

# PART TWO

## OPERATING INSTRUCTIONS

**NOTE:** For information on destroying this equipment to prevent enemy use, see the destruction notice at the front of this manual.

### SECTION IV

#### STEP-BY-STEP OPERATING PROCEDURE

##### 37. GENERAL.

Only those operating procedures relating to the complete Camera PH-330-G are considered in the discussion which follows. With a few minor exceptions, all parts issued for use with Camera PH-330-(\*) are involved in the operation of the complete Camera PH-330-G. Consequently, all characteristic stages of camera

operating procedure are here represented. Operation involving features not furnished with certain models (electric motors, magazine attachments, turrets, turret viewfinders, etc.) obviously will not apply to those models. It also is apparent that hand operation of the camera dispenses with procedure involving equipment used only with the tripod.

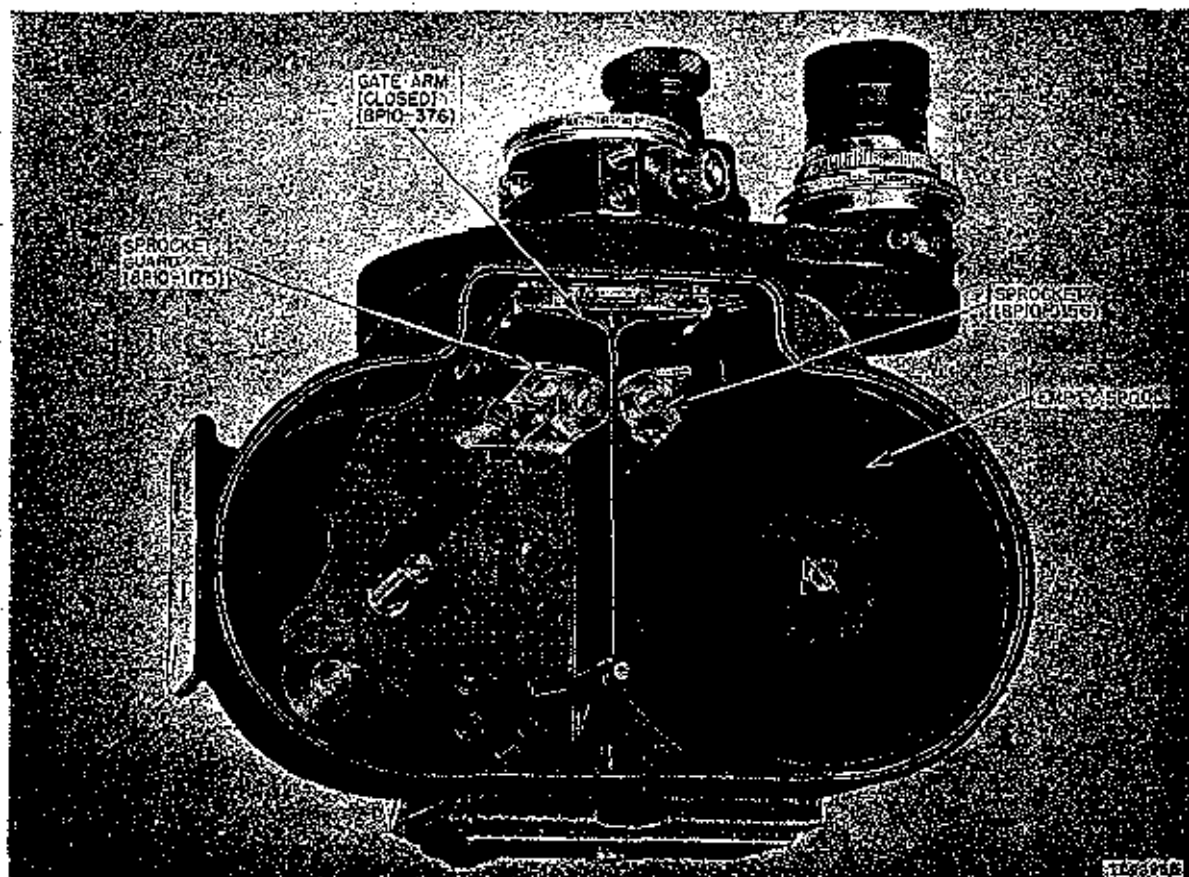


Figure 24. Before loading, Camera PH-330-(\*) gate arm in closed position.

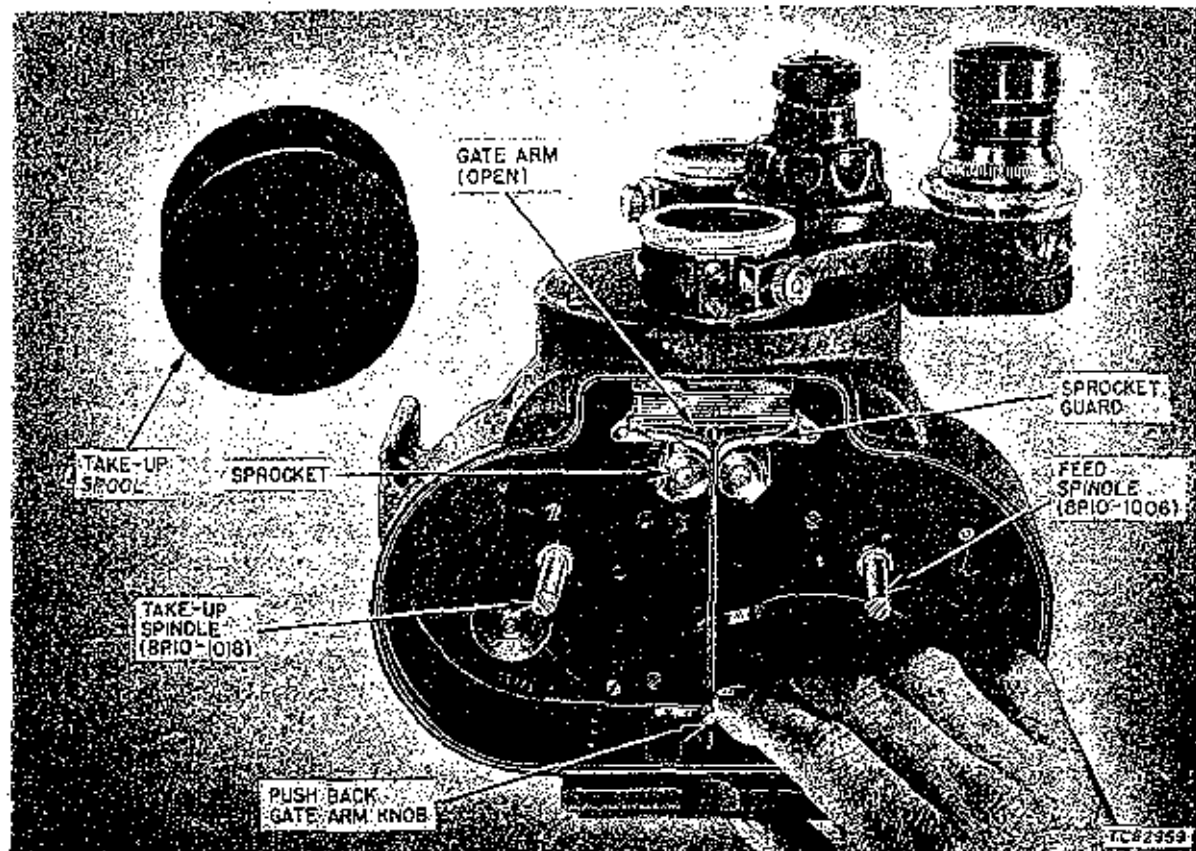


Figure 25. Before loading, Camera PH-330-(\*); opening film gate.

### 38. THREADING FILM (WITHOUT MAGAZINE).

**NOTE:** When using the 100-foot daylight loading spool, the loading and threading of the film may be done in daylight. A subdued light should be chosen; direct sunlight is to be avoided during the threading operation.

a. Make sure that the spring is tensioned by giving the ratchet crank one or two complete turns. This will bring the shuttle teeth (fig. 43 (21)) into their lower or engaged position at the film gate.

b. Place the camera on its side, with the camera door (left-hand side) up, and the lens away from the operator. Turn the camera door latches (fig. 6) to OPEN and remove the door. The two door latches which fasten the cover are actuated by a single cam link (fig. 66 (34)) and are turned simultaneously.

c. Remove the take-up spool (fig. 25). With the camera in the position described above, the take-up spool is at the left and the feed spool

is at the right. Both the feed and the take-up spindle (fig. 25) are now empty.

d. Open the film gate by pressing the gate arm knob (fig. 25) toward the back of the camera. Be sure to move the knob as far back as it will go, as the flange on the gate arm forces the sprockets away from the sprocket guards (fig. 25).

e. Hold the feed spool with the right hand, and with the left hand draw about a foot of film from the spool in a clockwise direction. Make an approximate loop with the left hand and place the spool partly over the feed spindle. Insert the film loop partly between the feed sprocket and its guard (fig. 26). Complete the rough thread-up by fitting the film into the channel between the pressure plate and the aperture plate (fig. 26) and then inserting it partly between the take-up sprocket and its guard (fig. 27). Be sure that the film is inserted so that the emulsion side is facing the lens.

f. Seat the feed spool securely on the feed

spindle (fig. 26). This may be done either by turning the spool counterclockwise, or by turning the feed spindle.

g. Fit the film snugly between the sprocket and its guard, and engage the sprocket holes in the teeth. Form loops above the film gate in such a way that the upper, or feed, loop will have nine sprocket holes visible when the gate is closed.

h. Insert the film between the take-up sprocket and its guard (fig. 27) and engage the sprocket holes in the sprocket teeth, so that the lower, or take-up loop will have 11 sprocket holes visible when the gate is closed.

i. Close the film gate by pressing the gate arm knob forward as far as it will go (fig. 27), locking the sprockets into operating position.

j. Engage the film in the shuttle teeth by inserting an index finger in the loops, pulling slightly to the right and to the left, until the teeth are firmly seated in the sprocket holes.

k. Check the take-up spool for shape. The flanges of the spool must not be battered or

bent inward, as this is one of the most frequent causes of buckling and film jam. Use the spool gauge (fig. 2 (18)) to check flanges.

l. Insert the end of the film into the slot on the hub of the take-up spool (fig. 28), winding it clockwise until most of the slack film has been wound on. Place the spool on the take-up spindle.

m. If the loops are found to lack the correct number of sprocket holes, re-open the film gate and increase or decrease the loop through the lower sprocket only. Always push the film through the open sprocket; do not pull it.

n. With the camera door still open, quickly press the operating lever on and off (fig. 29). Keep a finger pressed lightly on the feed spool (fig. 29) to prevent backlash and fogging of the unexposed film. If the loops do not buckle or alter their shape during this test run, the camera is threaded properly. Replace the camera door and turn the door latch to the CLOSED position. If the camera door does not fit easily in place on the camera housing, the gate arm is not fully closed.

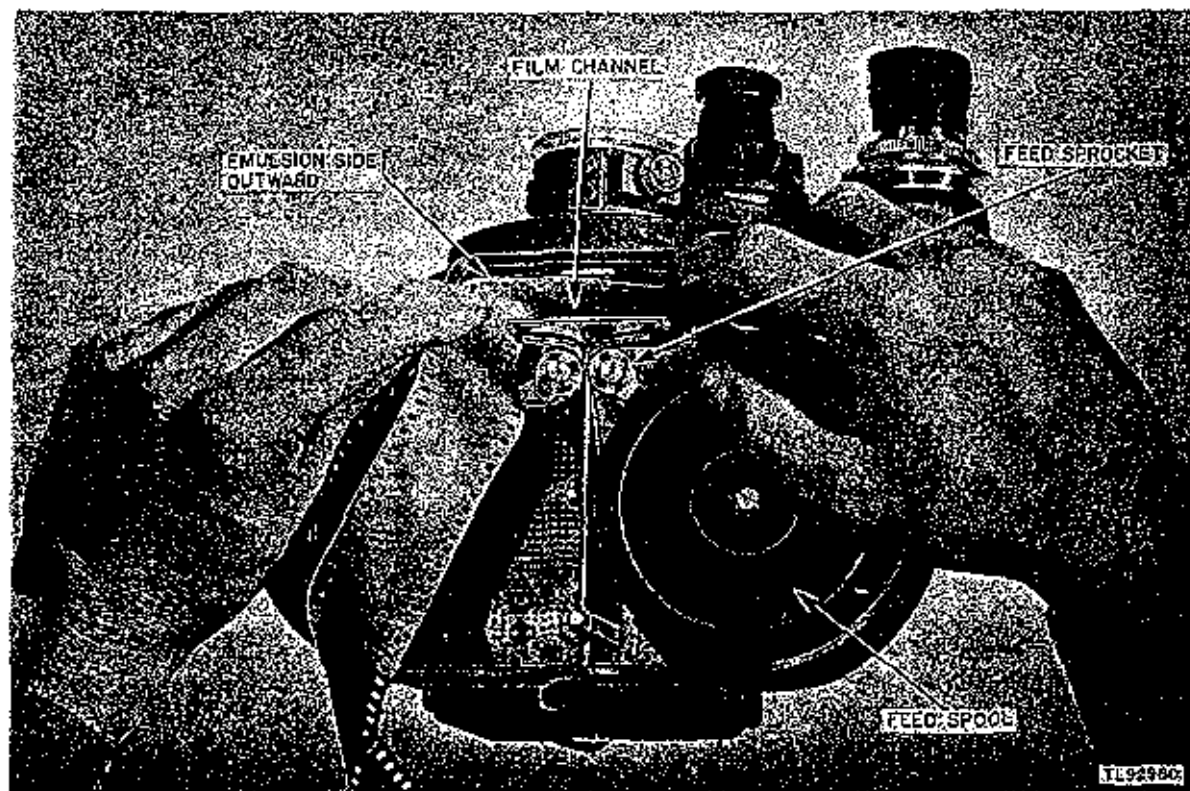


Figure 26: Loading, Camera PH-330-(\*); inserting film in channel and engaging sprocket holes.

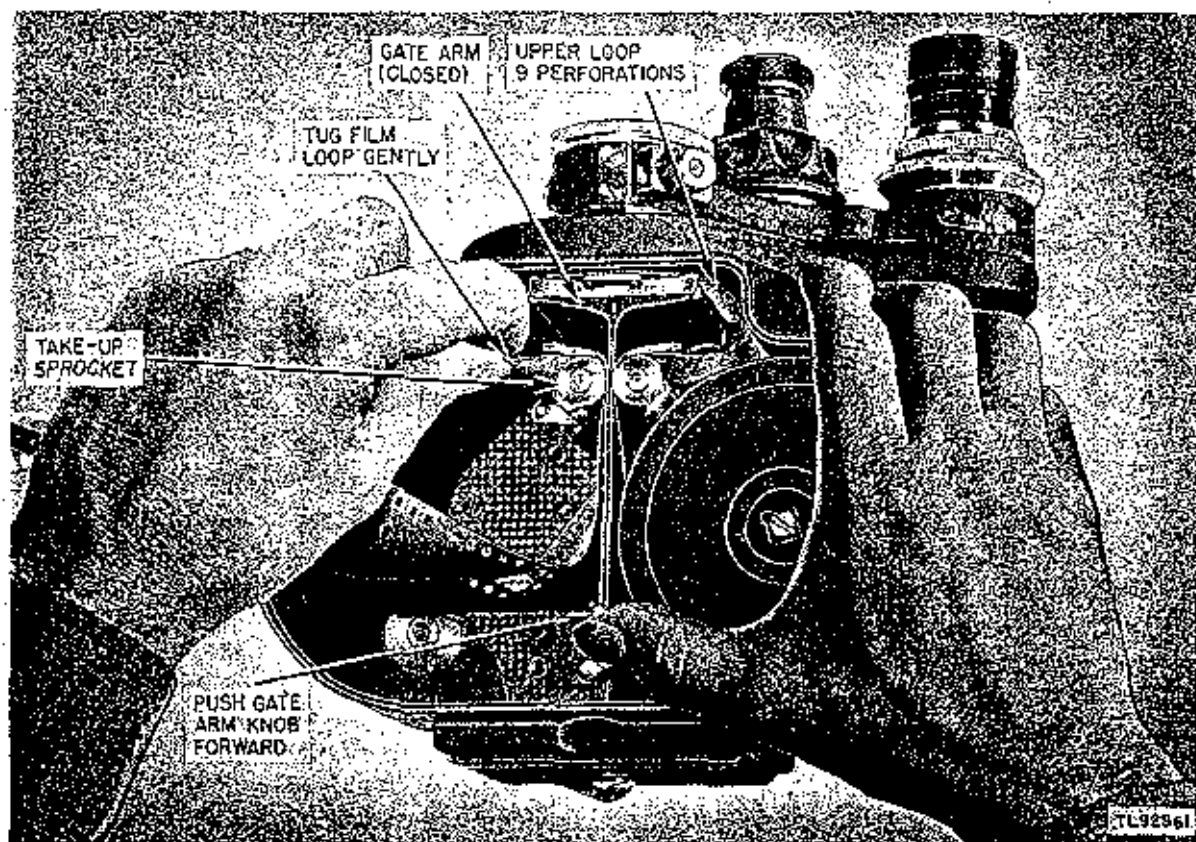


Figure 27. Loading, Camera PH-330(\*): forming loops, engaging film in shuttle teeth, and closing film gate.

**NOTE:** The 100-foot dialight spool carries an actual film load of about 110 feet, with a spliced leader to protect unexposed film during threading and a spliced trailer to protect the film roll after exposure. The leader at the beginning of the roll is marked "unexposed," and the trailer at the end is marked "exposed." Film may be used which has been spooled from bulk, in which case the loading and threading operation will have to be accomplished in the darkroom. If this is done, the total film length may be as much as 120 feet, all usable for exposure except for the short length used in threading.

### 39. WINDING SPRING MOTOR AND OPERATING BY HAND CRANK.

The spring motor should be fully wound before every take to insure a consistent operating speed for all exposures. All winding devices for Camera PH-330(\*) are operated by rotating in a counterclockwise direction until a definite mechanical resistance is noted, indicating the fully wound position.

**a. Ratchet Winding Crank (fig. 12 (2)).** Insert the crank into the winding crank receptacle (fig. 5) directly to the rear of the focusing magnifier. Wind counterclockwise.

**b. Hand Crank (fig. 12 (5)).** The function of the hand crank has been described in paragraph 8c. In general, this crank should be used sparingly as an emergency device for driving the camera mechanism. A uniform shooting speed is virtually impossible with hand operation; even when the camera is firmly seated on a tripod for the take. Special precaution also must be exercised when hand-cranking short lengths of film in reverse for making lap dissolves. A reverse cranking of the camera mechanism serves to wind the spring. Consequently, the amount of footage which can be rewound is limited by the extent to which the motor spring is unwound. Moreover, the feed spool will not take up the rewound film during this operation, leaving the rewound footage to loop back on itself inside the camera. Under no circumstances should more than 2 feet of rewound film be allowed to back up into the camera in this manner. When cranking in reverse, the lens should be covered with a lens cap to avoid unwanted exposures on the film. Wherever possible, all special effects, such as lap dissolves, should be accomplished in the laboratory by means of the optical printer. Note also that the



footage dial will add footage, instead of subtracting it, when the film is cranked in reverse. Footage therefore, should be recorded prior to reverse hand crank operation and the footage dial reset when reverse cranking is completed. The dial must be set back double the hand cranked (reverse) footage. For example:

Scene ended	50 ft
Reverse crank	2 ft
New reading	52 ft (50 plus 2)
Actual footage	48 ft (50 minus 2)
Required setting	4 ft back

#### 40. SETTING FOOTAGE DIAL.

**a. Before Exposure.** When the camera has been threaded properly and the camera door inserted in place, set the footage dial (fig. 11) with 0 at the small right-hand dot by turning the dial counterclockwise. For the standard daylight spool, allow a 5-foot leader to pass through the camera by operating the mechanism until the footage dial registers 0. The camera now is ready for a useful take of 100 feet.

**b. During Exposure.** Since the footage dial is calibrated for 100 feet only, it will be necessary to note carefully when and how often the pointer has registered 0 with magazine loads in excess of this amount. Extra footage with darkroom-loaded spools should be checked in this manner. The length of all individual scenes or shots may be determined by checking against the footage dial and the large center dot (fig. 11) engraved above it.

**c. After Exposure.** For the standard daylight-loaded run, the camera should not be opened when the footage dial has returned to the 0 position after one full revolution. The mechanism should be operated until the 0 mark coincides with the left-hand dot (at least another 5 feet) to provide a protective trailer around the exposed film roll.

#### 41. SETTING GOVERNOR SPEED DIAL.

Adjust the governor speed dial (fig. 11) to the desired number of exposures per second by rotating the dial until the appropriate index

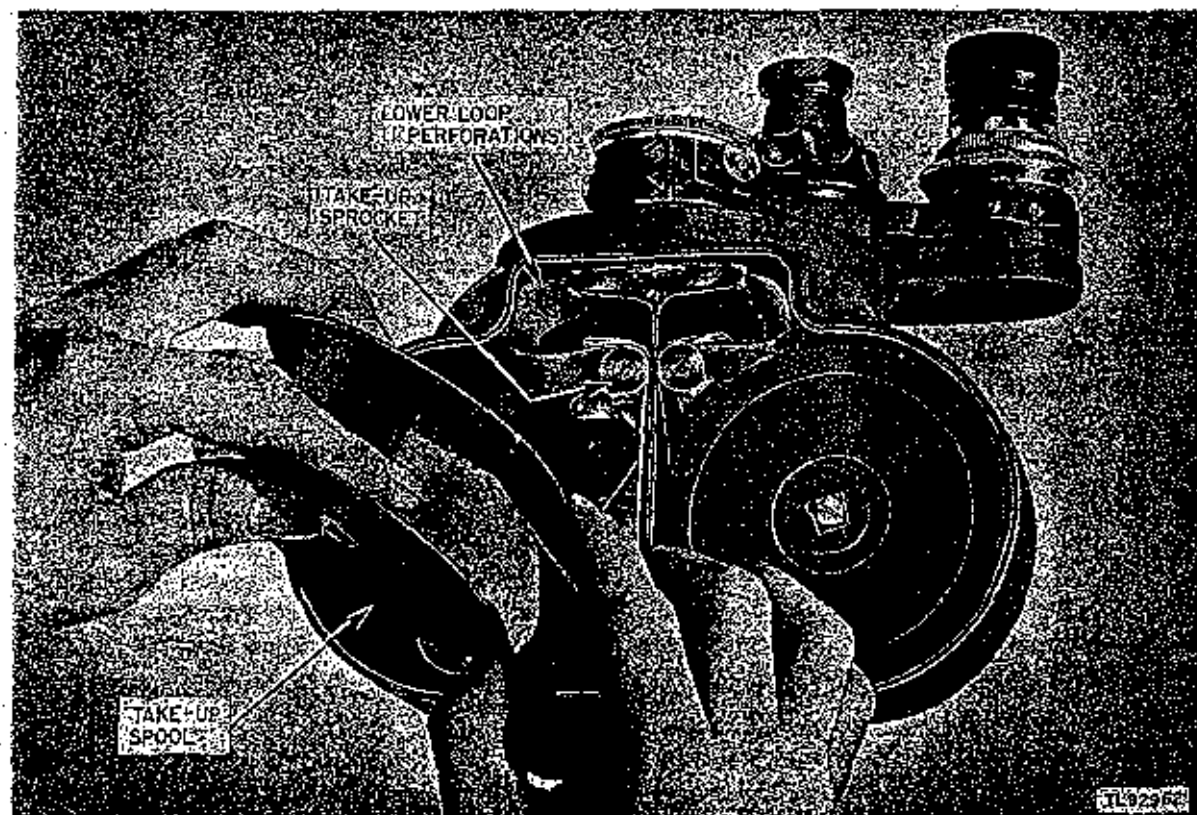


Figure 28. Loading, Camera PH-330-(\*); inserting film leader in take-up spool.

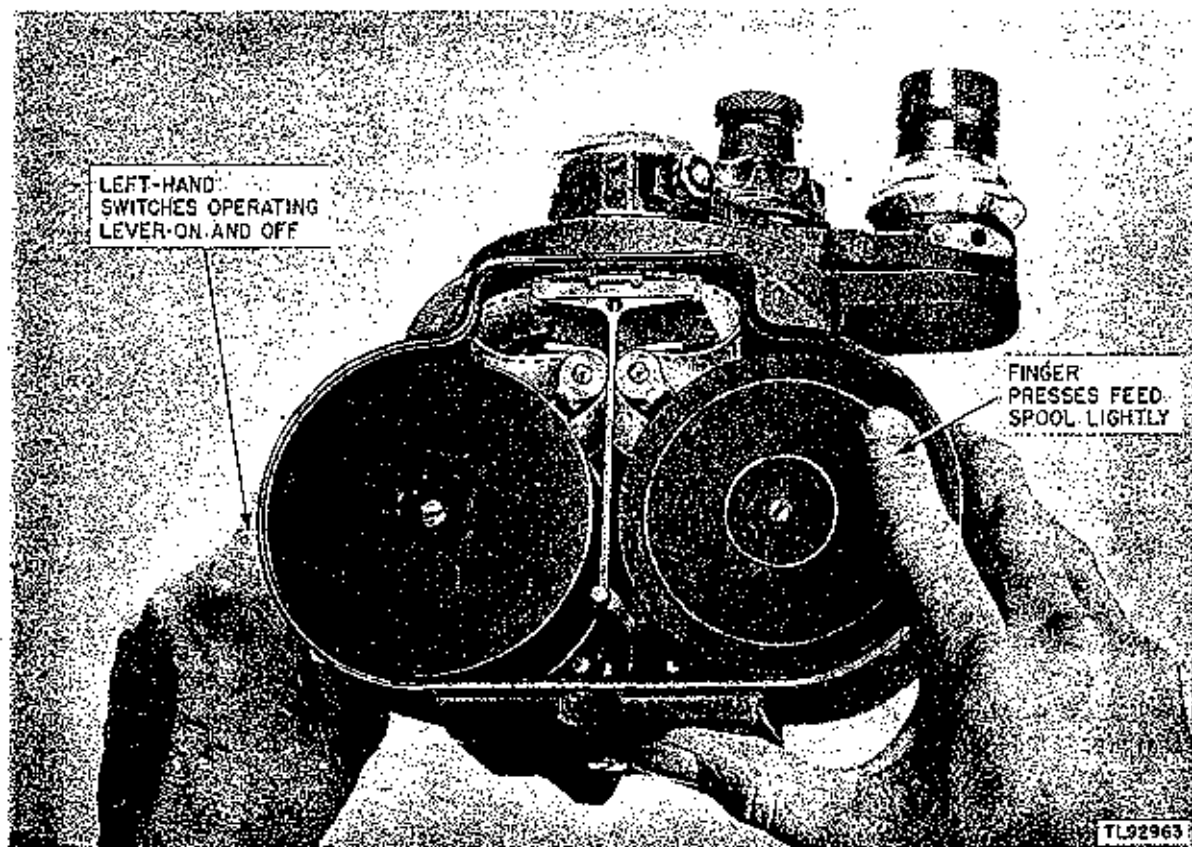


Figure 29. After loading, Camera PH-330-(\*): testing for performance.

marking is in position. Standard operating procedure demands that the speed dial be set at 24 frames per second for the normal theatrical sound-on-film run. Where special effects of slow or accelerated motion are desired, the speed may be varied above or below this marking. Films to be projected as silent motion pictures only, without an accompanying sound track, may be photographed at 16 frames per second. If the films are intended for general theatrical exhibition, however, a camera speed of 24 frames per second is necessary at all times, since theater projectors operate only at 24 frames per second.

#### 42. SETTING RELATIVE EXPOSURE INDICATOR.

Set the inner dial of the relative exposure indicator (fig. 11) so that the desired calibration for shooting speed (frames per second) is opposite the  $f$ /stop on the outer ring demanded by a specific lighting condition. To convert for any change of speed, find the new camera speed calibration on the inner dial. The corresponding

$f$ /stop index on the outer ring immediately above it will give the new diaphragm reading. Thus, if the inner dial is set for an operating speed of 24 frames per second, with a lens set at  $f$ /11, conversion to 48 frames automatically will call for a change of diaphragm to  $f$ /8.

#### 43. SETTING LENS DIAPHRAGM.

The lens diaphragm (fig. 8) collar opens and closes an iris diaphragm regulating the amount of light passing through the lens. When the proper  $f$ /stop reading for the prevailing light condition and camera speed has been determined on the relative exposure indicator, set the diaphragm collar at that stop by turning the ring to the appropriate index marking.

#### 44. SETTING LENS FOCUSING COLLAR.

The lens focusing collar (fig. 8) is calibrated for distance in feet and is adjustable for objects from close distances of only a few feet to objects at infinity distance. Measure the distance from the camera to the object being photographed.

Then revolve the focusing collar until the appropriate calibration for distance in feet is in line opposite the marker on the lens mount seat. Lock the collar at this setting by tightening the focusing clamp knob on the lens mount seat (fig. 8).

**CAUTION:** Double check the diaphragm and focusing collar readings before exposing film, for any change or shift of the collar position. Watch for accidental slippage, and remember at all times to convert diaphragm and focus calibrations for any change in speed, distance, and lighting condition. The use of a reliable exposure meter wherever available will be helpful in determining proper exposure. See TM 11-2351, Exposure Meters PH-77, PH-77-A, PH-77-C, PH-77-D, PH-77-E, and PH-252-A, as changed by Changes 1, dated 5 December 1944.

#### 45. CHANGING LENS.

When a change of lens is required, remove the lens mount from the lens mount seat by releasing the focusing clamp knob (fig. 8) and pressing on the lens mount lock lever (fig. 8). Fit the new lens mount in the lens mount seat by inserting it as far as it will go. Release the lens mount lock lever so that it is tensed firmly against the lens mount by the compression spring. When the lens mount is seated and locked, pull gently on the lens barrel to make sure that it is securely placed.

**NOTE:** The lens mount will not slide into its seat unless the groove or keyway in the lens mount coincides with the tongue in the lens seat.

#### 46. MOUNTING LIGHT FILTER.

The selection of the filter will depend on the prevailing light and terrain features, the nature and color of the subject, the film used, and the special requirements of the mission. A detailed filter factor table is given in the appendix to this manual and should be consulted whenever filters are used. The filter holder available for Camera PH-330-G is for 35-mm filter elements only. These may be readily fitted in the holder, and the holder slipped into place over the barrel of the lens. As previously pointed out in paragraph 18, special filter holders for use with the

75-mm Baltar lens and the 254-mm Wollensak lens are not provided. All filters used with the 75-mm Baltar lens are fitted directly between the lens and hood of the Baltar lens mount, while filters used with the 254-mm Wollensak lens are fitted between the lens and hood of the Wollensak lens mount. The procedure for mounting filters to be used with the Baltar 152-mm lens is given in the note following paragraph 18c. Check carefully on the correspondence of all filters and lenses.

#### 47. OPERATING SPIDER TURRET.

To rotate the turret arms for any desired lens, loosen the large turret lock knob (fig. 8) on the front of the turret plate by twirling it counterclockwise. Grasp the turret post dust cap (fig. 8) and pull the turret plate clear; care must be taken so that the turret tension spring does not forcibly snap the turret plate back into place. When the lens mount seats have cleared the camera head entirely, rotate the turret to bring the desired turret arm with its appropriate lens in either the viewing or the shooting position. The tension spring should draw the turret plate tightly into place against the camera head casting. Lock the turret by twirling the knob clockwise. Do not apply undue pressure to the knob, since the lock should not be screwed too tightly.

#### 48. HAND-HOLDING CAMERA.

When shooting is done without a tripod, the camera holding handle (fig. 5) should always be used to insure maximum camera control. The handle should be screwed into place in the tripod socket insert (fig. 51 (2)) under the base of the camera housing, before preparing to sight in the viewfinder. One method for holding the camera is shown in figure 1. Note that, in the standing position, both elbows are pressed firmly against the sides of the body for support and stability. The left hand may be kept entirely free, grasping the camera housing beneath the turret, with the handle grasped by the right hand and the strap looped over the right wrist. An alternate method is described below.

a. Loop the wrist strap over the left hand in such a way that the hand is free to hold the camera beneath the turret. Be careful to avoid covering the lens with the thumb.

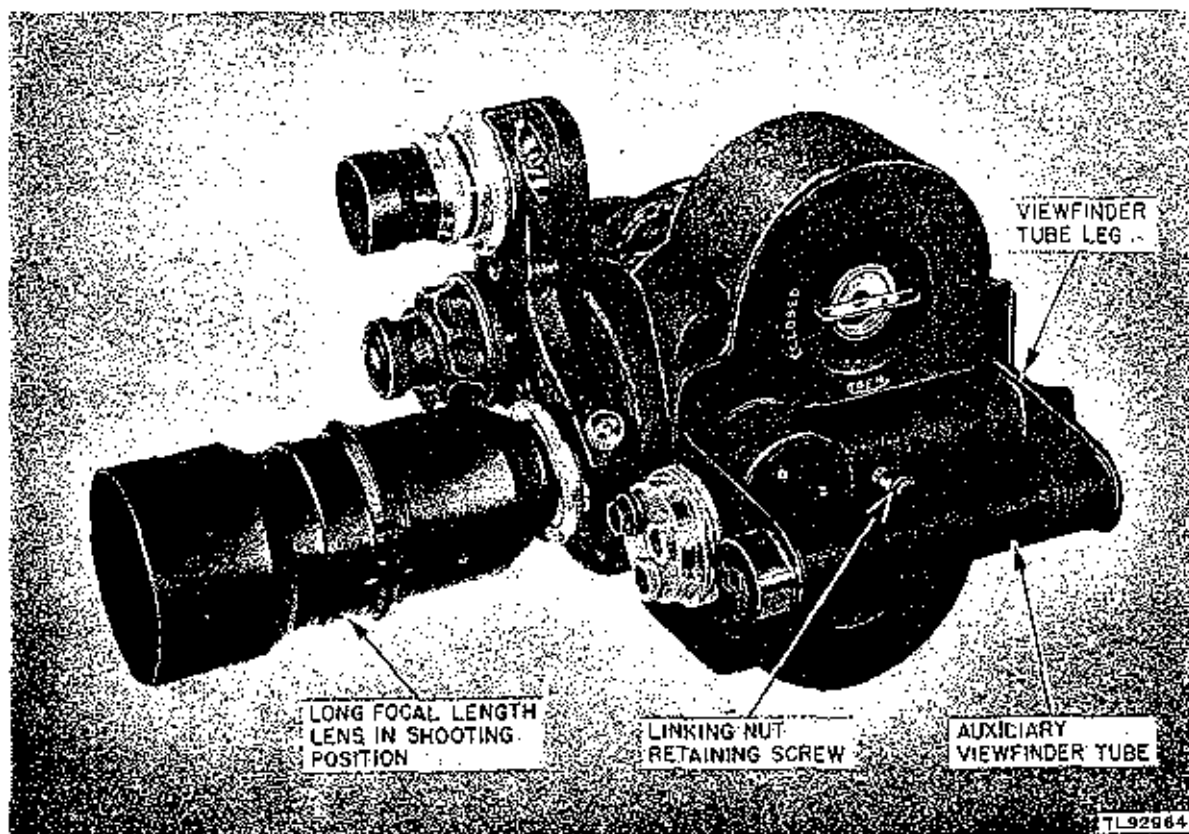


Figure 30. Camera PH-330-G, with auxiliary viewfinder tube attached.

b. Grasp the holding handle firmly with the right hand, with the right thumb in position on the operating lever or trigger.

c. Raise the camera into position for viewing, with the flat side of the camera braced firmly against the forehead and nose, and the left eye aligned with the viewfinder eyepiece.

**NOTE:** When the camera is being operated under emergency or combat situations, and particularly in the case of uneven or hazardous terrain, the use of the wrist strap is not advised.

#### 49. SIGHTING IN VIEWFINDER.

a. **Turret Viewfinder.** Before raising the camera to the viewing position, be sure that the viewfinder lens to be used in conjunction with the camera lens is screwed into place on the finder turret (fig. 4). Select the finder lens (fig. 4) to match the focal length of the camera lens and rotate the viewfinder turret until the finder lens is in position before the finder eyepiece. For example, the 35-mm finder lens should be in position before the finder eyepiece when the 35-mm camera lens is in the shooting position

at the exposure aperture. The 75-mm finder lens should be used with the 75-mm shooting lens, and so on. Raise the camera to the viewing position and locate the subject to be photographed in the viewfinder. When the scene has been composed in the viewfinder and the camera is firmly supported for shooting, press the operating lever for the actual take.

b. **Drum Viewfinder.** In models equipped with the drum viewfinder, revolve the calibrated outer dial until the matte corresponding with the focal length of the camera lens in use is in position before the viewfinder eyepiece. This is done by rotating the knurled edges of the drum until the dot and the appropriate numeral engraved on the drum are flush with the dot engraved on the tube of the finder (9 o'clock position (fig. 10)). Check carefully to see that the matte number on the revolving drum and the focal length of the shooting lens correspond: a 2-inch matte for a 2-inch lens, a 4-inch matte for a 4-inch lens, and so on. When the scene has been composed in the eyepiece and the camera is in position for shooting,



press the operating lever for the actual take.

**c. Auxiliary Viewfinder.** When lenses of long focal length and wide aperture (fig. 30) obstruct the field of the drum or turret viewfinders, an auxiliary viewfinder tube should be mounted alongside the standard finder. This is done by setting the auxiliary viewfinder tube flush with the turret viewfinder, so that the linking nut retaining screw (fig. 30) in the center of the auxiliary tube fits naturally over the threaded stud in the center of the turret viewfinder tube (fig. 10). When properly seated, the curved legs at each end of the auxiliary finder tube (fig. 10) will encircle the turret viewfinder tube just above the knurled drum at one end and the offset eyepiece at the other (fig. 30). When positioned on the drum viewfinder, the legs of the auxiliary tube must be fitted into place around the eyepiece rim and the base of the drum finder. Drum viewfinders do not provide the threaded stud in the center for the auxiliary linkage. Eyepieces and lenses for the auxiliary viewfinder are available in both the slip-in and the screw-on types, and should be properly attached before mounting the auxiliary unit. When the scene has been composed in the auxiliary viewfinder and the camera is in position for shooting, press the operating lever for the actual take.

**CAUTION:** Since the drum or turret viewfinder is located  $1\frac{1}{2}$  inches to the side of the lens, it is necessary when filming objects at close distances, to make a corresponding allowance for the offset of the finder from the position of the lens. The auxiliary viewfinder has a displacement of  $3\frac{3}{8}$  inches, or almost double that of the other two viewfinders. A greater correction, therefore, is required for compensation of parallax.

## 50. SETTING UP TRIPOD PH-520/U.

Tripod PH-520/U should be fully set up with alignment gauge and camera before any attempt is made to use the prismatic focusing magnifier or to attach the auxiliary magazine and motor units. The procedure is given below.

**a.** Invert the tripod, with the tripod head (fig. 7) on the ground and its legs in the air.

**b.** Raise the legs evenly to the desired height

by loosening the fluted knobs (fig. 7) between any leg unit and extending or telescoping the leg elements as required. Lock the leg at this position by tightening the fluted knob. Similarly adjust the other two legs for an approximate positioning of the tripod base in relation to the specific terrain features.

**c.** Return the tripod to its normal standing position. If the panning handle is not in position on the tripod head (fig. 7), unscrew it from its socket under the base casting. Insert it into the socket under the adapter plate (fig. 67) and screw it firmly into place.

**d.** Spread the legs to accommodate the tripod to the terrain and to the specific leg height for which it is adjusted. Where possible, sink the steel spurs at the base of each leg firmly into the ground by pressing on the foot plates (fig. 7).

**e.** To level the tripod, readjust the leg-locking knobs until the base of the tripod head is level in all directions. On tripod models not carrying the T-level bubble device, this may be done by sight-leveling the tripod head to bring it parallel with the real or imaginary horizon lines. Final positioning should be made wherever possible by adjusting one leg for the T-level bubble reading on the base of the tripod head.

**NOTE:** Final check for tripod position should be made after all adjustments prior to actual shooting are completed. All supplementary operating units should be attached before the tripod is finally positioned, since the adjustment of the tripod is likely to be disturbed during the assembly procedure.

## 51. ATTACHING ALIGNMENT GAUGE.

The alignment gauge (fig. 13) should always be used with the prismatic focusing magnifier to compensate for parallax in the two positions of the lens during focusing and shooting. To mount this unit, fasten the gauge to the tripod head, using the tripod and camera coupling knob and screw assembly (fig. 67 (18)). Note that when the gauge is not in use, this knob and screw assembly fastens the camera to the camera base adapter plate (fig. 67 (17)). Attach the camera to the sliding platform (fig. 13) by means of the screw which fits both the hole in the platform plate and the tripod socket insert (fig. 51 (2)) in the base of the camera. Seat the platform in the gauge channel so that it rides easily from one end of the gauge

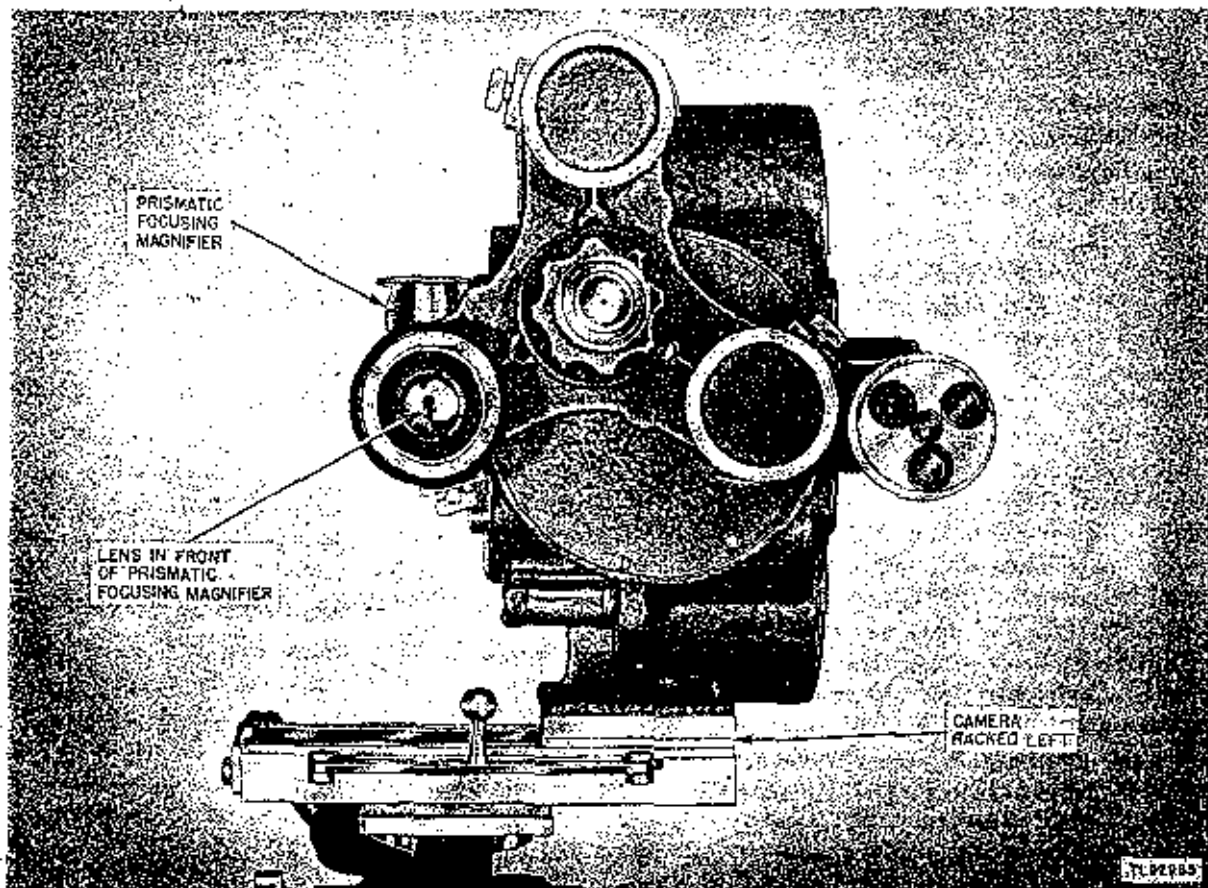


Figure 31. Alignment gauge, rack over, viewing position, Camera PH-330-G.

bed to the other, and test the platform-locking knob (fig. 13) for its engagement at either extreme.

## 52. OPERATING ALIGNMENT GAUGE.

Rotate the turret arm to bring the required lens into the viewing position (fig. 31) before the focusing magnifier. Rack the camera over by sliding the platform in its bed to the extreme left of the gauge (operator behind camera). Set the diopter adjustment to accommodate the eye of the operator, by rotating the eyepiece until the frame line on the ground glass is at maximum sharpness. Open the lens diaphragm and compose the scene by visual inspection in the prismatic magnifier. Focus the lens, and lock the focusing collar by tightening the focusing clamp knob. The lens now is adjusted for critical definition of the image, with the composition framed in the magnifier. Rotate the turret arm to return the lens to the shooting position before the exposure aperture.

Rack the camera over again to the extreme right of the gauge (operator behind the camera) so that the lens (in shooting position) is directly over the tripod head (fig. 32). Lock the platform in position with the platform locking knob (fig. 13). The camera now is focused and corrected for parallax.

## 53. OPERATING PRISMATIC FOCUSING MAGNIFIER.

The rule of the focusing magnifier in relation to the turret arms and lens when in viewing and shooting positions has already been explained (par. 5b and c). The procedure for visual focusing of the lens is self-explanatory: the focusing collar of the lens (in the viewing position) is rotated until definition of the image is visually sharp on the ground glass of the magnifier. For best results, the diaphragm should be fully opened while adjusting for definition. The collar then is locked in position by tightening the focusing lock clamp knob on

the lens mount seat, and the entire turret arm rotated to place the lens before the exposure aperture for shooting. Note that the eyepiece of the magnifier is set at right angles to the lens and may be rotated up or down at will. The pilot screw for adjusting the eyepiece to the individual operator is shown in figures 9 and 52 (5).

#### 54. MOUNTING ELECTRIC MOTOR.

In converting to electric motor drive with the 400-foot magazine attachment, the motor should be mounted before the camera is threaded. The procedure for attaching the motor follows.

a. Before attaching the motor, operate the camera mechanism until the spring motor is fully unwound. Lock the operating lever in the operating, or on, position by pressing it downward and turning the knurled end clockwise.

b. Loosen the motor mounting thumb screw

(fig. 33) at the base of the motor mounting bracket (fig. 33), to allow passage of the motor mounting shaft.

c. Insert the motor mounting shaft on the upper part of the motor (fig. 33) into the socket of the motor mounting bracket.

d. At the same time, insert the coupling shaft on the lower portion of the motor (fig. 9) into the coupling housing at the base of the camera frame below the focusing magnifier.

e. If the motor does not fit snugly against the camera frame, lift the motor slightly and hand-turn the knurled knob at the rear of the motor (figs. 9 and 33) until the coupling shaft engages the camera mechanism. When the engagement of slot and lug is complete, the motor should slide into its proper position.

f. With the camera door open, turn the knurled motor knob a few times by hand. The rotation of the camera sprockets assures proper

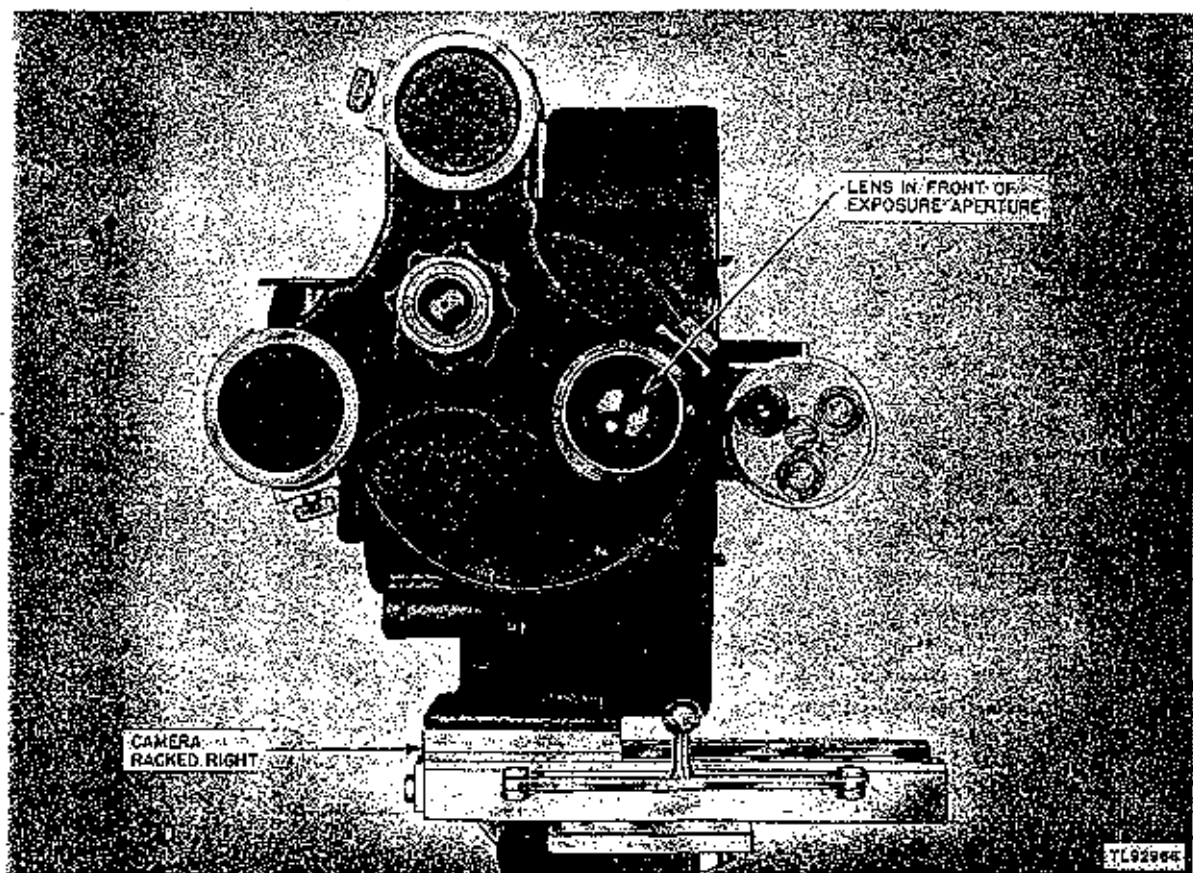


Figure 33. Alignment gauge, rack over, shooting position, Camera PH-330-G.

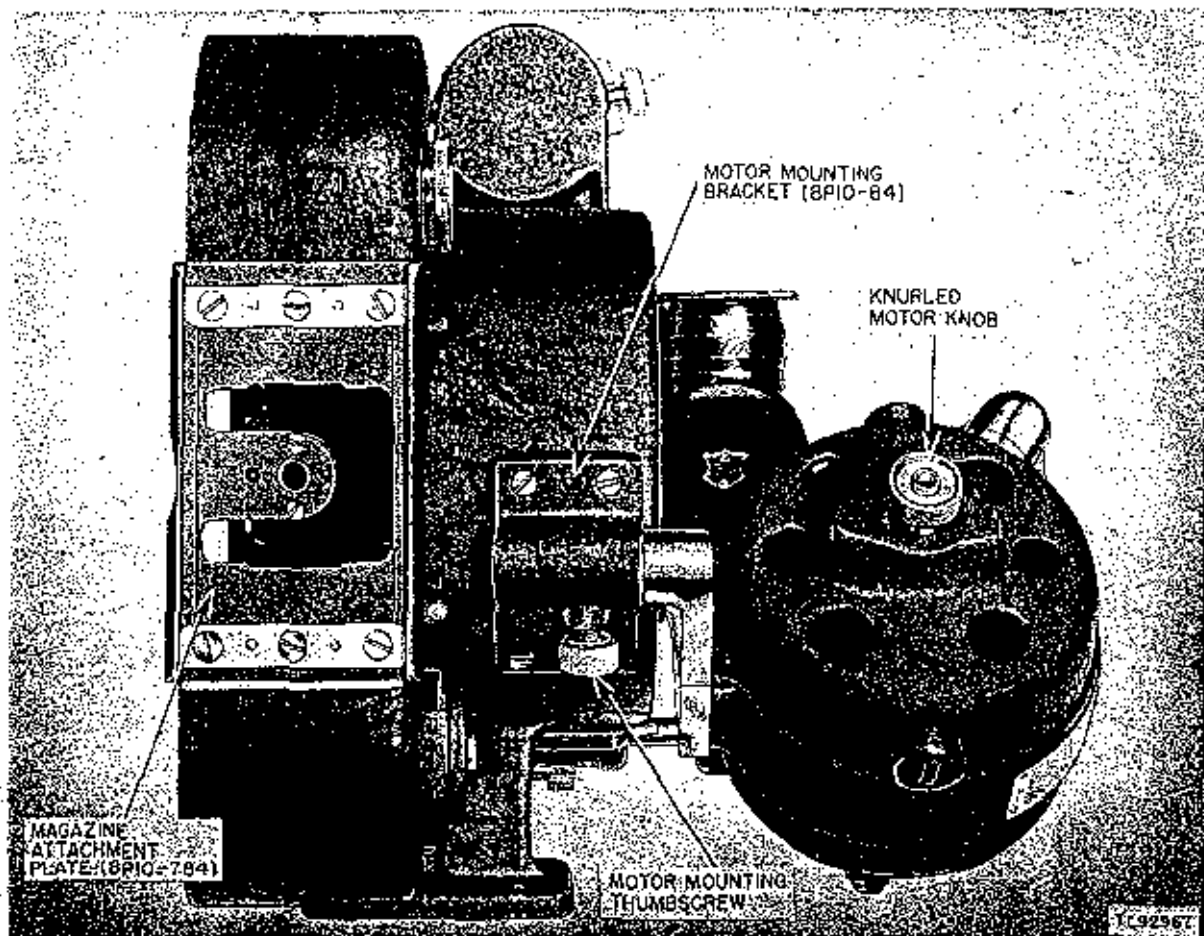


Figure 33. Camera PH-330-G, with electric motor attached, rear view.

engagement of the motor coupling shaft with the operating mechanism.

g. Connect the power cable assembly by fitting the cable plug cap into the plug cap receptacle at the top of the motor (fig. 7), and attaching the twist lock plug at the other end of the cable (fig. 7) to the receptacle of battery Case PH-403.

**CAUTION:** When direct current is used, check the line voltage and frequency with the specifications indicated on the nameplate of the motor.

h. Set the governor speed dial at the desired speed.

i. Keep the cable operating switch (fig. 7) in the OFF position until ready for shooting. After threading, switch to ON to operate the camera mechanism.

## 55. LOADING MAGAZINE.

The loading of the magazine must be done in a darkroom or changing bag before the magazine is mounted on the camera. When using a 200-foot load in the 400-foot magazine, the wooden core on which the film is originally wound must be replaced by the metal or plastic spool provided in the magazine. Large-sized film rolls are already packed with the proper metal core. The recommended procedure for darkroom loading follows.

a. Place the magazine, cover side up, with the coupling plate (fig. 14) away from the operator. Unscrew both magazine cover plates (fig. 14) by pressing three or four fingers firmly into the circular depressions on the plates, and turning counterclockwise.

b. Insert the spur-shaped end of the valve opening clip into the aperture on the magazine

coupling plate as illustrated in figure 14. Bring the clip handle flush with the side of the magazine and secure the metal loop at the upper end over the edge of the magazine. The clip should be in this position throughout the loading operation to keep the film light valves open.

**NOTE:** In the latest issues a lever key (Signal Corps stock No. 8P10-529) is substituted for the valve opening clip.

c. Unwind from 12 to 14 inches of film, to allow for complete threading from the feed spool to the coupling plate and back again to the take-up spool.

d. Guide the free end of the film through the feed compartment valve and out beyond the coupling plate and drop the film spool onto the feed spindle.

e. Make a loop of approximately 8 inches (emulsion side out) and thread the film back into the lower valve to the take-up compartment (fig. 14). Crimp the first quarter-inch of the film and insert the end of the film in the take-up spool slot. Fasten it securely by revolving the spool counterclockwise with the hand. Do not wind the loop back into the magazine.

f. Screw back the magazine cover plates. Remove the valve opening clip. Check the loop outside the magazine; if less than 8 inches long, draw the required amount from the feed spool.

## 56. MOUNTING MAGAZINE.

The mounting of the magazine is a second stage in loading and threading the camera, and may be performed in daylight. To attach the magazine to the camera, first unscrew the magazine attachment plate cover (fig. 5) on the rear of the camera frame. Slip the magazine film loop into the camera, fitting the loop over and around the U-shaped portion of the magazine attachment plate (fig. 33). Bring the magazine into place against the attachment plate, with the magazine cover plates facing the same side as the camera door. Fasten the magazine firmly against the attachment plate by tightening the large knurled knob on the rear of the magazine (fig. 13). Insert one end of the spring driving belt (fig. 2 (13)) into the opening in the magazine belt pulley housing (fig. 5) and feed the belt over the pulley until it emerges at the other opening. Fasten both ends of the belt together securely, check the joined ends for

kinks, and slip the loop thus formed over the lower, or take-up magazine pulley (fig. 7). Make sure that the belt is neither too tightly nor too slackly mounted on the pulleys.

## 57. THREADING CAMERA (WITH MAGAZINE).

Threading with the large magazine (fig. 13) is essentially the same process as threading with the small magazine, except for the differences noted below. Open the camera door and pull back the gate arm (fig. 25), placing tension on the spring by hand-winding the motor, or turning the knurled knob on the back of the electric motor (fig. 33) until the shuttle teeth are in the lower and engaged position. Proceed to thread the loop of film from the magazine in the manner already described (par. 38). The upper loop, however, should be 10 sprocket holes instead of 9, and the lower loop should be 12 holes instead of 11. The additional sprocket hole in each case will be taken up by the tension of the magazine. Close the camera door. Note that the camera door latches actuate a plunger which opens the film light valves of the magazine when the door latches are turned to the CLOSED position. The film then may pass freely from the magazine to the camera and back. Conversely, the door latches in the OPEN position automatically lock the magazine light valves, eliminating stray light and film fog.

## 58. MISCELLANEOUS OPERATING FEATURES, CAMERA PH-330-(\*).

Various operating features not included on Camera PH-330-G give rise to the following differences in operation.

a. **Single Lens Cameras.** Cameras PH-330-A and -H are single lens models, with no provision for multiple lens mount (pars. 29a and 30a). Lens mounts for these cameras, vary slightly from the mounts fitted to the other models in this series. The lenses therefore, are not interchangeable with the lenses of other models. Lenses are similarly installed and locked in the single lens mount seat, and require an identical focusing procedure. Lenses of varied focal lengths may be used wherever available (par. 45).

b. **Ratchet Winding Key.** The non-rotating ratchet winding key (fig. 12 (1)) and the geared winding crank (fig. 12 (4)) are furnished with



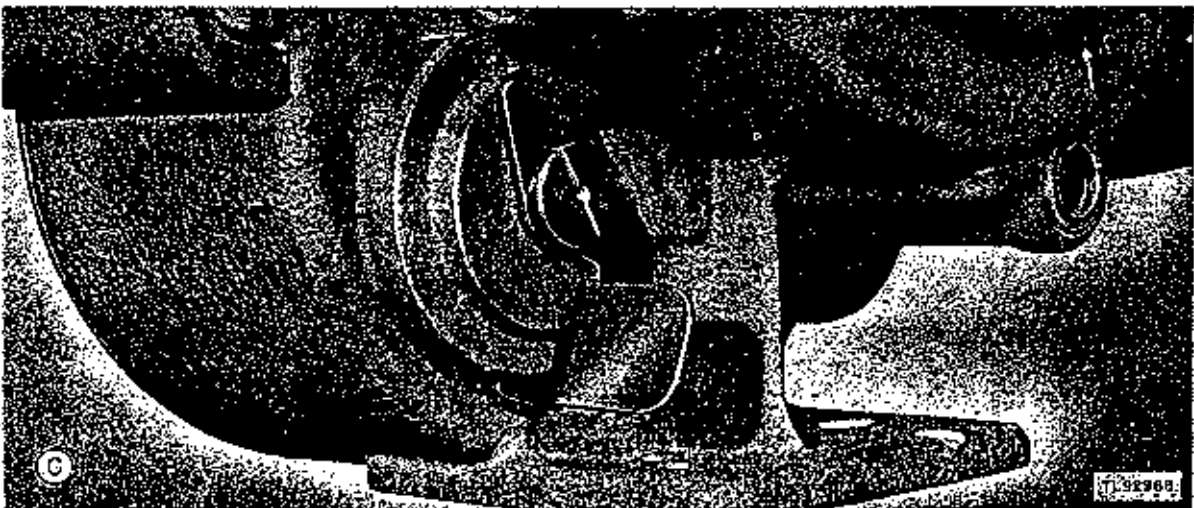
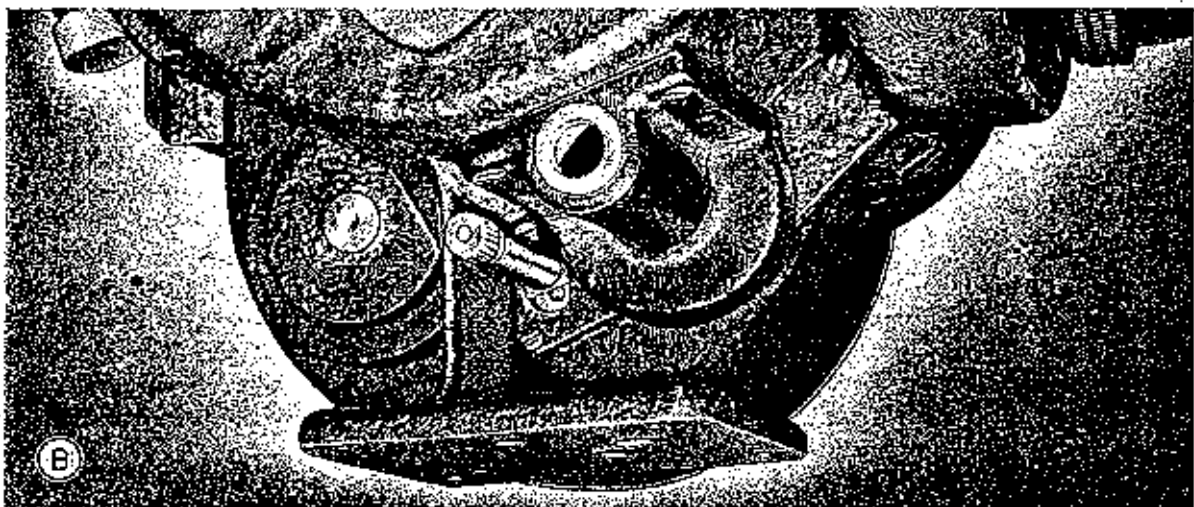
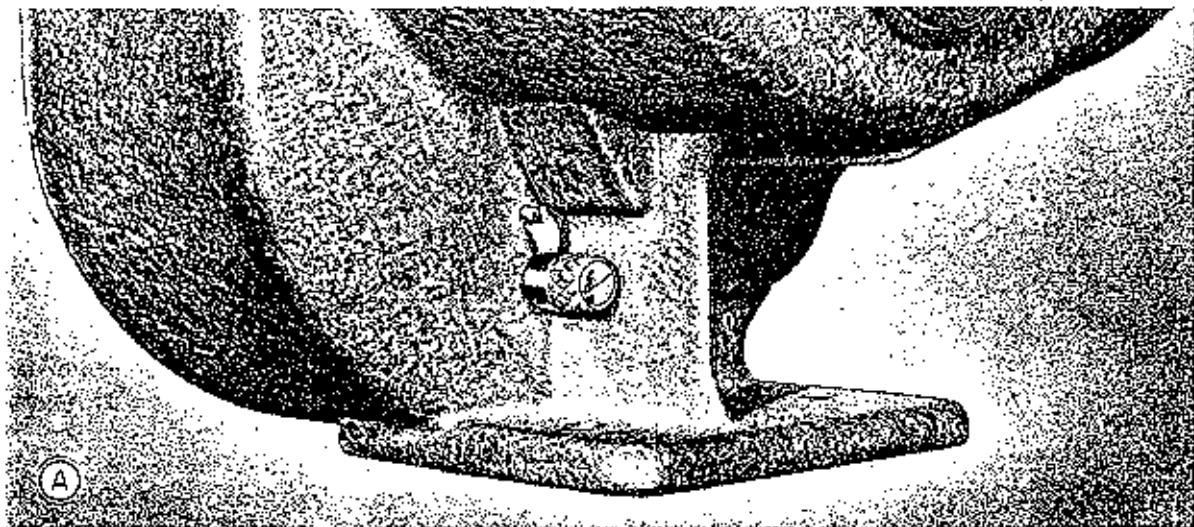


Figure 34. Operating lever devices, Cameras PH-330-A, -G, and -H.

Cameras PH-330-H and -A (bombspotter model). When winding with the ratchet key, use the weight of the camera itself for leverage, rather than relying solely on hand operation. The key is semipermanently attached, with a wing handle that may be folded back against the camera when not in use.

**c. Geared Winding Crank.** The geared winding crank provided with Cameras PH-330-H and -A (bombspotter model) is semipermanently attached and collapsible. When not in use it is extended full length against the side of the camera, with the wooden handle fitted into the curve of the coupling housing (fig. 23) at the base of the camera. When in use, the crank is folded upward on itself, with the wooden handle away from the camera housing. After each winding, the handle should be allowed to spring back to the extended position and should be locked into place with the crank holder (fig. 23). Otherwise, the crank will hinder operation while the camera is running.

**d. Compact Turret.** Caution should be used in mounting two or more lenses of any appreciable focal-length variation on the compact lens turret because the barrels are certain to interfere with one another's field. For example, a 4-inch lens cannot be used at all with a standard 47-mm lens, because of actual

physical interference. A 3-inch lens may be mounted with a 47-mm lens, but must be removed when shooting with the 47-mm lens since it interferes with the field of view. In point of actual practice, the three-lens compact turret is virtually as limited as the single lens camera, and is used most safely with a single lens mount only.

**e. Filter Channel.** Camera PH-330-H is provided with a special filter channel on the upper left-hand portion of the camera head behind the lens (fig. 19). Rectangular metal filter holders with an aperture for gelatin filters (fig. 23) are dropped directly into the slot (fig. 23) from above. Models of Camera PH-330-A have a filter slot on one side for insertion of the filter holder.

**f. Operating Lever Devices.** A previous model of Camera PH-330-H is equipped with a flat operating trigger convenient for thumb operation, but not adapted to rough handling in the field. It has since been supplanted by an operating lever device similar to that in general use with Camera PH-330-(\*) (fig. 34).

**g. Viewfinder PH-532/UF (Vario-focus).** For full details concerning the installation, operation, and maintenance of this viewfinder; see TB Sig 159, Viewfinder PH-532/UF.

# SECTION V

## EQUIPMENT PERFORMANCE CHECK LIST

### 59. CAMERA PH-330-G (HAND-HELD).

Item No.	Item	Action or condition	Normal indication	Checks and corrective measures	
P R E P A R A T O R Y	1	Film chamber (100-foot load)	Loaded and threaded as directed (par. 38) for daylight or darkroom.	See threading pattern (fig. 29). Upper loop 9 sprocket holes, lower loop 11 holes.	Alter shape and size of loop as needed.
	2	Camera door	Locked for shooting.	Latched in CLOSED position.	
	3	Spring motor drive	Wound for shooting.	Fully wound after every shot.	
	4	Footage dial	Set for shooting.	Dial reads 0.	See par. 40.
	5	Governor speed dial	Set for shooting speed.	Dial at 24 frames for normal run.	See par. 41 for other speeds.
	6	Relative exposure indicator	Set for <i>f</i> /stop calculation (optional use).	Inner and outer dials correlated as directed (par. 42).	
	7	Lens and mount	Correctly selected for focal length and angle.		
			Mounted for shooting.	Seated and locked in lens mount seats.	See par. 58d for multiple mounting with compact turret.
			Set at required <i>f</i> /stop.	Diaphragm collar rotated to desired <i>f</i> /number.	Check for slippage.
	8	Filter and filter holder	Focused for shooting.	Focusing collar at required calibration for distance.	Tighten focusing lock clamp screw.
			Mounted for shooting.	Mounted in filter holder, lens mount, or lens hood, as directed (par. 46).	Set <i>f</i> /stop to compensate for filter factor.
	9	Turret (spider)	Rotated and locked for shooting.	Correct turret arm in position before aperture.	Check arm for correct lens. Lock turret knob.
10	Turret (compact)	Rotated and locked for shooting.	Correct lens in photographing position.	Check multiple lens mount for interference.	
11	Camera carrying handle	Hand-held for shooting.	Strap and handle in position as directed. Thumb on operating lever.	Avoid using wrist strap under hazardous conditions.	
12	Viewfinder (general)	In position for shooting.	Camera braced against forehead and nose. Left eye at finder eyepiece.	Correct for parallax for distances closer than 6 feet. Align camera to frame scene in viewer.	

	Item No.	Item	Action or condition	Normal indication	Checks and corrective measures
	12a	Turret viewfinder	Rotated and adjusted for viewing.	Correct finder lens in position before eyepiece.	Check correspondence of finder lens and shooting lens.
	12b	Drum viewfinder	Rotated and adjusted for viewing.	Correct matte on drum in 9 o'clock position.	Check correspondence of matte and shooting lens.
	12c	Auxiliary viewfinder	Mounted and adjusted for viewing with lens of long focal length.	See instructions for mounting (par. 49c).	Check eyepiece and lens elements.
S T A R T	13	Operating lever	Depress to start camera mechanism.	Characteristic sound of film driving mechanism.	Check for jam and motor wind if mechanism stops.
			Lock lever for continuous run.	Lever depressed and knob pushed clockwise.	Retain hold on lever for instant unlocking action.
	14	Footage dial	Registers footage exposed.	Rotation when camera is operating.	Take dial reading before and after operating.
S T O P	15	Operating lever	Release or unlock to stop mechanism.	Film driving mechanism silent.	Do not jar mechanism to unlock lever. Maintain steady camera hold.
	16	Footage dial	Note footage exposed and remaining.	New footage reading.	Check by large center dot above dial.
	17	Spring motor drive	Wind spring fully.		Full rewind after each shot.

#### 60. CAMERA PH-330-G (WITH TRIPOD, ELECTRIC MOTOR, AND MAGAZINE ATTACHMENTS).

	Item No.	Item	Action or condition	Normal indication	Checks and corrective measures
P R E P A R A T O R Y	1	Tripod PH-520/U	Set up with alignment gauge and camera as directed (pars. 50 and 51).	Tripod head level with horizon.	
	2	Alignment gauge	In viewing position.	Racked over to left of gauge.	Check for position.
			In shooting position.	Racked over to right of gauge.	Check for position.
3	Prismatic focusing magnifier.	In viewing position.	Correct lens and turret arm in position before magnifier.	Check diopter adjustment of eyepiece. Adjust lens focusing collar for sharp image on ground glass. Compose scene. Lock lens collar. Readjust diaphragm.	

	Item No.	Item	Action or condition	Normal indication	Checks and corrective measures	
P R E P A R A T O R Y	4	Spider turret	In shooting position. Turret arm rotated for viewing. Turret arm rotated for shooting.	Focused lens and turret arm in position before exposure aperture. Correct lens and turret arm before magnifier. Lens focused in magnifier before exposure aperture.	Check for position, seating of lens, and lens lock. Check turret arm for correct selection for lens and position.	
	5	Electric motor	Mounted and connected for electric motor drive.	Motor mounting shaft snug in motor mounting bracket; coupling shaft engaged with camera mechanism. Power cable assembly connected to battery and camera. Power cable switch on OFF position.	Spring motor unwound. Operating lever locked in ON position.	
	6	Magazine attachment (400-foot)	Load magazine as directed (par. 55). Mount magazine as directed (par. 56). Thread magazine as directed (par. 57).	8-inch loop outside magazine with emulsion side out. Cover plates replaced. Magazine flush with camera. Cover plates face camera door. See threading pattern. Upper loop 10 sprockets. Lower loop 12 sprockets.	Load in darkroom. Check loop size. Use valve opening clip as directed (par. 55b). Tighten magazine knob. Check film loop around coupling plate. Check loop size. Camera door in CLOSED position.	
	7	Driving spring belt	Fastened for magazine drive.	Around magazine take-up pulley and camera drive pulley.	Check belt for kinks and tension.	
	For all other adjustments see check list for hand-held operation (par. 59).					
	S T A R T	8	Cable assembly switch	Switch to ON position.	Characteristic motor driving sound. Rotation of footage dial, pulleys, and spring belt.	Check footage dial. Note when and how often 0 is passed.
		9	Tripod PH-520/U	Pan and tilt as needed.		Do not jar tripod when using. Use upper half of body to pan and tilt. Avoid foot movement. Follow scene in viewfinder.
S T O P	10	Cable assembly switch.	Switch to OFF position.	Motor, footage dial, and pulley movement off.		