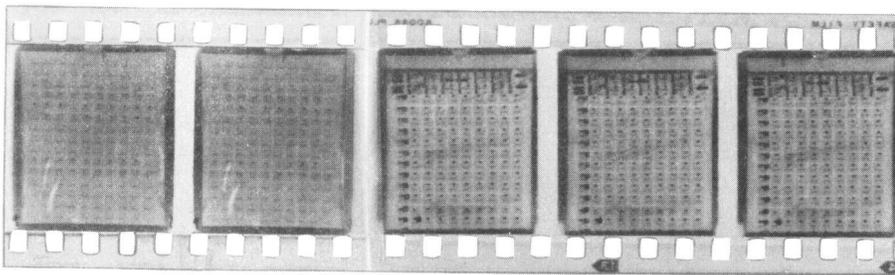
13.



Polaroid Filter  
Missing

19F

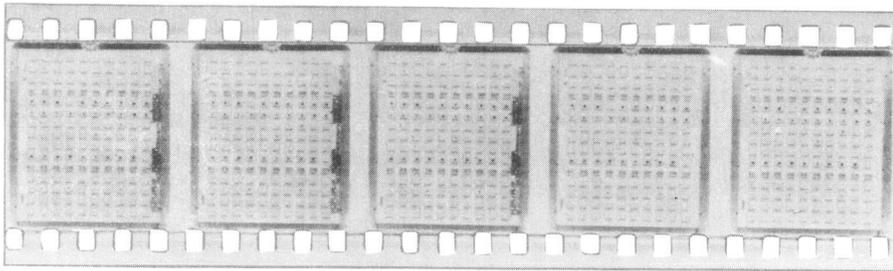
14.



Dirty Mirror  
(2 Examples)

11A, 13A,  
14A

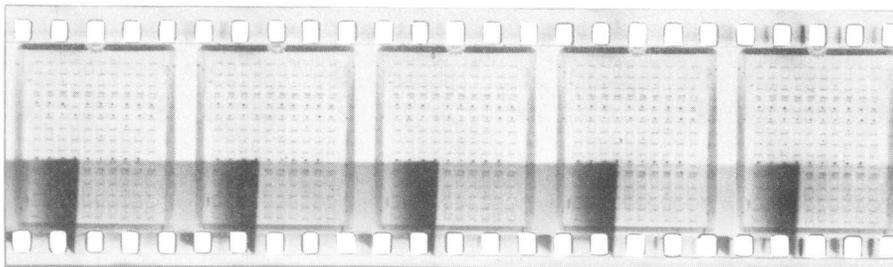
15.



External Light  
Entering Side of  
Camera Field  
(3 Frames)

19B

16.

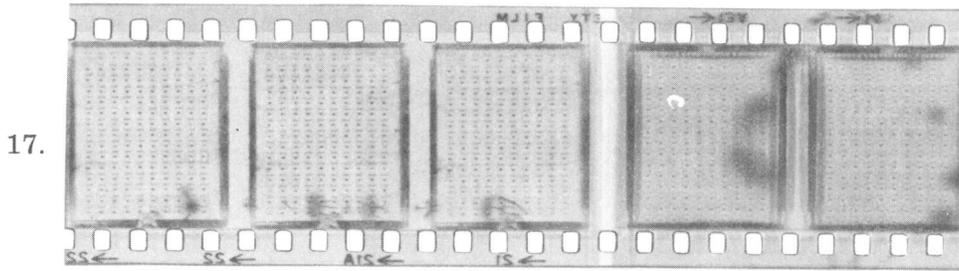


Peculiar Pattern  
of Light Leakage

18A

TABLE B (Cont)

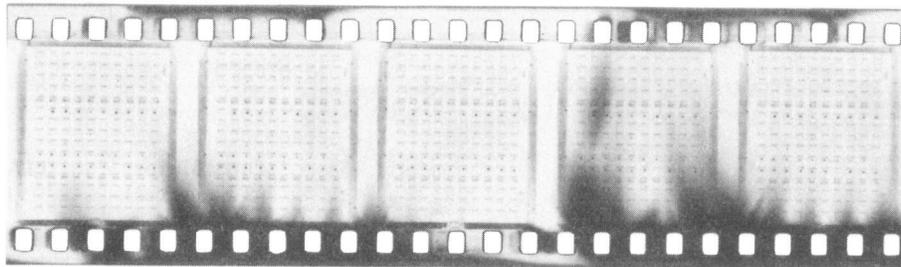
FILM DESCRIPTION REFER TO TABLE A



17.

Pressure Streak  
Down Center of Film  
(Either Dark Line or  
Scratches)

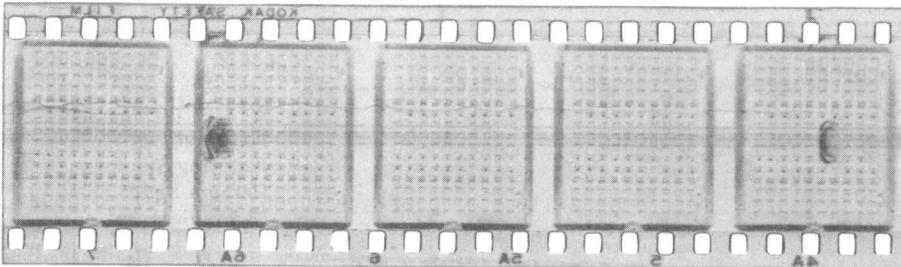
20C3



18.

Nonuniform Dark  
Areas Across or Along  
Edge of Film

16A



19.

Dark Spots or  
"Crows Feet"  
(2 Examples)

15A

*Note:* The above illustrations lack the tonal quality of the original film and are presented only to assist the craftsman in determining various types of camera malfunction.