Repair & Parts

Manual

for ARRIFLEX IIB and IIC 35mm Cameras

and related equipment

VOL. I

CinePress

Hollywood

Introduction

This all-new manual represents the latest and most complete information yet available concerning parts and service for the Arriflex 35mm cameras.

For the experienced camera repair technician, the detailed information contained in this book should enable him to achieve results in maintenance and repair which are equivalent to factory standards.

For the working cinematographer, the instructions are clear and concise, so that he may make emergency repairs in the field.

Acknowledgements

The information in this manual is based in part on material originally issued by Arnold & Richter KG, Munich, and the Arriflex Corporation of America, New York. Additional material was furnished by the engineering department of Birns & Sawyer Cine Equipment Co., Hollywood.

Repair & Parts
MANUAL

for IIB & IIC

ARRIFLEX
35mm Cameras

Prepared and Published by

CinePress

Box 38726, Hollywood, Ca.90038

Contents

Technical Data

LENS SEATING: All lenses used in Arriflex cameras are adjusted in their focusing mounts for precisely 52mm (2.o472") flange focal distance.

FOCAL DISTANCE: All cameras are adjusted for a flange focal distance of 51.97mm (2.046"). This flange focal distance is measured from the surface of the turret lens mount to the test block.

INTERCHANGEABILITY: Any lens can be interchanged with any other lens in any of the three lens sockets in the turret. Lenses also may be interchanged from one camera to another.

All lenses used on Arriflex 35mm cameras also can be used on Arriflex 16mm cameras.

But lenses used on 16mm cameras can be used on Arriflex 35mm only in focal lengths of 28mm and longer. The shorter focal lengths would interfere with and damage the mirror-reflex shutter in the 35mm camera. Furthermore, the shorter focal lengths will not cover the full field of the 35mm aperture.

Exceptions are short focal length lenses especially designed for the Arriflex 35mm, such as:

9.8mm Kinoptik f:1.8

14.5mm Angenieux f:3.5

18mm Cooke Speed Panchro f:1.7

18.5mm Angenieux f:2.2

25mm Cooke Speed Panchro f:2.0

Preventive Maintenance

Because failure or inefficient operation of a single component can cause breakdown of the entire system, the importance of preventive maintenance cannot be overstated.

TOOLS AND MATERIALS:

Lens tissue
Lens cleaning fluid
Camel hair brushes
Clean, soft cloth
Orange stick
Oil
Grease

LUBRICATION: After 25,000 feet of film runs, or twice a year, whichever occurs first, the camera should be lubricated according to the following procedure:

Remove the cover plate over the claw mechanism, marked oil, by turning the screw in the direction of the arrow and lifting the plate off. An oil hole on top of the claw is marked with a white arrow, and two additional smaller holes can be seen when the claw is in its most extended position. Into each of these three holes should be put one small drop of the oil supplied with the camera.

In addition, all moving parts of the claw movement should be well greased, using the grease supplied with the camera.

CLEANING: The camera always must be maintained absolutely clean. To prevent dust getting into the camera body, the lenses should remain seated in the turret. If any are removed, they must be replaced by cavity cups. When there is no magazine on the camera, the protective cover must be put in its place. When the camera is not in use, it will best be protected when stored in its closed case.

The lens surfaces, mirror surface, and other parts of the optical system should never be touched with the fingers. If they require cleaning, a camel hair brush or a piece of well-laundered soft linen cloth should be used.

After each magazine run, the film gate should be opened and examined for emulsion deposits. If any exist, they should be removed with an orange stick. Metal should never be used. The chromium part of the gate should be wiped with a soft cloth, and occasionally should receive a very thin layer of vaseline, which then should be wiped off. The spring-loaded pressure rail, located directly behind the gate catch, should be checked occasionally to be sure no emulsion has accumulated in front of or behind it which would prevent its freedom of action.

Film chips, which may accumulate in the body of the camera, must be removed with a camel hair brush, so that they cannot get into the mechanism.

General Check List

Before and after the camera has been serviced, the following points should be checked as regular routine:

1. Clean the lenses and check them, on a collimator, for proper focus
2. Check the flange focal distance
3. Check the viewfinder for proper infinity adjustment
4. Check the film pressure plate for proper pressure
5. Check the side pressure plate for proper spring tension
6. Check the film gate for emulsion deposits
7. Check the film gate for scratches
8. Check the shutter timing in relation to claw movement
9. Check the claw movement for proper function
10. Check the magazine lock assembly on the camera for proper function
11. Check the motor
12. Check the camera for obvious damage or excessively worn spots
13. Check the lens turret for proper fit to the camera
14. Check a test film for frame line, steadiness, sharpness and scratches
15. Check the power supply for proper voltage, and clean the contacts
16. Check the lens focus rings for clearance with the hood, shutter projection and matte box
17. Check the film chamber and turret sockets for film chips
18. Check the door fit and latches

Trouble-Shooting Chart

TROUBLE:	POSSIBLE CAUSE:
1. Picture not sharp	a) Lens out of adjustment b) Incorrect flange focal distance c) Play between lens turret and camera housing d) Lens elements not clean, or loose e) Play in lens mount f) Inferior optical quality of filter
2. Picture not steady	a) Play in film transport mechanism b) Improper loading; upper or lower loop either too small or too large c) Film gate pressure pad has either too much or too little pressure d) Side pressure pad has either too much or too little pressure e) Film emulsion has adhered to aperture plate or side pressure rail
3. Film light-struck	a) Film not loaded or unloaded in complete darkness b) Magazine or camera cover not closed properly c) Light leaking through viewfinder d) Magazine not properly attached to camera e) Camera or magazine not light tight (missing parts or screw-damaged light traps) f) Light entering through lens receptacle in turret
4. Camera speed not steady	a) Magazine take-up tension too high b) Cable doesn't make proper contact to camera or power supply
5. Film scratched	a) Aperture plate or pressure plate rough or damaged b) Too much pressure from pressure plate c) Film loop too large d) Film scratched in magazine sprocket housing assembly
6. Camera doesn't come up to speed	a) Low battery power b) Poor cable connections c) Camera not lubricated with special grease supplied by factory

7. Magazine doesn't take up properly	a) Magazine take-up spring tension is either too strong or too weak b) Film is dished and touches magazine door or bottom c) Magazine belt has too much slip d) Magazine sprocket rollers or drive gear doesn't move freely. e) Film roller guide in magazine is in lock position
8. Tachometer doesn't register speed	a) Tachometer gear loose or disengaged from drive gear b) Tachometer defective
9. Camera doesn't start	a) Battery terminals loose b) No connection from battery to camera c) Defective cable

Parallax Adjustment

GENERAL: Since the Arriflex camera is of reflex type, parallax errors should not exist.

Because the picture seen in the finder is relayed to it from the taking lens, it is exactly the same picture as is recorded on the film, as shown on page 30. This applies to lenses of all focal lengths.

CHECKING: If, however, a new mirror shutter, ground glass, or ground glass holder is installed, parallax must be checked.

The tool required is prism T35-5.

First mount the camera on a tripod and focus on a target.

Then mark the target area covered on right and left.

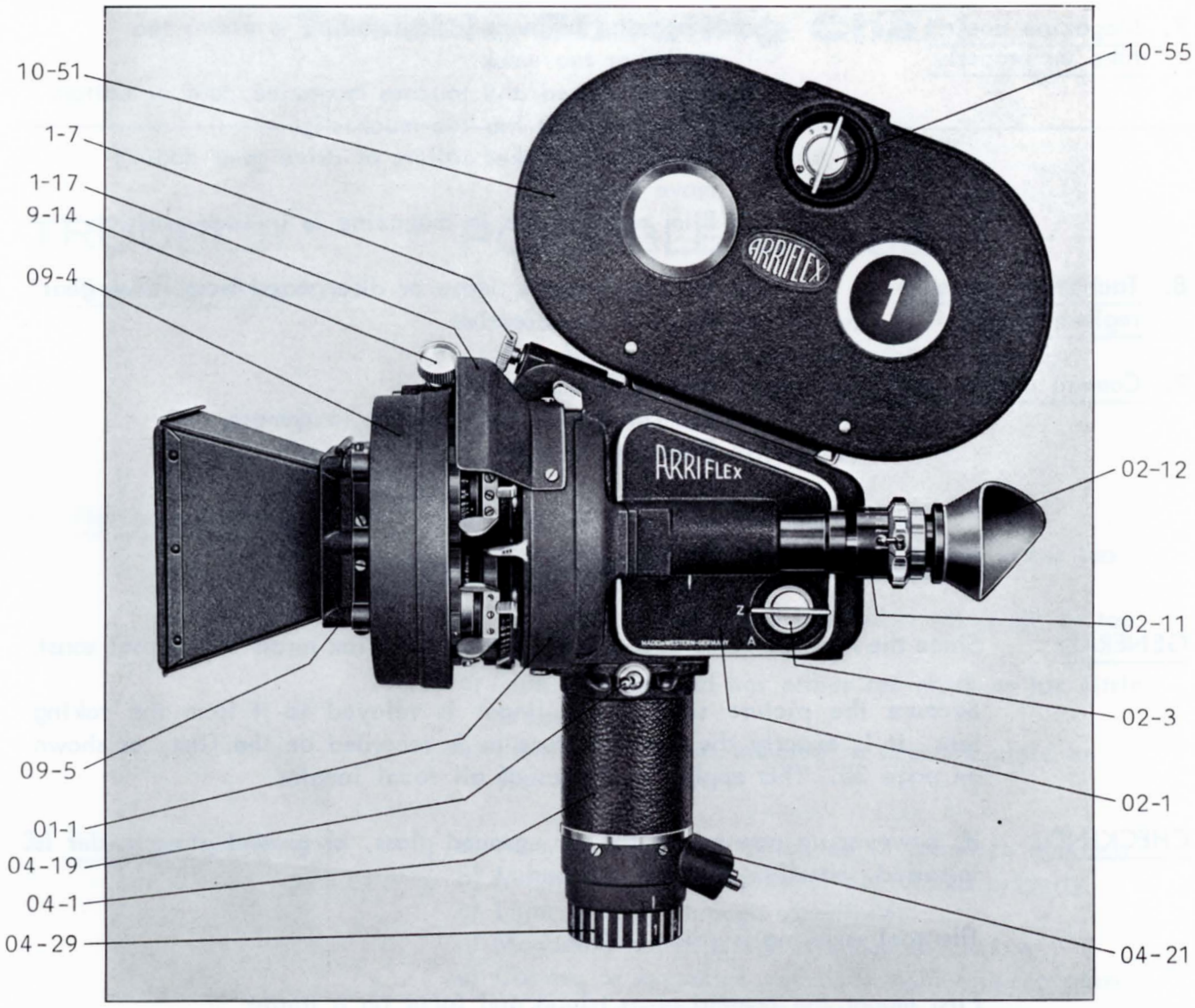
Next remove the camera door, open the film gate and hold the prism against the aperture.

Turn the mirror shutter to the open position by turning the inching knob.

Now the area seen through the prism should be the same as that marked on the target and seen through the finder.

ADJUSTMENT: If adjustment is required, the ground glass holder must be removed.

Then the surface of the camera housing to which the ground glass holder is mounted must be either filed down slightly, or shimmed up slightly, depending upon the direction in which the error has been observed.

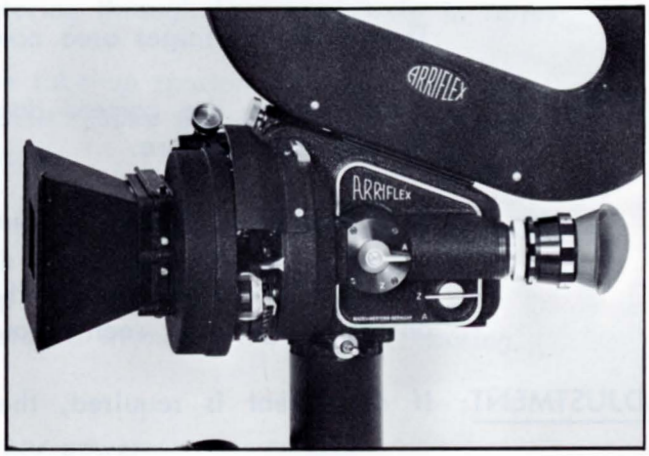


Left side

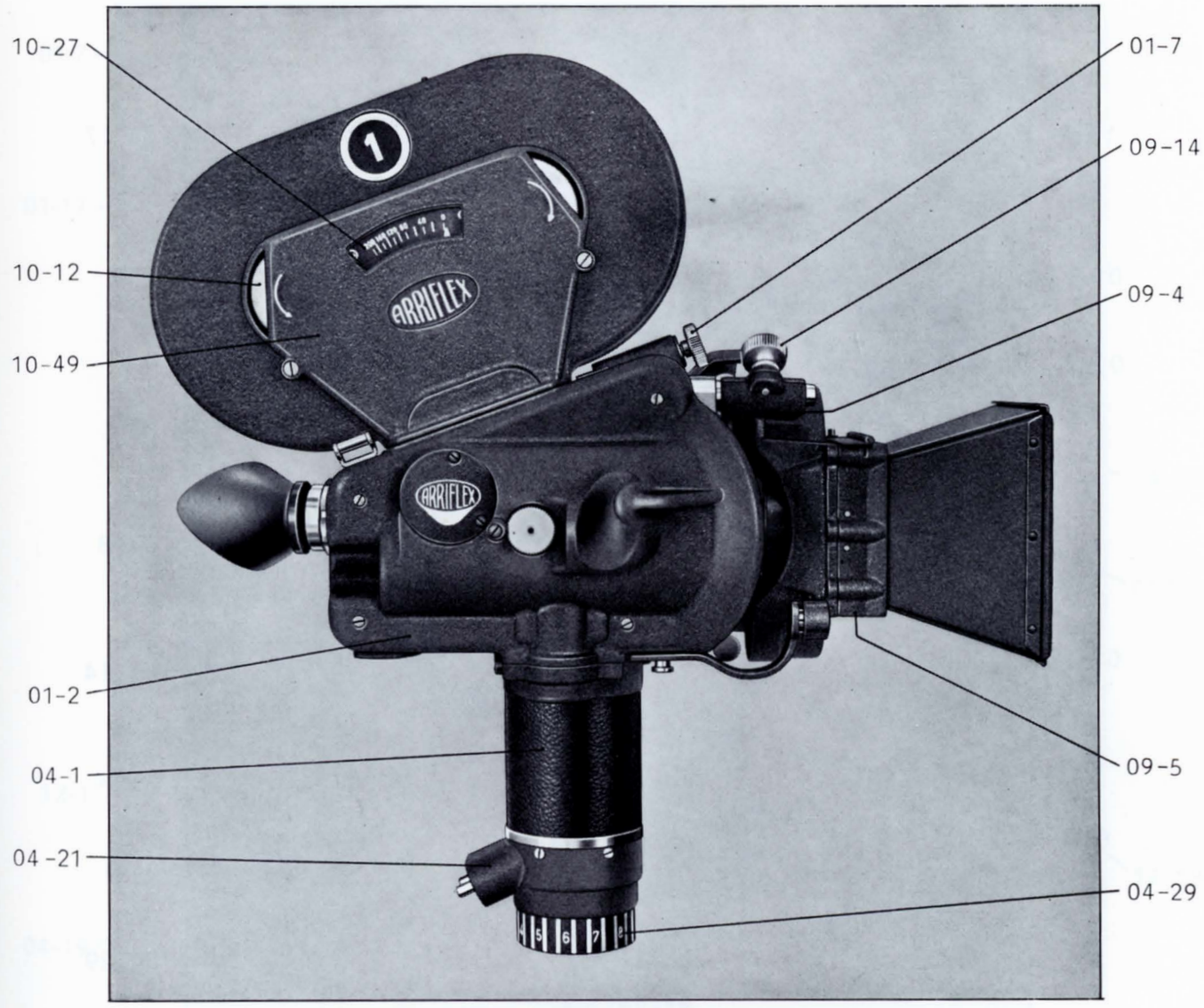
The illustration shows the left side of the ARRIFLEX 35 II B, on which the viewfinder is mounted.

The following parts are marked in the illustration:

01– 1	Camera housing
01– 7	Knurled knob for securing magazine
01–17	Outer shield
02– 1	Camera door with viewfinder receptacle
02– 3	Latch knob
02–11	Viewfinder
02–12	Rubber eyepiece
04– 1	Motor Handgrip
04–19	Toggle switch
04–29	Rheostat end cap
04–21	Male connector
09– 4	Sunshade support casting
09– 5	Sunshade with rectangular funnel
09–14	Knurled clamp screw
10–55	Locking handle
10–51	Magazine lid



MODEL II C has detachable magnifying eyepiece with diopter adjustment collar and lock collar. Permits use of periscope finder attachment and/or automatic closure eyepiece.

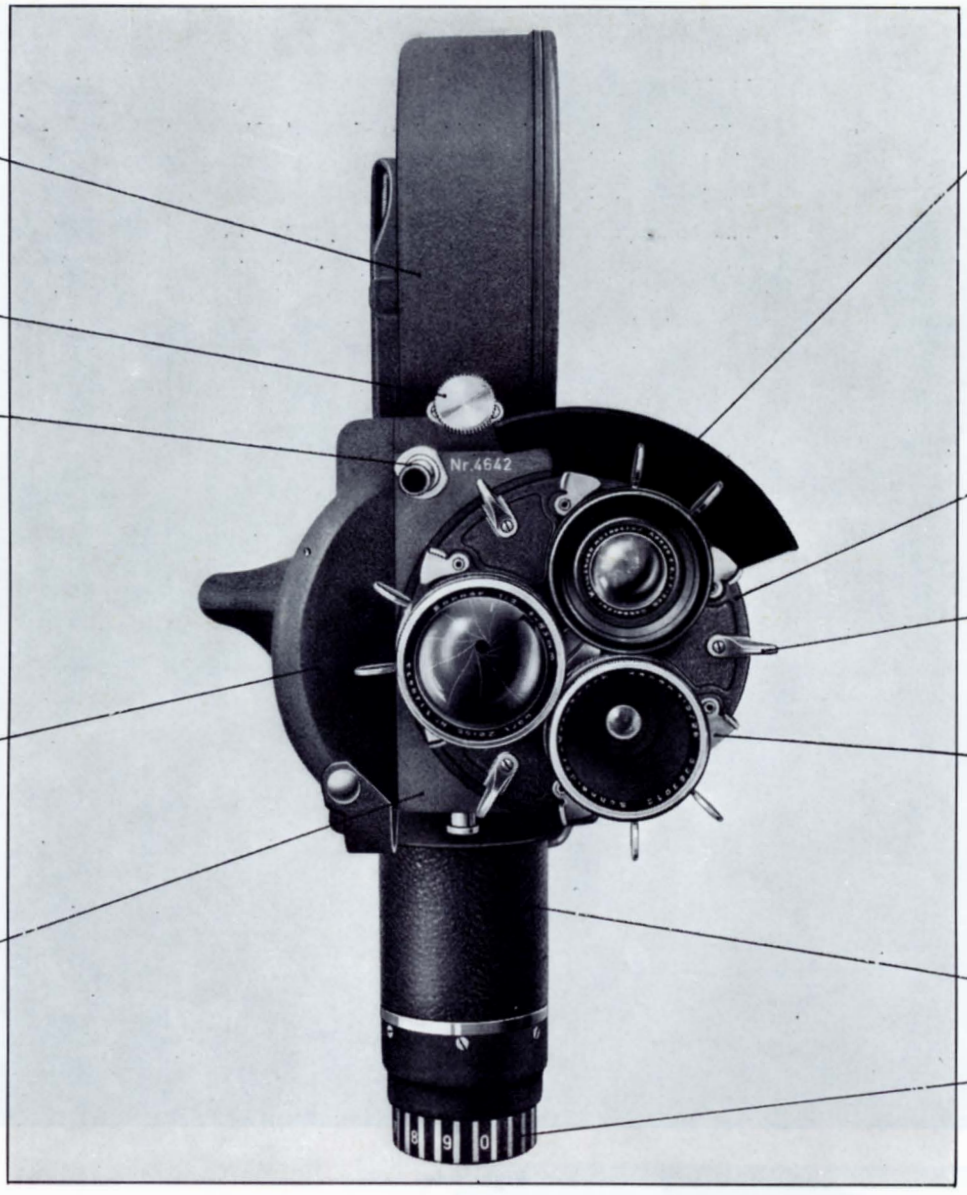


Right side

The illustration shows the right side of the ARRIFLEX 35 II B with the gear cover and the projection housing the reflex mirror.

The following parts are marked in the illustration:

01– 2	Gear cover
01– 7	Knurled knob for securing magazine
04– 1	Handgripmotor
04–29	Rheostat end cap
04–21	Male connector
09– 4	Sunshade support casting
09– 5	Sunshade with rectangular funnel
09–14	Knurled clamp screw for sunshade
10–12	Knurled film tensioning disks
10–27	Meter scale
10–49	Magazine mechanism cover

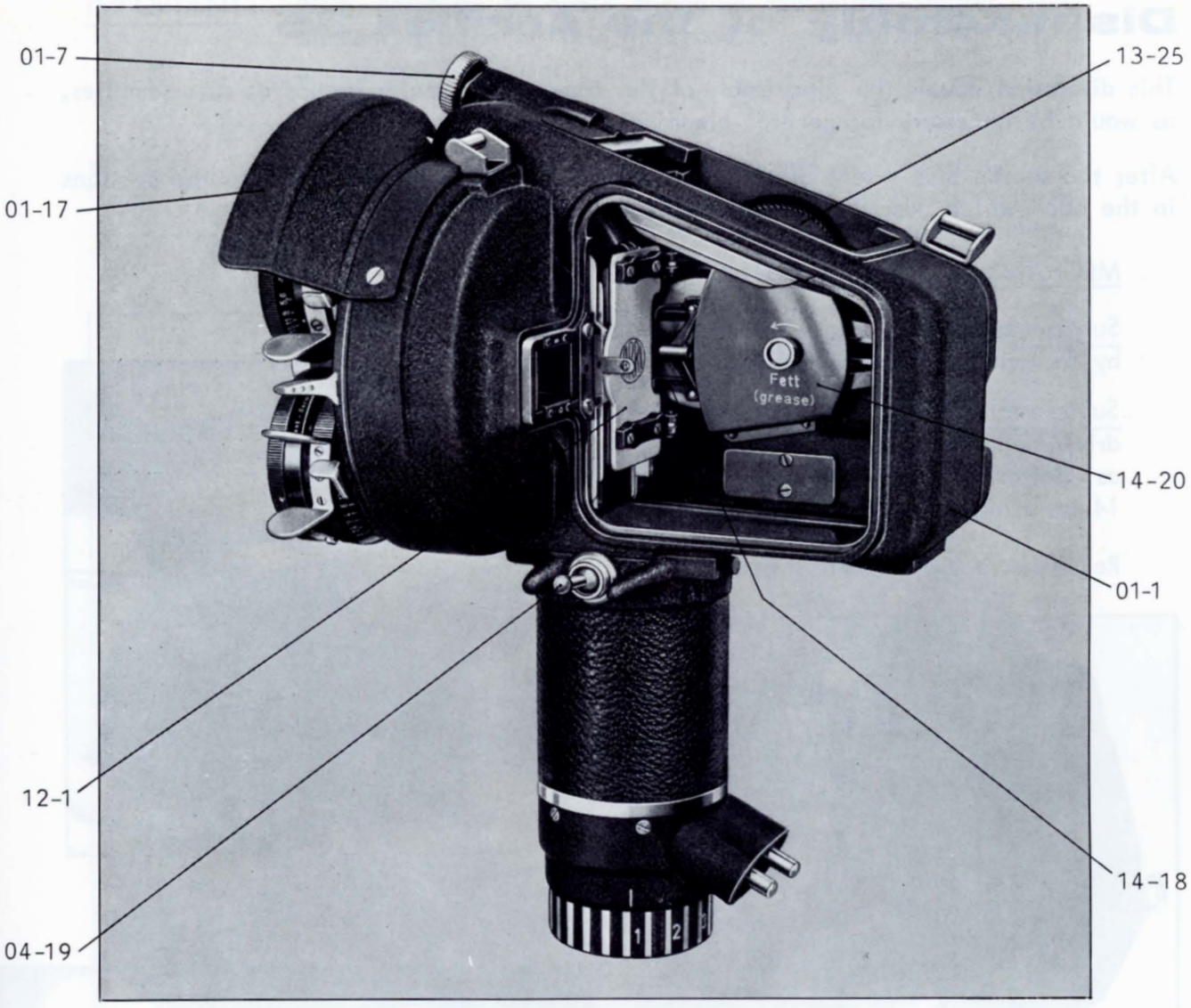


Front view

The illustration shows the front view of the ARRIFLEX 35 II B with lens turret.

The following parts are marked in the illustration:

01– 1	Camera housing
01– 2	Gear cover
01– 7	Knurled knob for securing magazine
01–17	Outer shield
03– 1	Lens turret
03– 8	Lever for turning turret
03–14	Lens release latch
04– 1	Handgrip motor
04–29	Rheostat end cap
09– 2	Sunshade mounting stud
10– 1	200 ft magazine



Opened

In this picture the ARRIFLEX 35 II B is shown with the camera door removed and without a magazine.

The following parts are marked in the illustration:

01– 1	Camera housing
01– 7	Knurled knob for securing magazine
01–17	Outer shield
04–19	Toggle switch
13–25	Intermediate gear
14–18	Claw arm with claw pin holder
14–20	Drive mechanism cover plate
12– 1	Film gate

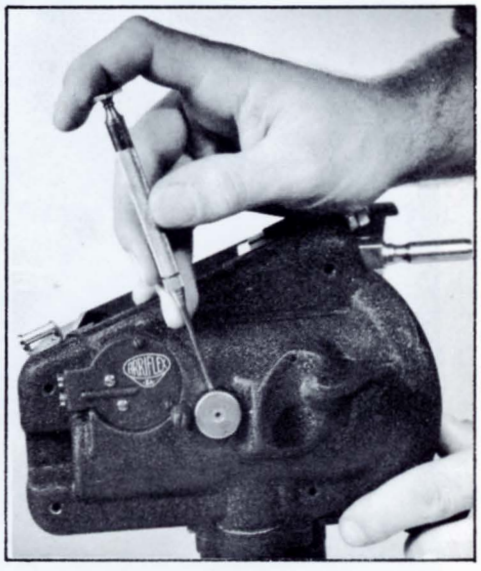
Disassembly of the Arriflex 35

This discussion covers the disassembly of the camera into major groups or subassemblies, as would be necessary for general cleaning and inspection.

After the source and extent of the trouble have been determined, refer to the sections in the book which describe further disassembly and servicing.

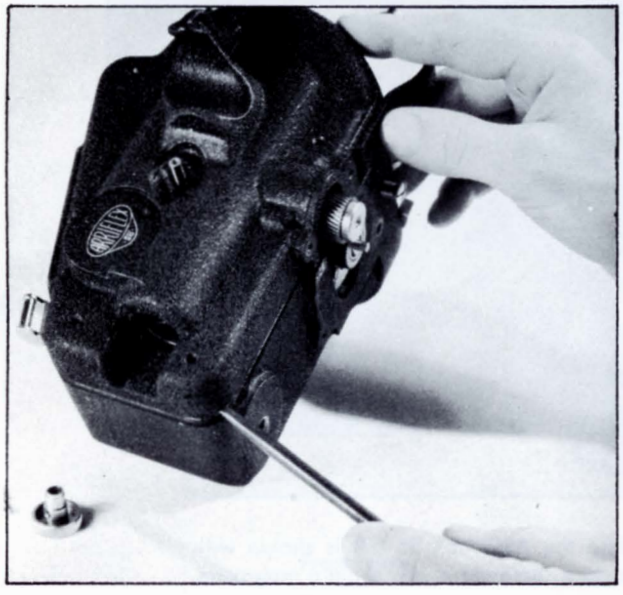
MECHANISM COVER CASTING

Subassembly 04A — Motor: Take off the motor by removing four screws 04A-36.



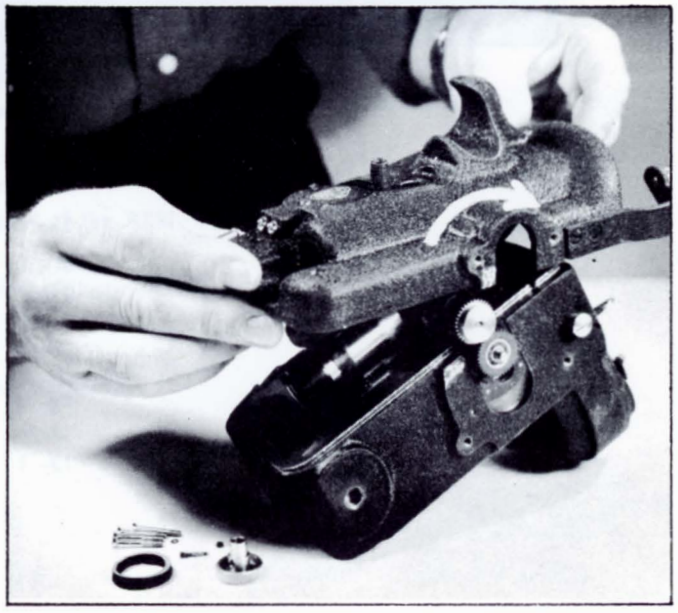
Subassembly 01 — Cover: To expose the camera drive mechanism, first remove the inching knob as shown at right, using tool T35-7 (see page 14 for illustration of tools).

Remove screws 01-3 holding gear cover in place.



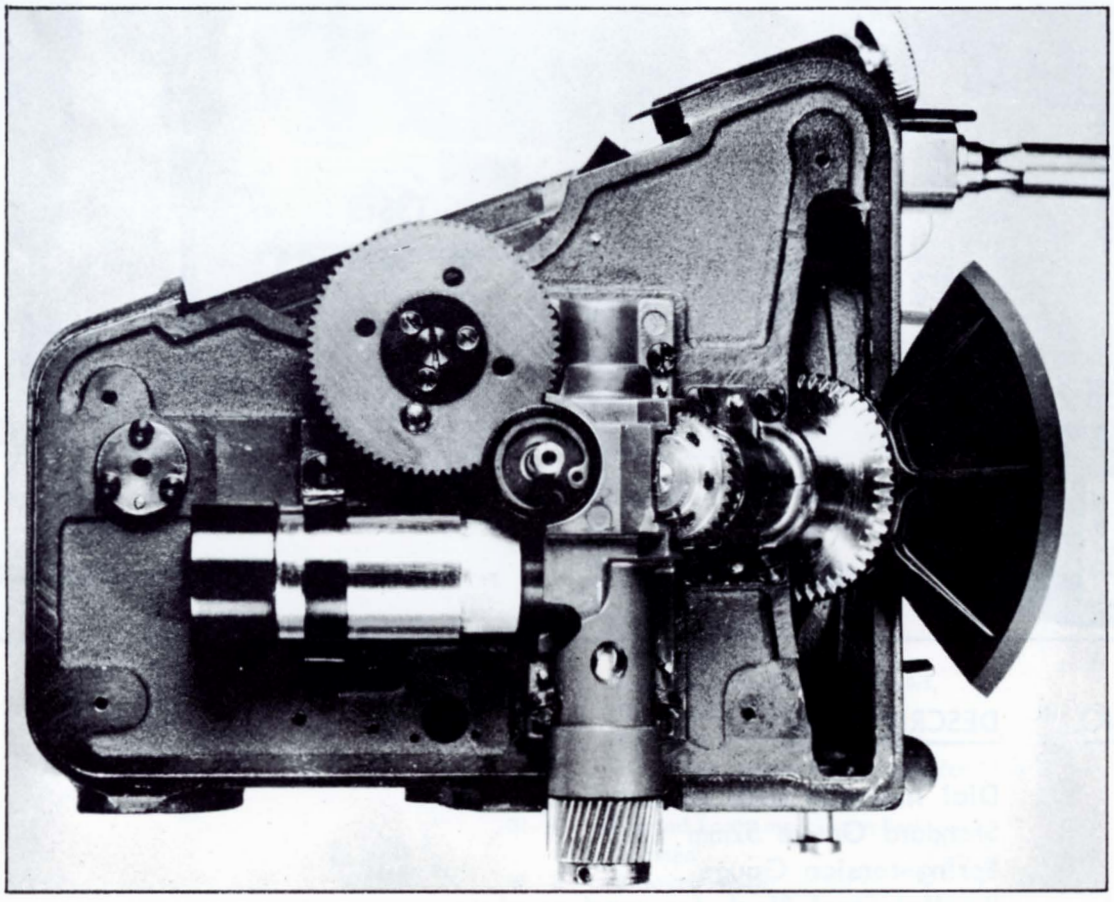
If the cover has a tight fit, use screwdriver or knife blade as shown above.

Remove the cover by lifting it carefully from the rear until the inching knob shaft clears the hole in the cover. Lift the cover carefully in the direction indicated by arrow in the photo at right.



IMPORTANT: Work carefully to avoid damaging the mirror-shutter. This element is made of solid glass and is mounted at a 45 angle underneath the cover.

NOTE: Inserted between the camera housing and the tachometer is a small rubber gasket for protection against dust. This gasket can be put back into place after complete assembly of the camera.

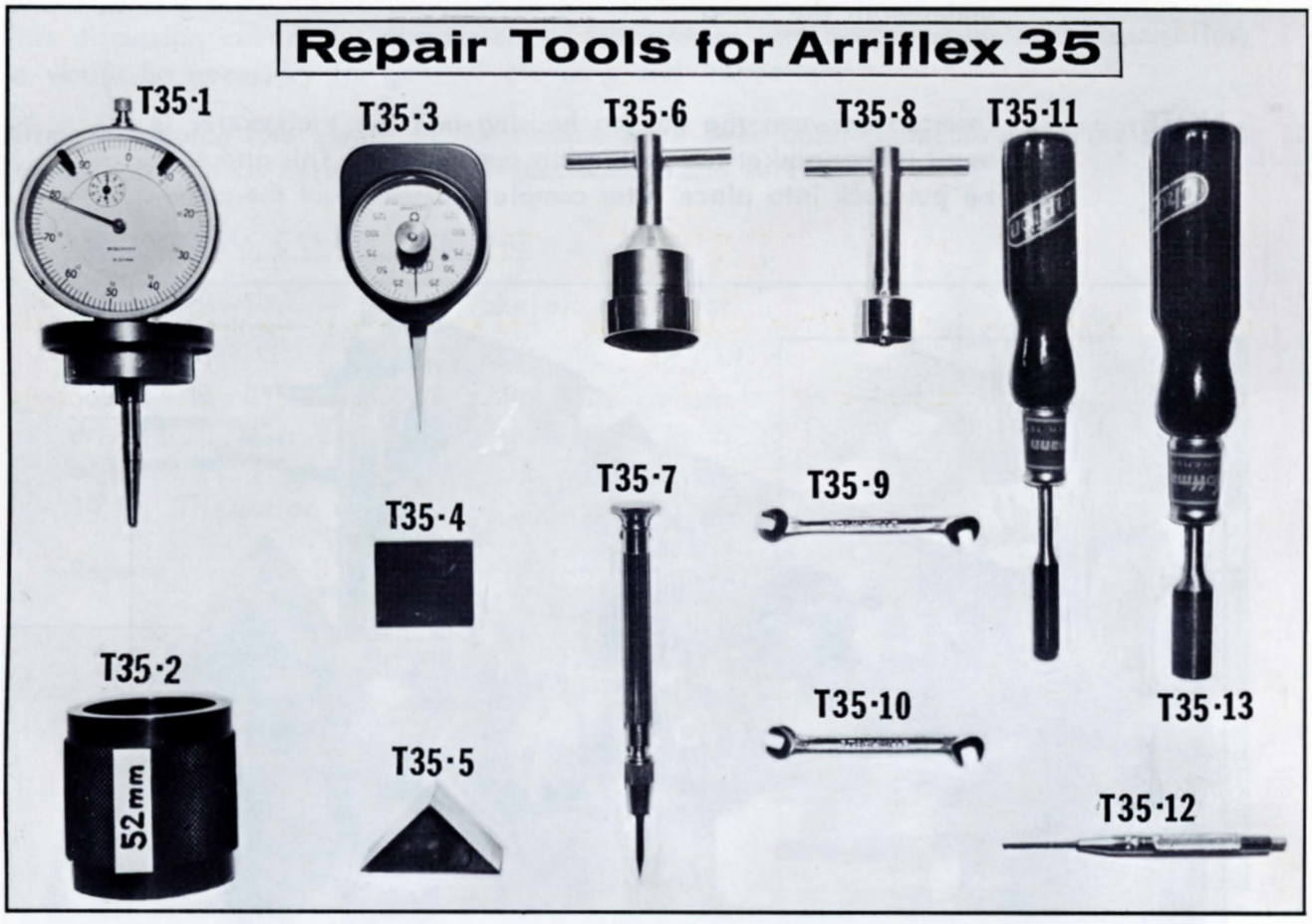


When the camera gear assembly is exposed, as shown above, it can be checked, cleaned and lubricated.

Further disassembly of the camera will depend on its condition and malfunction.

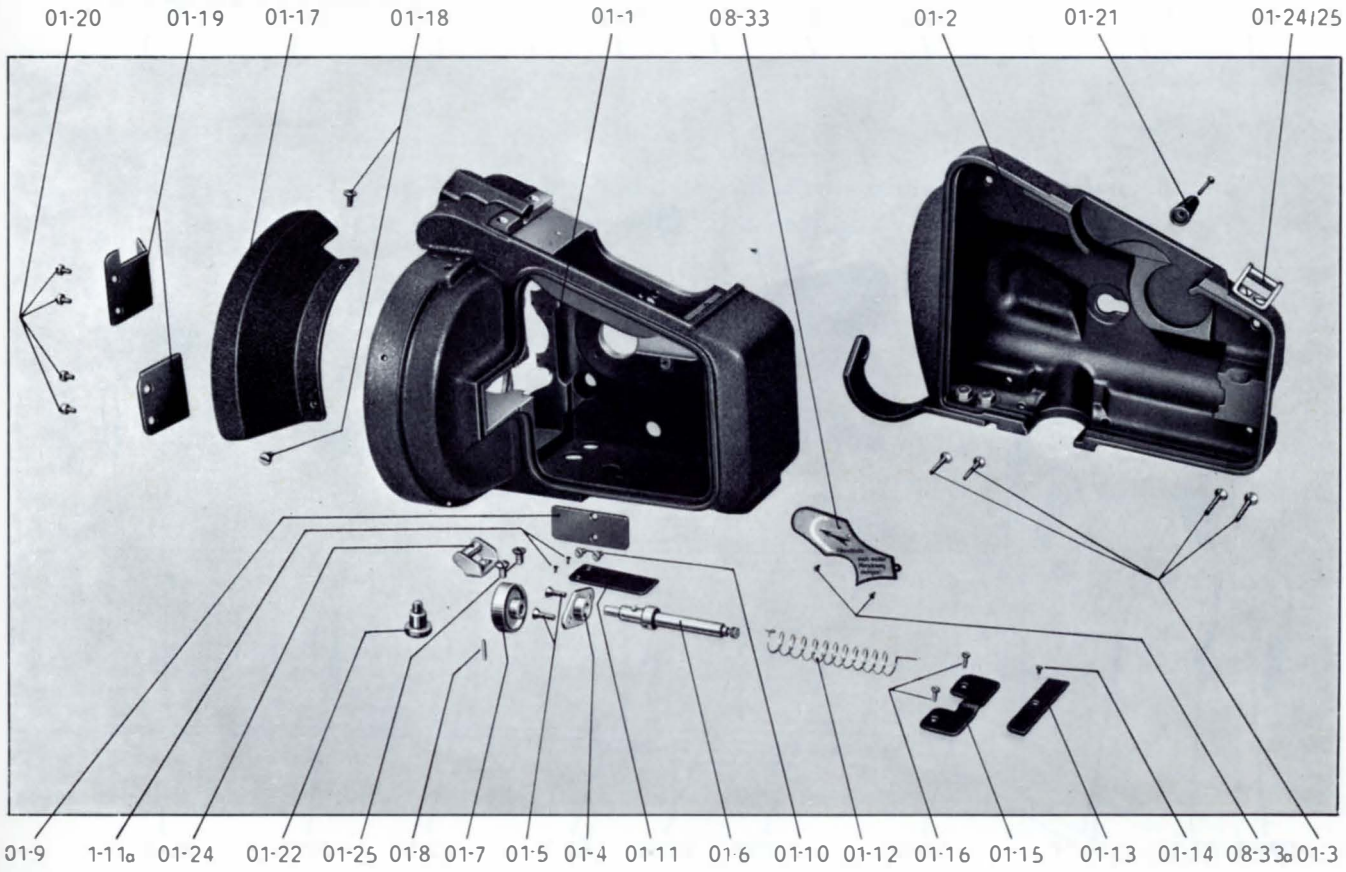
To make any further disassembly easier, and to prevent damage to the mirror-reflex-shutter, remove the mirror-shutter and the flange-bearing housing (see pages 30 to 36).

Special Tools for Servicing the Arriflex



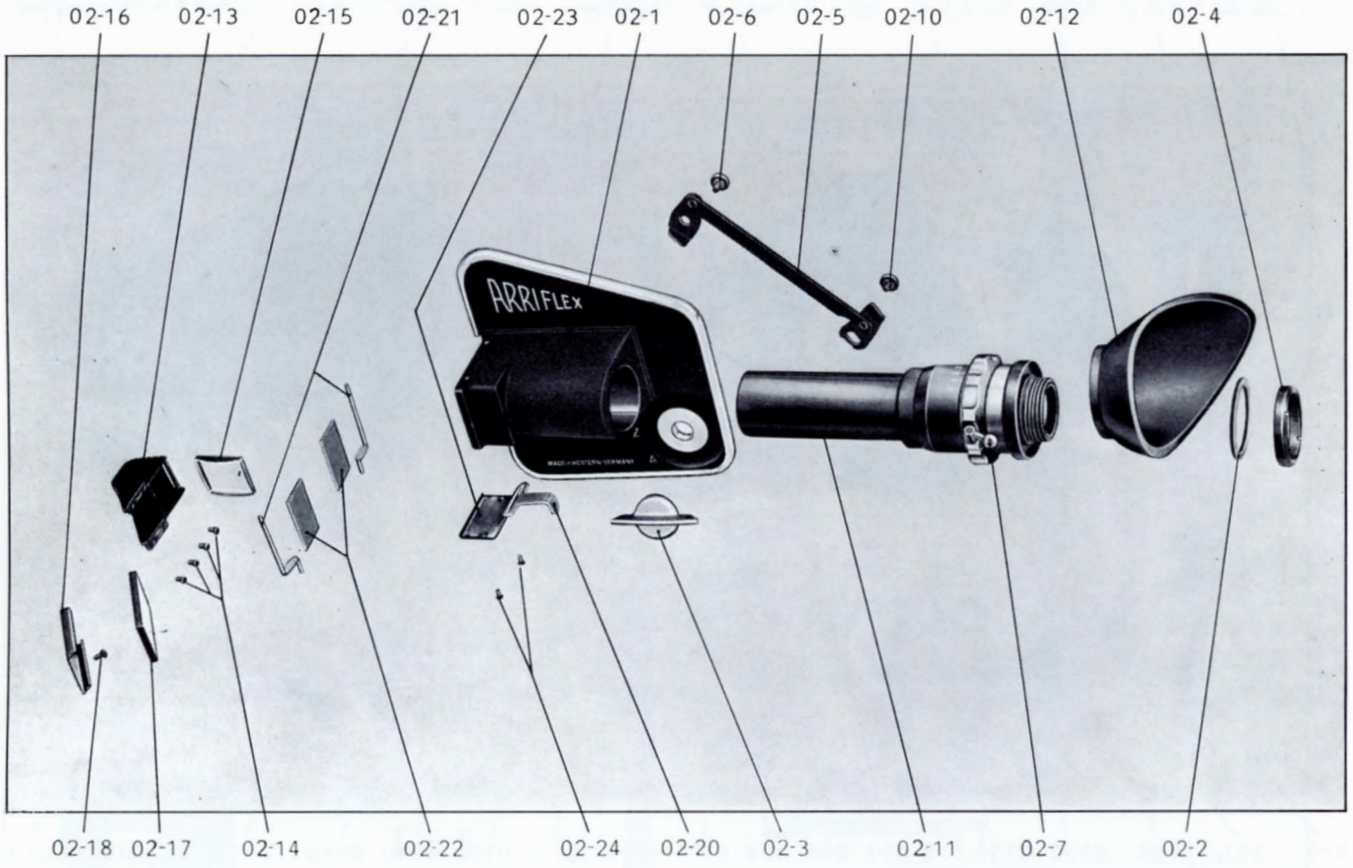
TOOL NO.	DESCRIPTION
T35-1	Dial indicator with special flange
T35-2	Standard Gauge 52mm
T35-3	Spring-tension Gauge
T35-4	Parallel Steel Block for aperture plate
T35-5	Prism to check parallax
T35-6	Spanner wrench for magnifying eyepiece
T35-7	Spanner screwdriver for claw system
T35-8	Spanner wrench for mirror shutter
T35-9	Open-end wrench 5mm for claw assembly
T35-10	Open-end wrench 5.5mm for motor-handgrip
T35-11	Socket wrench 5mm for lens turret
T35-12	Pin punch 1.4mm
T35-13	Socket wrench 9mm for tachometer

Tools listed and shown are required for repair and adjustment of the Arriflex 35 camera. They can be obtained in sets from Arriflex Corp. of America, 257 Park Avenue South, New York, N. Y. 10010.



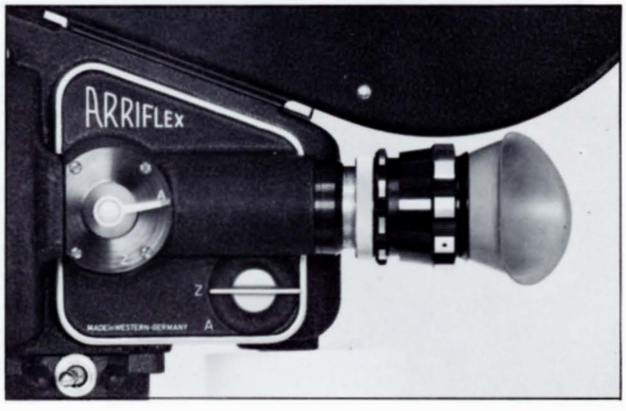
Camera housing

		Quantity
01– 1	Camera housing	1
01– 2	Gear cover	1
01– 3	Oval-head countersunk screws, chromed for 01–2	4
01– 4	Magazine retaining key plate	1
01– 5	Oval-head countersunk screws for 01–4	2
01– 6	Magazine release shaft	1
01– 7	Knurled knob, machine-milled and chromed	1
01– 8	Grooved dowel pin for 01–7	1
01– 9	Side cover plate for end-of-reel cut-out	1
01–10	Countersunk screws for 01–9	2
01–11	Lower cover plate for tripod thread	1
01–12	Torsion spring	1
01–13	Magazine locking latch	1
01–14	Countersunk screw for 01–13	1
01–15	Cover plate	1
01–16	Countersunk screws for 01–15	2
01–17	Outer shield	1
01–18	Cheese head screws for 01–17	2
01–19	Anti-reflection masks, inside right and left	2
01–20	Cheese head screws for 01–19	4
01–21	Protective nose for single-frame shaft	1
01–22	Tripod screw	1
01–24	Eyelets	2
01–25	Countersunk screws for 01–24	4
01–11 a	Countersunk screws for 01–11	2
08–33	Film threading indicator plate	1
08–33 a	Grooved studs for 08–33	2



Viewfinder sub-assembly

		Quantity
02– 1	Camera door with tubular viewfinder receptacle	1
02– 2	Clamping ring	1
02– 3	Latch knob	1
02– 4	Nut for mounting rubber eyepiece	1
02– 5	Latch mechanism	1
02– 6	Countersunk screw for 02–5	1
02– 7	Tommy screw	1
02–10	Shoulder screw	1
02–11	Viewfinder	1
02–12	Rubber eyepiece	1
02–13	Ground glass holder	1
02–14	Countersunk screws for 02–13	4
02–15	Ground glass	1
02–16	Mirror mounting	1
02–17	Mirror	1
02–18	Cheese head screw for 02–17/16	1
02–20	T-slide	1
02–21	Wire clamps	2
02–22	Viewfinder flaps	2
02–23	Cover plate	1
02–24	Countersunk screws for 02–23	2



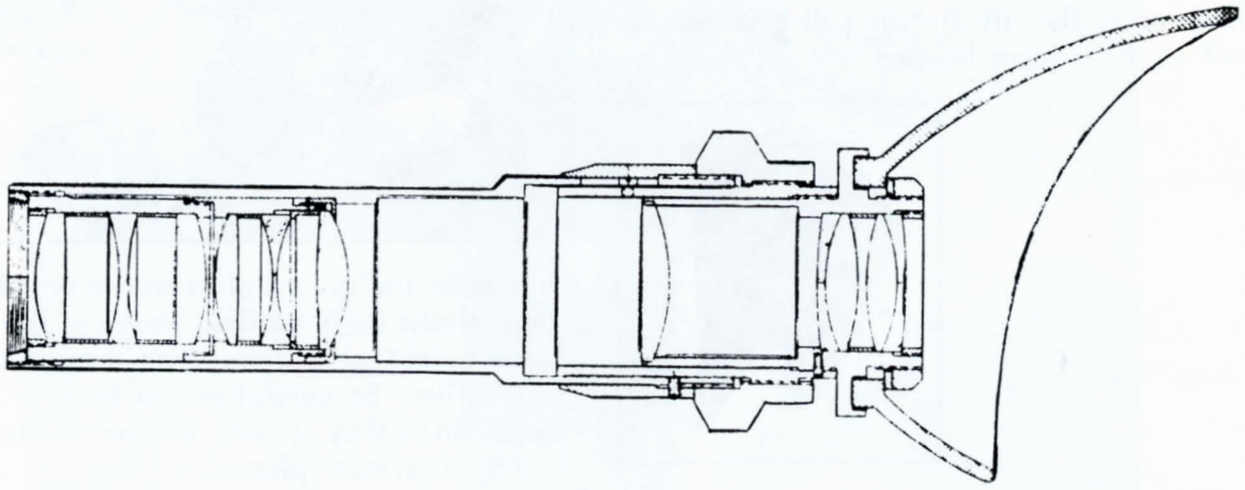
MODEL IIC is similar to IIB, except for the detachable eyepiece (above), which permits use of periscope finder attachment and/or automatic closure eyepiece. Closure mechanism lever may be replaced with anamorphic lens.

Parts Numbers for Models IIB and IIC are essentially the same.

Viewfinder

GENERAL: The viewfinder has a 10X magnification. The eyepiece has an adjustable collar for diopter adjustment for individual eyesight.

A cross-section of the viewfinder optical system is shown below.



The viewfinder as a unit should not be disassembled. If any optical elements are damaged, it might be necessary to replace the entire finder assembly. At any rate, any repairing should be done only by an experienced optical technician.

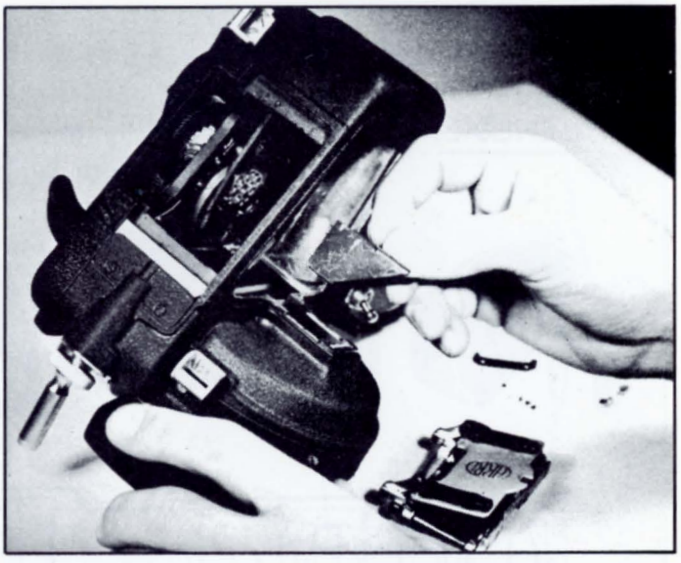
EYEPIECE: The rubber eyepiece can be replaced using tool 35-6.

REMOVAL: The viewfinder tube is inserted into the camera door by a press fit only. If the tube must be removed, an aid to its reinstallation will be to indicate with a pen the distance the finder was originally inserted into the door.

REINSTALLATION: After the finder is reinserted into the door, check to determine that the image seen through it is sharp. The diopter adjustment scale should read zero to provide for necessary plus-or-minus adjustments.

Ground Glass and Holder

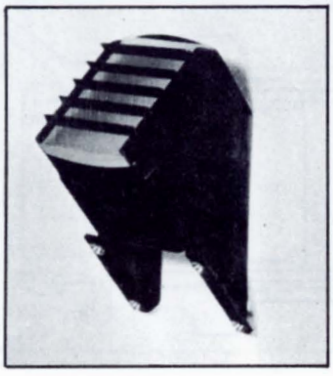
GENERAL: The ground glass is set in its holder and as a unit mounted in the camera housing. The image formed on the ground glass is transmitted to a stationary mirror and from there is reflected into the viewfinder.



REMOVAL OF GROUND GLASS HOLDER:

The ground glass holder can be removed only after the film gate has been taken out, as shown at right.

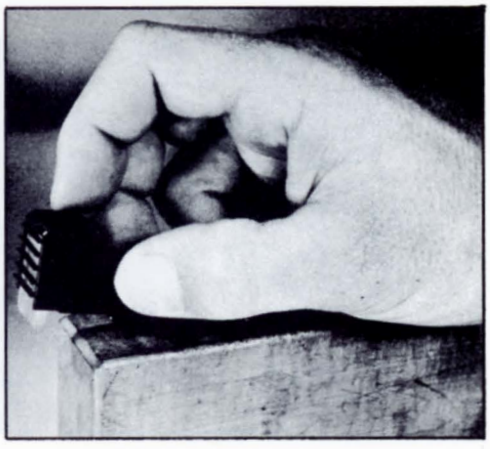
First remove four countersunk screws 02-14; then carefully lift the ground glass holder out of the camera housing.



In front of the ground glass holder are five thin metal blades (light baffles), shown at left. These prevent light reflections from the ground glass to the film. Be careful not to bend or damage them, since they appear as fine vertical lines in the viewfinder picture.

REMOVAL OF THE GROUND GLASS :

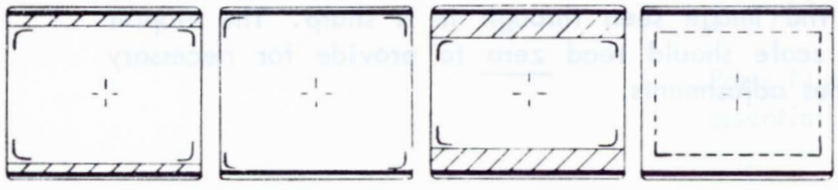
The ground glass may have a tight fit in the holder. Do not use any metal tools to remove it, since the holder or glass can easily be damaged. Tap the holder against a wooden edge until the glass slides out, as shown at right.



CLEANING : Always use a lens cleaner and lens tissue.

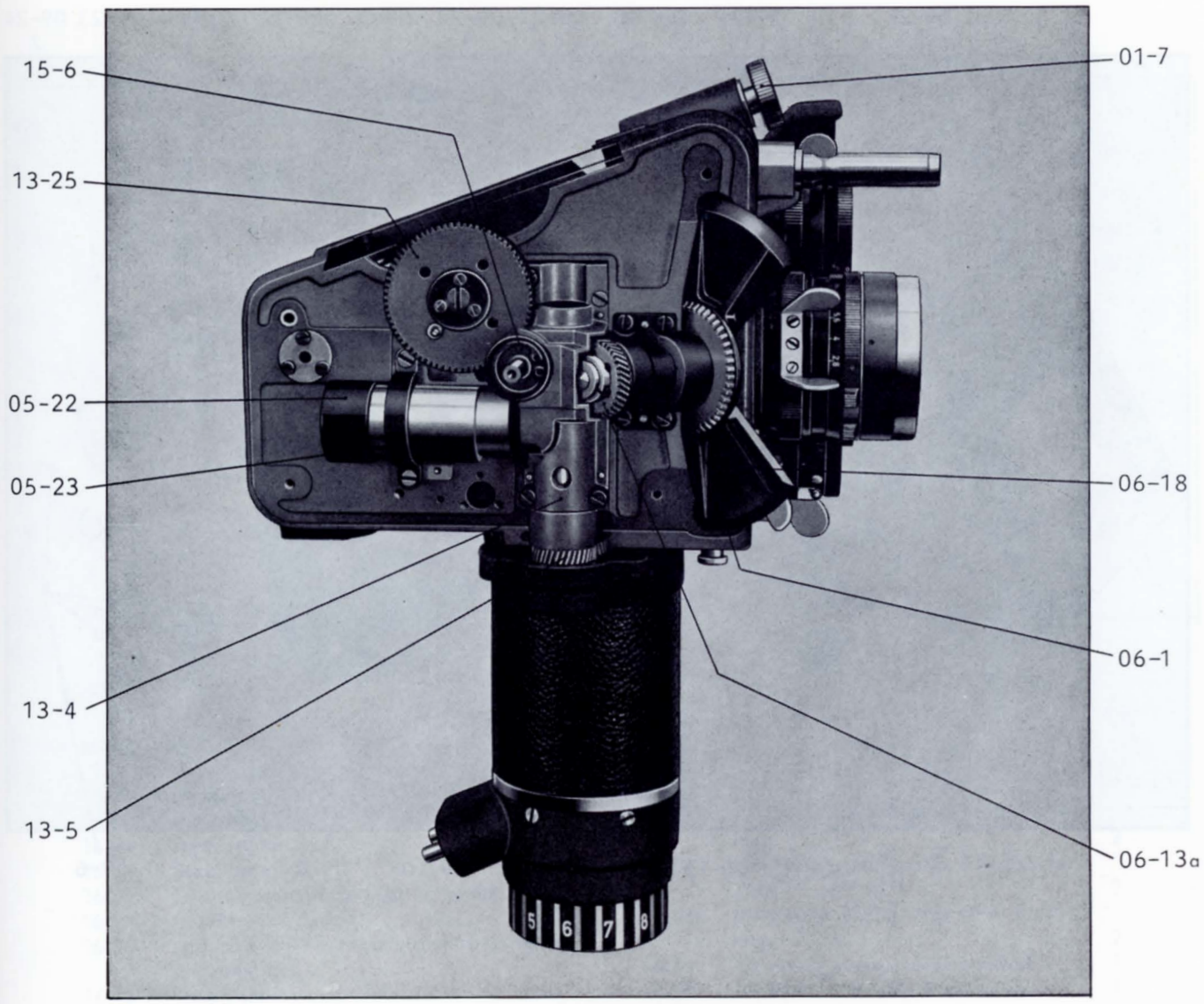
REASSEMBLY: Insert the ground glass in its holder. Be sure the ground surface is facing the baffles. Put the holder back in the camera housing and line it up exactly with the four screw holes in the camera housing.

CHECKING : Mount the camera on a tripod. Use a medium focal length lens (50mm) and set the lens scale at infinity. View some subject at infinity range, not closer than 600 ft. Choose a viewing point such as a flagpole or tower, for clear definition. If the ground glass is exactly in the focal plane, the picture observed through the viewfinder will appear sharp. If a slight adjustment is necessary, loosen the screws and move the ground glass holder into exact focal plane. Then tighten the screws and recheck.



Academy 1.375:1 | Cinemascope 2.35:1 | Wide Screen 1.85:1 | TV Safe Action

Interchangeable ground glasses are available—each etched with correct camera aperture, projector aperture, and center cross. The ground glass is easily changed through an empty lens socket.

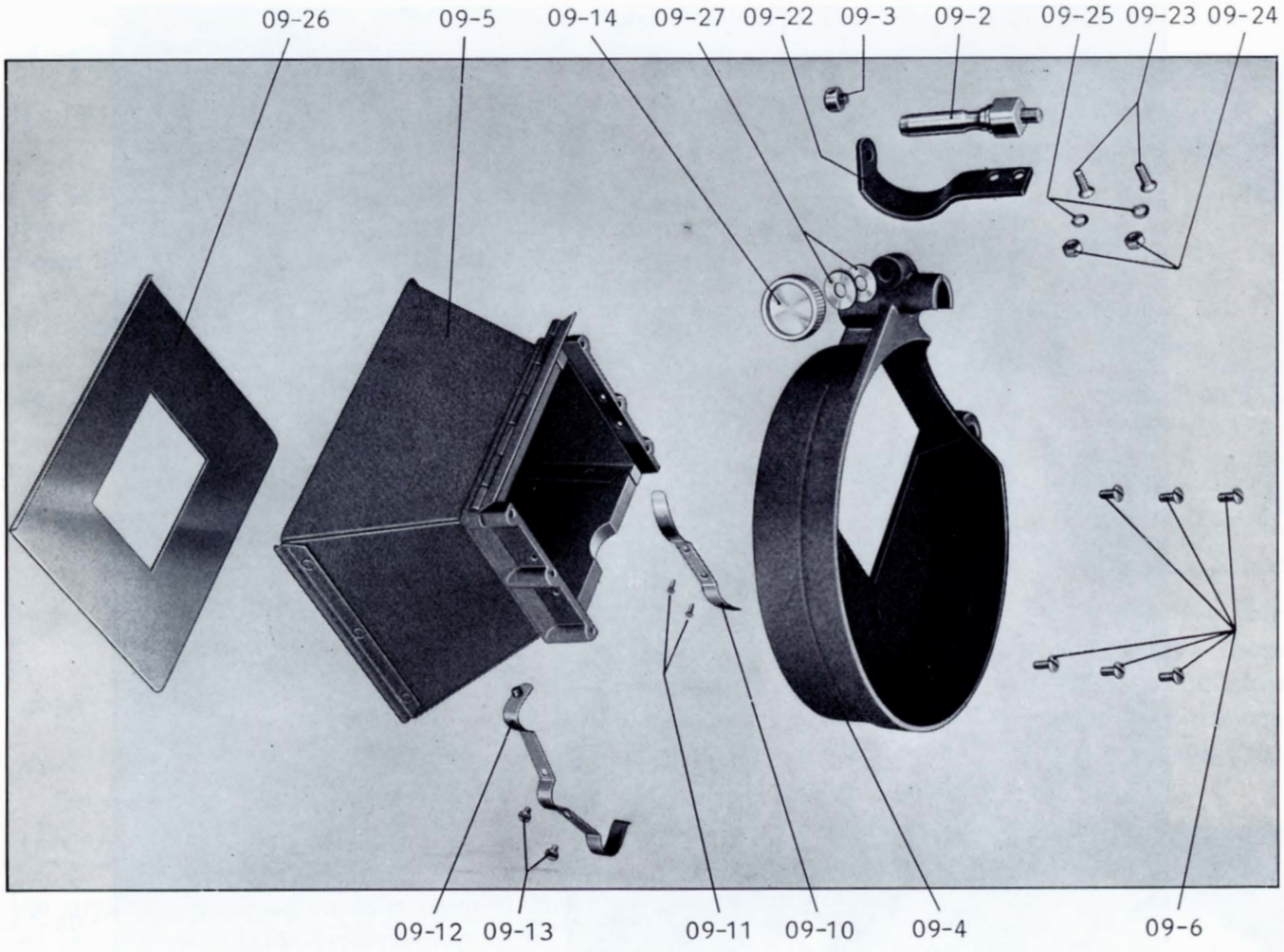


Drive mechanism

The illustration shows the drive mechanism and the mirror reflex shutter of the ARRIFLEX 35 II B after removal of the gear cover.

The following parts are marked in the illustration:

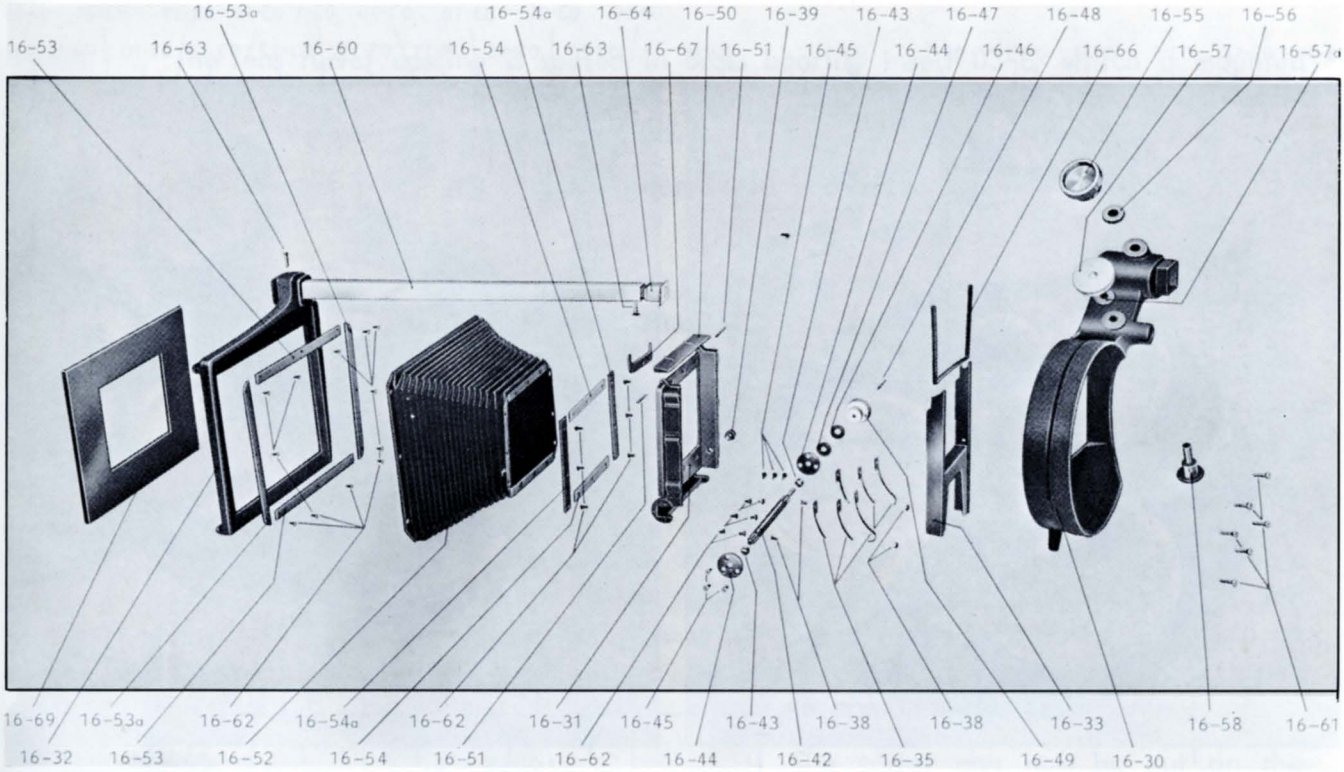
01– 7	Knurled knob for securing magazine
13–25	Intermediate gear
05–22	Tachometer
05–23	Tachometer retaining strap
06– 1	Shutter bearing bracket with flange
06–13a	Gear for shutter
06–18	Mirror reflex shutter
15– 6	Claw bearing housing
13– 4	Housing for vertical shaft
13– 5	Vertical shaft with gear



Sunshade (Compendium)

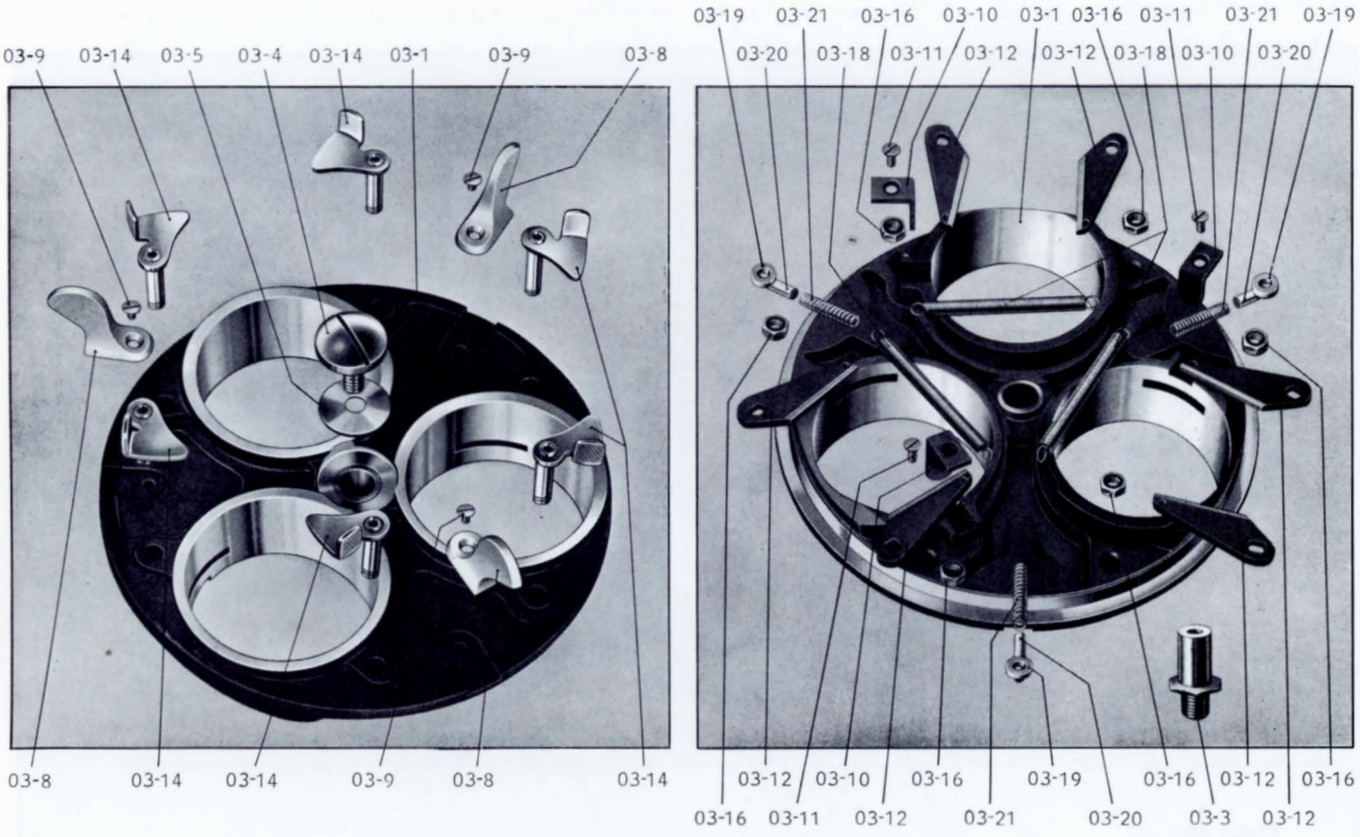
		Quantity
09– 2	Sunshade mounting stud	1
09– 3	Sunshade locating stud	1
09– 4	Sunshade and filter holder support casting	1
09– 5	Sunshade with rectangular funnel	1
09– 6	Countersunk screws	6
09–10	Leaf spring	1
09–11	Grooved studs	2
09–12	Leaf spring	1
09–13	Cheese head screws	2
09–14	Knurled clamp screw, machine-milled	1
09–22	Support bracket	1
09–23	Countersunk screws	2
09–24	Hexagon nuts	2
09–25	Spring washers	2
09–26	Mask for 75 mm lens	1
09–26 a	Mask for 50 mm lens (not shown)	1
09–27	Washer	1

NOTE:
The term "compendium" is European nomenclature and is used interchangeably for either the sunshade or the matte box.



Matte Box

		Quantity
16-30	Matte box support	1
16-31	Filter holder	1
16-32	Front frame	1
16-33	Rack, complete	1
16-35	1 set of pressure springs, complete	1
16-38	Countersunk screws	2
16-39	Lock screw M 8 with compression spring and steel ball	1
16-42	Pinion shaft	1
16-43	Spacers	2
16-44	Bearing flanges	2
16-45	M 2 countersunk screws for bearing flange	6
16-46	Washer	1
16-47	Disk spring	1
16-48	M 3 set screw, cone point	1
16-49	Knob, machine-milled	1
16-50	Cover	1
16-51	Shouldered set screws	2
16-52	Bellows	1
16-53	Bellows mounting strip, front frame, short	2
16-53 a	Bellows mounting strip, front frame, long	2
16-54	Bellows mounting strip, filter holder, short	2
16-54 a	Bellows mounting strip, filter holder, long	2
16-55	Clamping screw, machine-milled	1
16-56	Washer	1
16-57	Knurled nut, machine-milled	1
16-57 a	Washer	1
16-58	Clamping bolt	1
16-60	300 mm (12") boom	1
16-61	Countersunk screws for filter holder mounting, M 3 x 10	6
16-62	Countersunk screws for bellows mounting, M 2 x 6	24
16-63	Countersunk screws for boom	2
16-64	Front insert	1
16-66	Additional holder for German filters	1
16-67	Cover spring	1
16-69	Mask	1



Lens turret

		Quantity
03– 1	Turret with centre-hole	1
03– 3	Turret centre stud (only for older cameras)	1
03– 4	Cheese head screw for model II B	1
03– 4a	Cheese head screw for model II B	1
03– 5	Washer for model II B	1
03– 5a	Washer for model II	1
03– 6	Turret bearing insert, for model II only	1
03– 7	Grooved dowel pins for model II	2
03– 8	Turret levers	3
03– 9	Countersunk screws for 03–8	3
03–10	Lens mount keys	3
03–11	Countersunk screws for 03–10	3
03–12	Lens retaining latches (pairs)	3
03–14	Lens release latches with studs (pairs)	3
03–16	Hexagon nuts for 03–14	6
03–18	Tension springs	3
03–19	Turret indexing detents	3
03–20	Turret indexing plungers	3
03–21	Compression springs	3

Lens Turret

GENERAL: The lens turret casting is seated in brass bearing insert 03-6, which is mounted in the camera housing. The turret itself is held in place by the turret center screw connected to the center stud.

REMOVAL: First remove screw 03-4 and washer 03-5. The turret can now be taken off the camera housing.

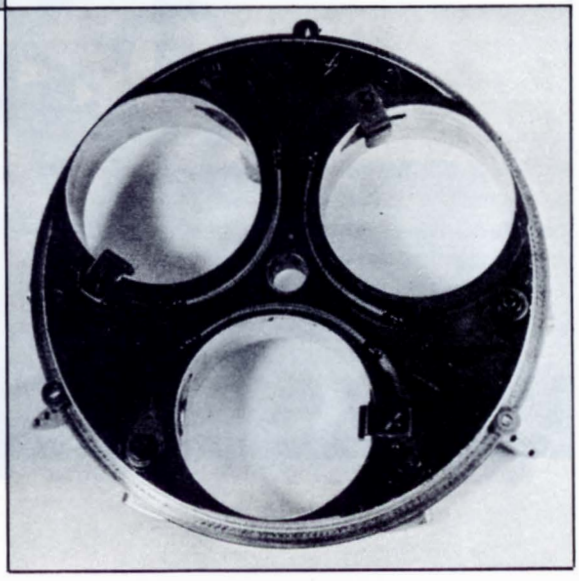
IMPORTANT: Remove the turret slowly and carefully, so that the spring-loaded locking roller assemblies do not fly out. There are three roller assemblies in the turret. Each assembly consists of turret indexing wheel 03-19, turret indexing plunger 03-20, and compression spring 03-21.

SUGGESTION: To prevent rollers from jumping out when the turret is being removed, put a towel around the turret to prevent the loss of the spring-loaded locking assemblies.

REASSEMBLY: Clean and lubricate mating surfaces of the turret and camera housing, using grease supplied by Arriflex. Insert the compression springs, turret indexing plunger and turret indexing wheels. Make sure each locking assembly moves freely in its groove in the turret casting. Press against each unit with a screwdriver blade to check mobility.

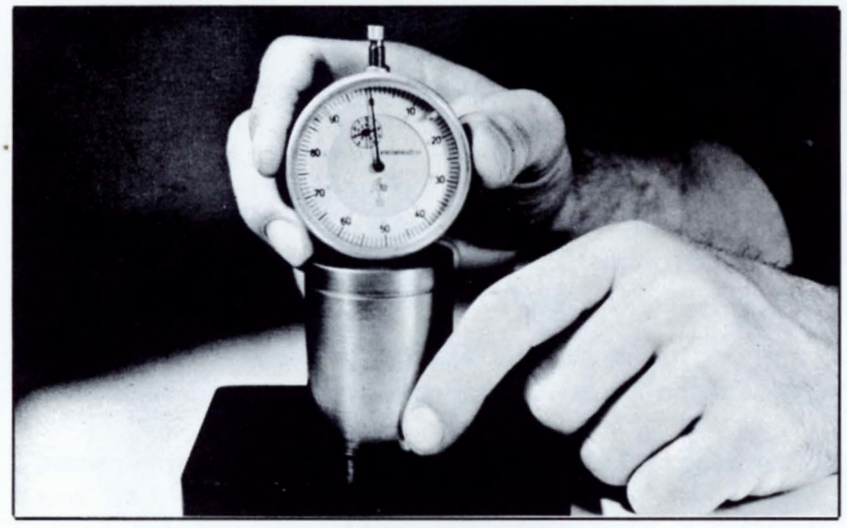
The turret can now be put on the camera housing. The sunshade should be removed to make assembly easier. The turret will rest on its three extending rollers. To seat the turret completely into the brass bushing, the three rollers must be pushed in simultaneously with the blade of a medium-sized screwdriver. Pressure on the turret will then snap it securely in place. This is a tricky maneuver — better done with aid of an assistant.

Fasten the center screws and check the turret for smooth revolving, also for excessive play between turret and housing. If too much, shorten center stud accordingly. If stud is too short and turret fits too tightly, compensate with a washer between screw and stud. Before inserting lenses, lubricate inside walls of lens sockets with a thin layer of the Arriflex grease.



REPLACEMENT: If a damaged turret casting must be replaced, the new casting may require machining to obtain required distance between lens mount seat and film plate.

Measuring the Flange Focal Distance

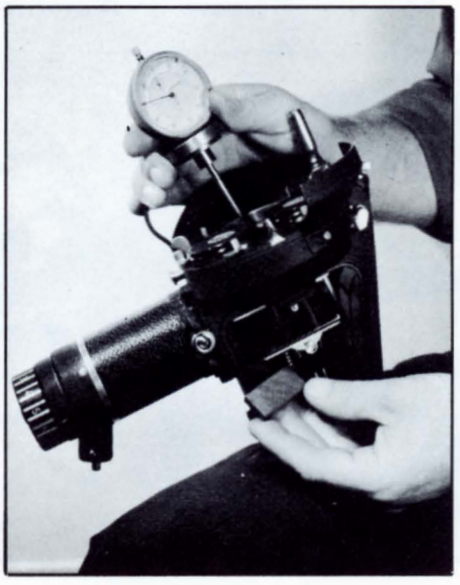


To obtain perfect focus and sharp pictures, the flange focal distance must be kept in strict tolerance.

For measuring this distance the following tools are used:

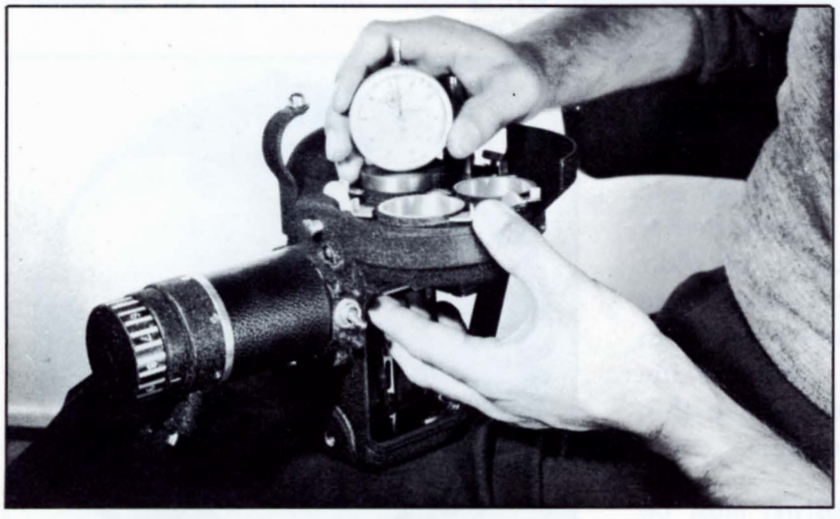
T35-1 Dial indicator
T35-2 Standard gauge
T35-4 Parallel steel block

First place the standard gauge on a piece of flat ground stock. Put the dial indicator on top of it and set the scale to zero, as shown at left.



Hold the parallel steel block firmly against the film aperture plate, and place the dial indicator into the open lens socket, as shown at right. Make sure that the matching surfaces of the dial and lens socket are clean.

The dial indicator should now read 52mm -0.02 to -0.03, or 2.046 inches, as shown below.



Since all lenses used on Arriflex cameras are adjusted for exactly 52mm, the question arises as to why the distance from the turret surface to the film aperture should be 52mm -0.03. The reason for the minus tolerance is that most film is not perfectly flat, but tends to curve slightly away from the lens. Degree of curvature may vary depending upon type and age of the film. By compensating for this curvature, perfect sharpness will be obtained.

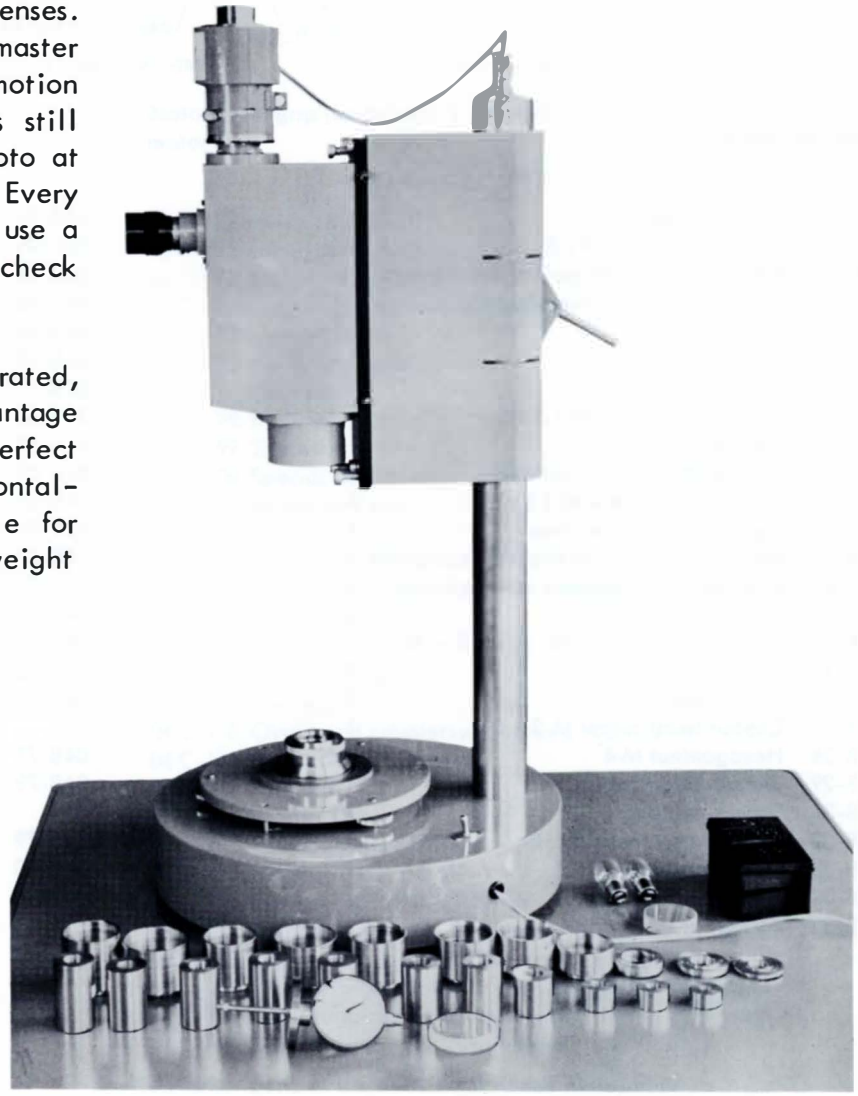
Lens Seating

The construction of the focusing mounts of lenses for the Arriflex 35mm camera varies with each manufacturer, model, focal length and other specifications. All lenses are positioned in their focusing mounts to meet the requirements of a flange-to-film distance of 52mm (2.0472"). This should be made as precise as possible, well within -0.1mm+0 or 0.0003"+0.

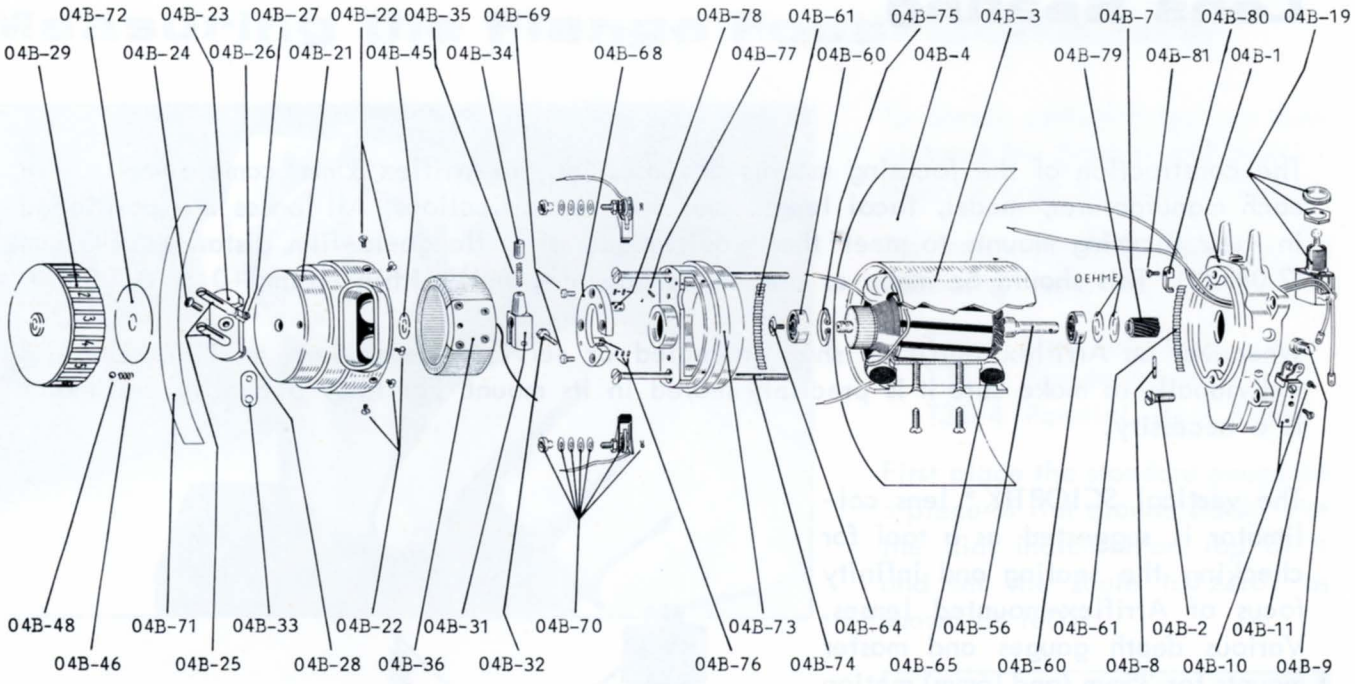
Whenever an Arriflex outfit is shop inspected or serviced, each lens must be checked individually to make sure it is precisely seated in its mount. For this, a quality collimator is a necessity.

The vertical SCIOPTIK* lens collimator is suggested as a tool for checking the seating and infinity focus of Arriflex-mounted lenses. Various depth gauges and master mounts for 35mm (and 16mm) motion picture cameras, as well as still cameras, are shown in the photo at the base of the collimator. Every camera repair section could use a collimator of this type to check lenses for all their cameras.

Because it is vertically operated, this collimator has the advantage that each lens is always in perfect checking position. On horizontal-type collimators, it is possible for a lens to drop of its own weight from its true axis.



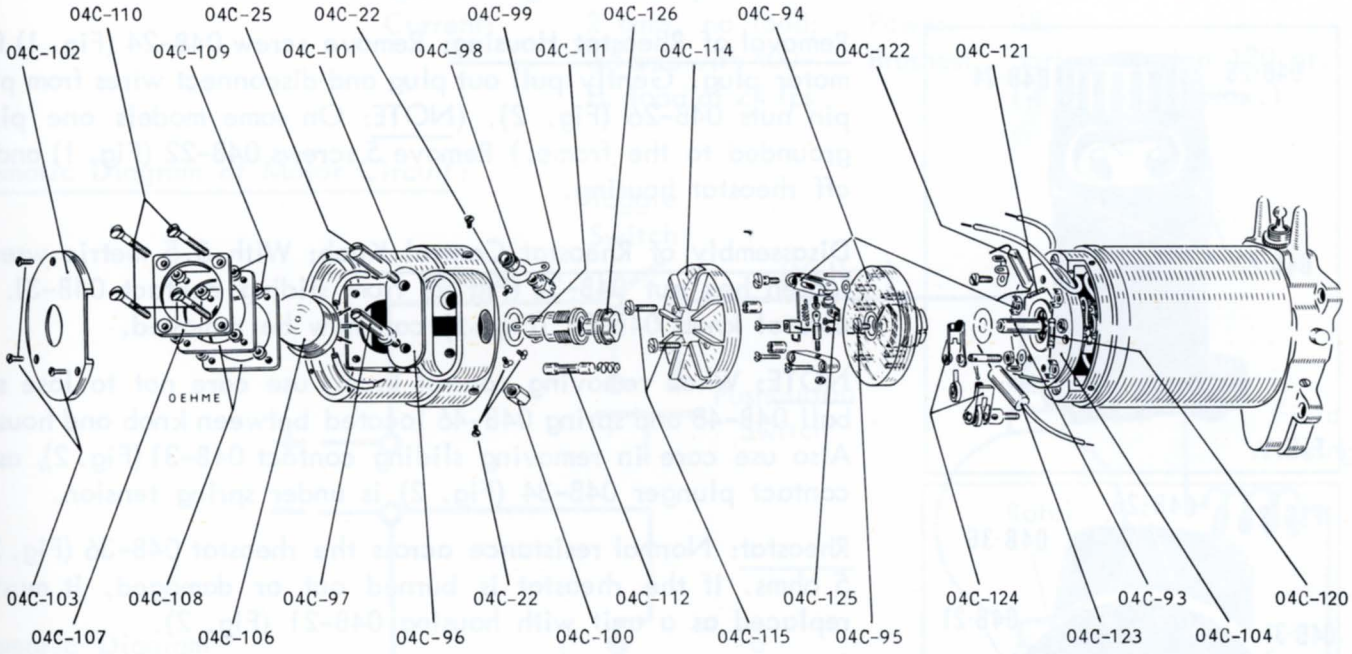
*Trademark



Motor-Handgrip

		Quantity
04 B– 1	Motor flange	1
04 B– 2	Oval-head screws 4 x 8	4
04 B– 3	Motor housing with pole shoes, countersunk screws and field winding, complete	1
04 B– 4	Coating	1
04 B– 7	Drive gear	1
04 B– 8	Grooved dowel pins 1.5 x 6	1
04 B– 9	Press button	1
04 B–10	Press button switch, complete	1
04 B–11	Countersunk screw M 2.3 x 6	1
04 B–19	Toggle switch, complete	1
04 B–21	Male connector with rheostat, complete	1
04 B–22	Oval-head countersunk screws 2.3 x 4	5
04 B–23	Insulating plate	1
04 B–24	Oval-head countersunk screw 3 x 10	1
04 B–25	Plug pins	2
04 B–26	Special nuts	2
04 B–27	Cheese-head screw M 2 x 4	1
04 B–28	Hexagon nut M 4	1
04 B–29	Rheostat end cap	1
04 B–31	Sliding contact	1
04 B–32	Hexagon screw M 3 x 10	1
04 B–33	Contact bridge	1
04 B–34	Plunger	1
04 B–35	Spring	1

		Quantity
04 B–36	Resistor (cast into 04 B–21)	1
04 B–45	Spacer	1
04 B–46	Spring	1
04 B–48	Ball	1
04 B–56	Motor rotor, complete	1
04 B–60	Ball bearing EL 5, high precision	2
04 B–61	Heat insulating strips	2
04 B–64	Screw	1
04 B–65	Field winding	1
04 B–68	Brush holder support	1
04 B–69	Cheese head screws M 2.3 x 6	2
04 B–70	Brush holders, pair, complete	1
04 B–71	Insulating strip	1
04 B–72	Insulating ring	1
04 B–73	Motor bearing support	1
04 B–74	Countersunk screws M 4 x 80	2
04 B–75	Circlip retainer	1
04 B–76	Special clamp with 3 grub screws M 1.7 x 3	1
04 B–77	Grub screw M 1.7 x 3	1
04 B–78	Special clamp with 2 grub screws M 1.7 x 3	1
04 B–79	Disk springs	2
04 B–80	Cable clamp	1
04 B–81	Countersunk screw M 2 x 6	1



Motor-Handgrip (centrifugally controlled transistor motor)

		Quantity
04 C– 22	same as 04 B–22	5
04 C– 25	same as 04 B–25	1
04 C– 93	Motor rotor (extended spindle)	1
04 C– 94	Centrifugal governor, complete	1
04 C– 95	Special screw	1
04 C– 96	Insulating plate	1
04 C– 97	Plug pin	1
04 C– 98	Bushing	1
04 C– 99	Special nut	1
04 C–100	Special nut	1
04 C–101	Motor end cap	1
04 C–102	Cover	1
04 C–103	Countersunk screws M 2 x 8	3
04 C–104	Brush holder support	1
04 C–106	Transistor	1
04 C–107	Leakage strip	1
04 C–108	Leakage strips	2
04 C–109	Spacers	8
04 C–110	Oval-head countersunk screws M 3 x 15	4
04 C–111	Fuse holder, complete	1
04 C–112	Fuse, 4 A	1
04 C–114	Fan cover	1
04 C–115	Special screws M 3 x 12	2
04 C–120	Resistor 2 Ω, 0.5 W	1
04 C–121	Resistor, 360–500 Ω, 0.5 W	1
04 C–122	Resistors, ceramic, 5 Ω, 4 W	2
04 C–123	Capacitor, 11 µ F, 60 V	1
04 C–124	Carbon brush holders, pair, complete	1
04 C–125	Centrifugal governor contacts	2
04 C–126	Bayonet head for fuse holder	1

All other parts of the above-mentioned motor handgrip correspond to those of group 04 B.

Variable Speed Motor 16v

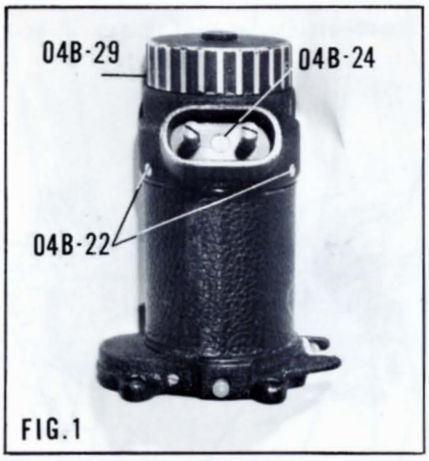


FIG. 1

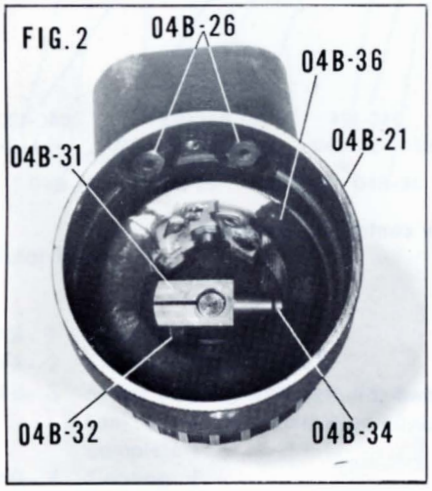


FIG. 2

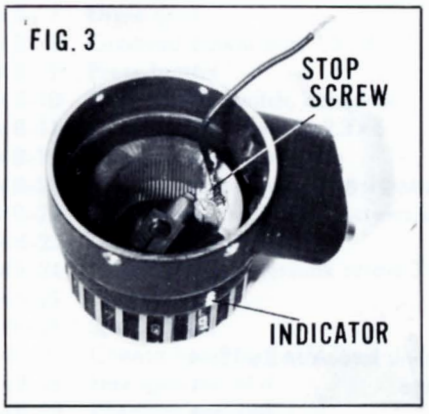


FIG. 3

Removal of Rheostat Housing: Remove screw 04B-24 (Fig. 1) from motor plug. Gently pull out plug and disconnect wires from plug-pin nuts 04B-26 (Fig. 2). (NOTE: On some models one pin is grounded to the frame.) Remove 5 screws 04B-22 (Fig. 1) and lift off rheostat housing.

Disassembly of Rheostat Control Knob: With 5.5 metric wrench, loosen hex nut 04B-32 (Fig. 2) from sliding contact 04B-31. The control knob 04B-29 (Fig. 1) can now be removed.

NOTE: When removing control knob, use care not to lose steel ball 04B-48 and spring 04B-46 located between knob and housing. Also use care in removing sliding contact 04B-31 (Fig. 2), as the contact plunger 04B-34 (Fig. 2) is under spring tension.

Rheostat: Normal resistance across the rheostat 04B-36 (Fig. 2) is 5 ohms. If the rheostat is burned out or damaged, it must be replaced as a unit with housing 04B-21 (Fig. 2).

Assembly: When assembling, be sure all electrical contacts are clean. Coat the inside of the end cap 04B-29 (Fig. 1) with a thin film of light grease.

To install sliding contact, set end cap indicator (Fig. 3) on the number 9, and place sliding contact against the stop screw connected to the outgoing wire (see Fig. 3). Tighten hex nut.

Brush Replacement: To replace brushes, remove two screws 04B-69 (Fig. 4) from brush holder. With the brushes held back so as to clear the frame, the unit can easily be removed.

To remove each brush, take out cotter pin (Fig. 5) and disconnect brush wires from the clamps 04B-78 (Fig. 5). The brush and spring will then slide off of each shaft.

Replace in reverse order, being sure to position the spring in the slot of the shaft. After replacing brushes 04B-70, adjust brush tension to about 120 gr at the connector, with the tension adjusting screw (Fig. 4).

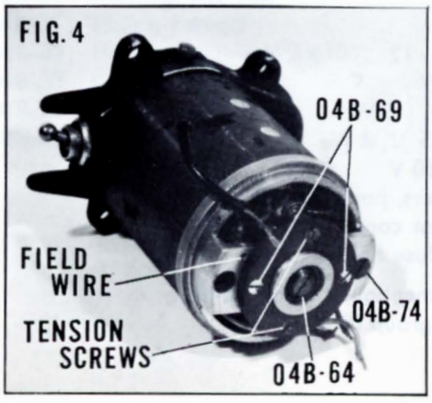


FIG. 4

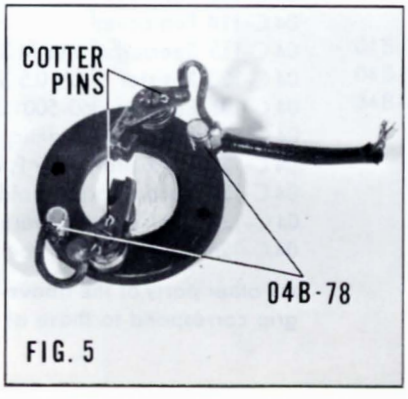


FIG. 5

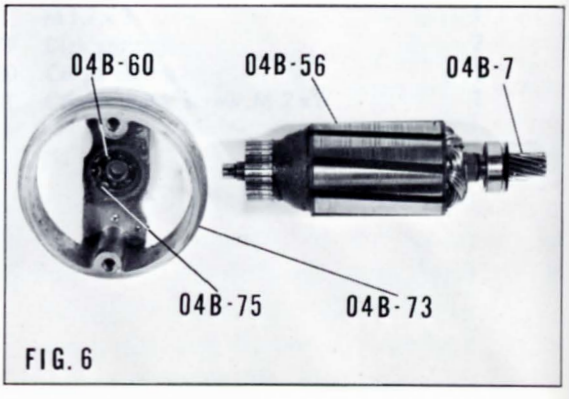
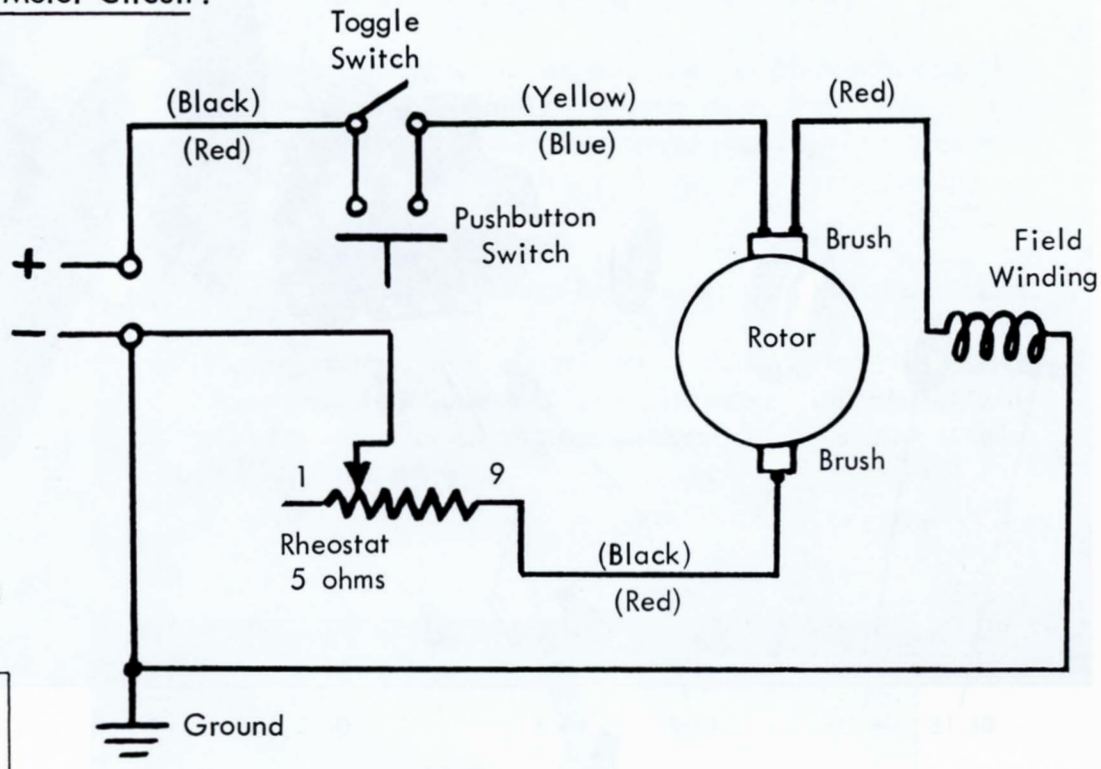


FIG. 6

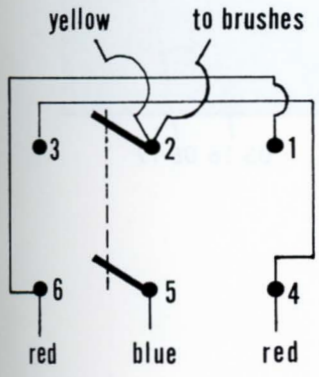
TECHNICAL DATA:

Voltage:	16v, DC	Speed:	7,000-7,200 rpm idling; 4,320 rpm at 24 fps
Speed Range:	16-36 fps		
Current:	2 amp, no load; 3.5 amp with 400-ft. load at 24 fps	Power:	48w
		Brushes:	Spring tension 120 gr. (4 ounces approx.)

Schematic Diagram of Motor Circuit:



Schematic Diagram of Reversing Switch:



On cameras with reversing-type motors, rheostat housing can't be removed until five wires leading to reversing switch have been disconnected. (It is not necessary to disconnect the jumper wires between poles 1-6 and 3-4.) When reassembling, use the diagram above.

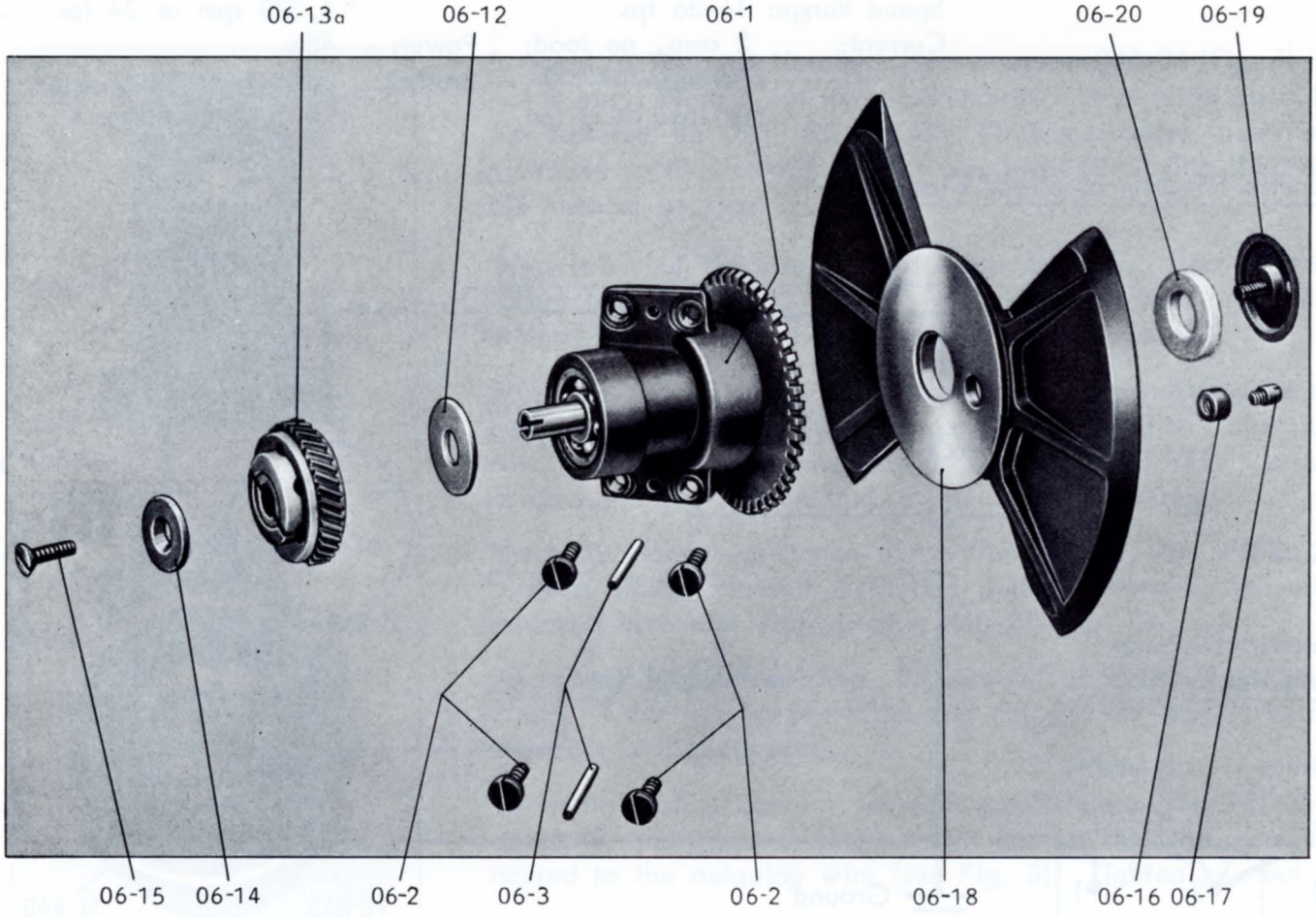
REMOVAL OF ARMATURE & BEARINGS:

Remove wires from clamps 04B-78 (Fig. 5, opposite page), and the field wire from the motor bearing support (Fig. 4). Remove two screws 04B-74 (Fig. 4) from the motor housing, and remove the rear bearing retaining screw 04B-64 (Fig. 4). Motor bearing support and motor rotor 04B-56 (armature) may now be removed.

The rear bearing 04B-60 (Fig. 6) can be taken out by removing the spring retainer clip 04B-75. The front bearing can be removed by first driving out the roll pin from the front of the drive gear 04B-7 (Fig. 6). Use extreme care not to damage the gear teeth.

The gear and bearing can now be pulled off the shaft. If the ball bearings show any signs of roughness, looseness or noise, replace them. If the old bearings are usable, they should be cleaned and lubricated before replacement.

ASSEMBLY: Assemble in reverse order.



Mirror Reflex Shutter

		Quantity
06– 1	Shutter bearing bracket with bearings and flange shaft, complete	1
06– 2	Cheese head screws for 06–1	4
06– 3	Grooved dowel pins for 06–1	2
06–12	Brass spacer	1
06–13a	Gear for shutter (model II B)	1
05–14	Keyed washer	1
06–15	Countersunk screw	1
06–16	Plastic sleeve	1
06–17	Shoulder screw	1
06–18a	180° mirror reflex shutter (model II B)	1
06–19	Shutter mounting screw	1
06–20	Felt washer	1

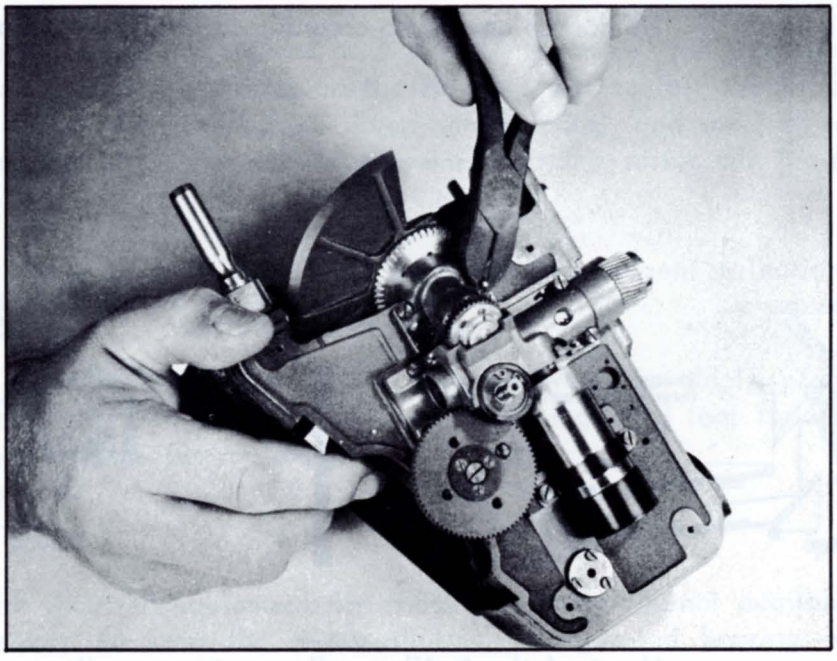
Mirror Shutter Disassembly

REMOVAL: First pull out locating pins 06-3, using pliers as shown below. Then remove four screws 06-2. The mirror shutter assembly can now be removed from the camera housing.

NOTE: Upon reassembly, when the pins are put back in place, they will extend approximately 1/8-inch above the flange-bearing housing when they are in the correct position. This is because the holes for the locating pins in the camera housing are bottom holes.

IMPORTANT: The shutter assembly cannot be removed with the pins in place.

NOTE: Never remove the mirror-reflex shutter from the flange unless repair adjustments or replacements on this assembly must be done. For complete disassembly of the shutter bearing housing, see page 34.



Mirror

GENERAL: The mirror, Part 02-17, is inserted into mirror holder 07-16, the two being mounted as a unit into the camera housing.

DISASSEMBLY: The screw which secures the mirror mount to the camera housing can be seen and removed only through an open lens-mount receptacle of the turret.

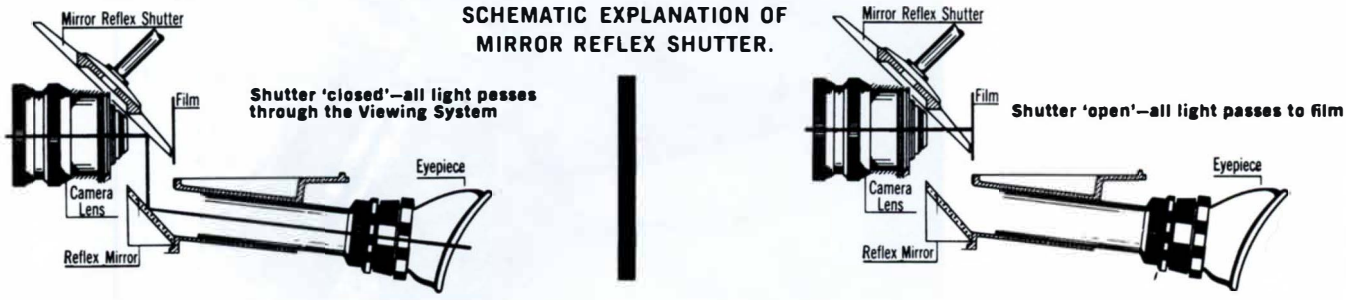
If the mirror must be replaced, remove the screw and then remove the mirror with its holder from the camera housing.

The mirror in its holder is secured with cement. Use acetone to remove the old mirror from its holder.

ASSEMBLY: Install the mirror in reverse order to the foregoing instructions.

IMPORTANT: The front mirror surface is silver coated, and it should be cleaned only with lens cleaner.

Do not use any strong cleaning solution, such as acetone, for this purpose.



SCHEMATIC EXPLANATION OF MIRROR REFLEX SHUTTER.

Heart of the Arriflex reflex system, as diagrammed above, is the segmented mirror-shutter which rotates at a 45° angle between the lens and the filmplane. When the shutter is closed, the image is reflected off the mirror segments into the viewfinder. When the shutter is open, all of the light passes between the segments directly into the film. Thus the system is a time-sharing arrangement and no beam splitter is used.

Mirror Shutter Installation

GENERAL: The mirror shutter, made of solid glass, is ground optically flat and metal coated. The mirror, mounted on the flange shaft, must run in a true tolerance of 0.003mm. If this tolerance is not maintained, the image transmitted into the viewfinder system will appear to move. This movement would be most noticeable when viewing objects composed of straight lines — such as poles, window frames or fence pickets.

NOTE: Avoid removing the mirror shutter except as necessary for replacement, or if repairs are necessary on the shutter bearing assembly.

REMOVAL: Use spanner wrench T35-8. Remove screw 06-19 and felt washer 06-20.

IMPORTANT: Never touch the mirror surface with the fingers, and carefully protect its surface at all times.

ASSEMBLY: Before placing the mirror on the shaft, be sure that mating surfaces are clean. Place the shutter on the flange, put the felt washer on the mirror and fasten with the screw. Exert utmost care, and use judgment in tightening the screw, as excessive pressure on the mirror can break it.

IMPORTANT: The edges of the mirror should be painted to prevent reflections to the film.

CHECKING: To check if the mirror shutter rotates in a true single plane, a special fixture with dial indicator is used. Applying gold leaf for balance should only be done by an expert.

If the required equipment for checking rotation is not available, it will be necessary to send the mirror shutter, flange and bearing assembly with bearing housing to the nearest Arriflex service depot.

Shutter Bearing Housing

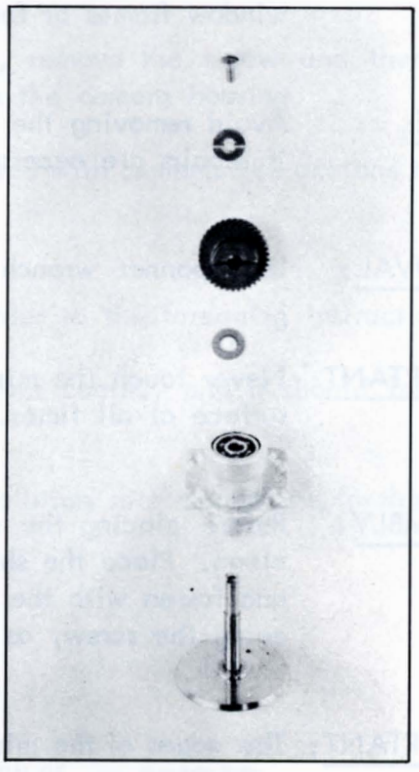
DISASSEMBLY:

If the bearing housing must be disassembled, the shutter must be removed first.

Next, in order, remove screw 06-15, then keyed washer 06-14, gear 06-13, and brass spacing washer 06-12.

The flange may fit tightly in the ball bearing. If so, use a soft mallet to tap it out.

Ball bearings may be removed for cleaning and lubrication or replacement.



REASSEMBLY:

Proceed in reverse order. When fully assembled, the shaft with gear should turn easily and smoothly, but it must not have any play.

Timing the Mirror Shutter

GENERAL: The mirror shutter must revolve relative to the film transport mechanism in such a way that at the very moment the claw begins to move the film, the shutter must cover the film aperture completely during the period in which the film is being transported.

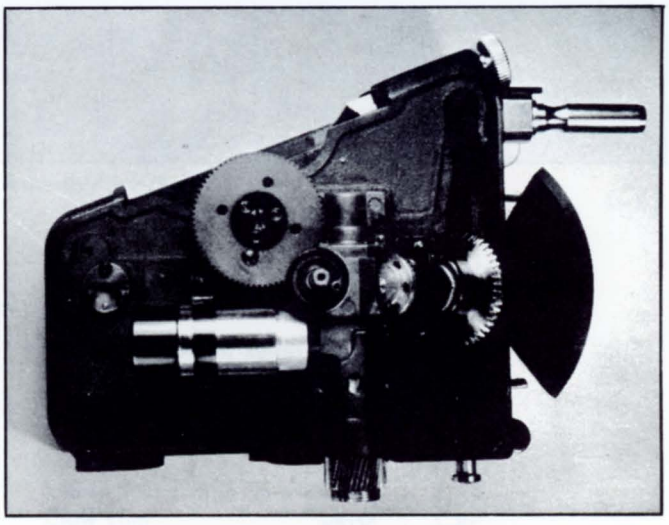
From the moment the transport claw disengages the film perforation, and the film comes to a full stop, the shutter must be completely open for the period of the exposure.

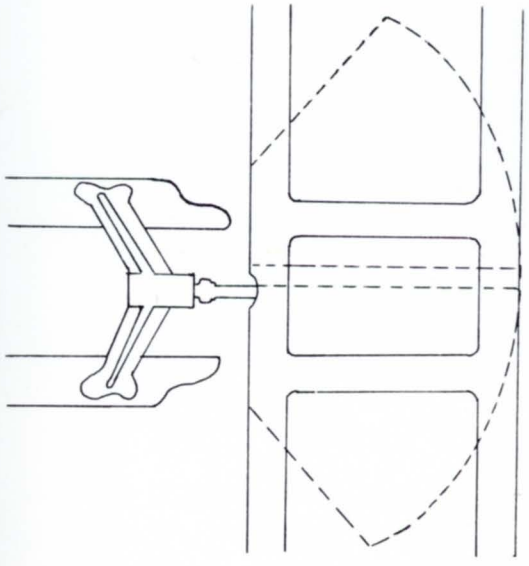
The proper relationship between the shutter and transport claw movements is achieved by precise engaging of the mirror shutter shaft gear to the intermittent shaft gear.

If either of these gear units has been removed during disassembly or repair, special attention must be given after reassembly to re-establish exact timing.

TIMING: Reassemble the camera, except for the mirror shutter assembly and the cover. Turn intermittent shaft 15-3 until the transport claw is in its deepest position, and exactly in the middle of the aperture plate. Now attach the shutter assembly so that one segment of the mirror covers the film aperture plate. There is a reinforcing rib on the back of both mirror segments, which also marks the center of each segment. This rib can be seen when looking through the film aperture when the film gate is opened.

The illustration at right shows the mirror shutter position when it is engaged to the intermittent gear and claw center in the deepest position in the film gate.



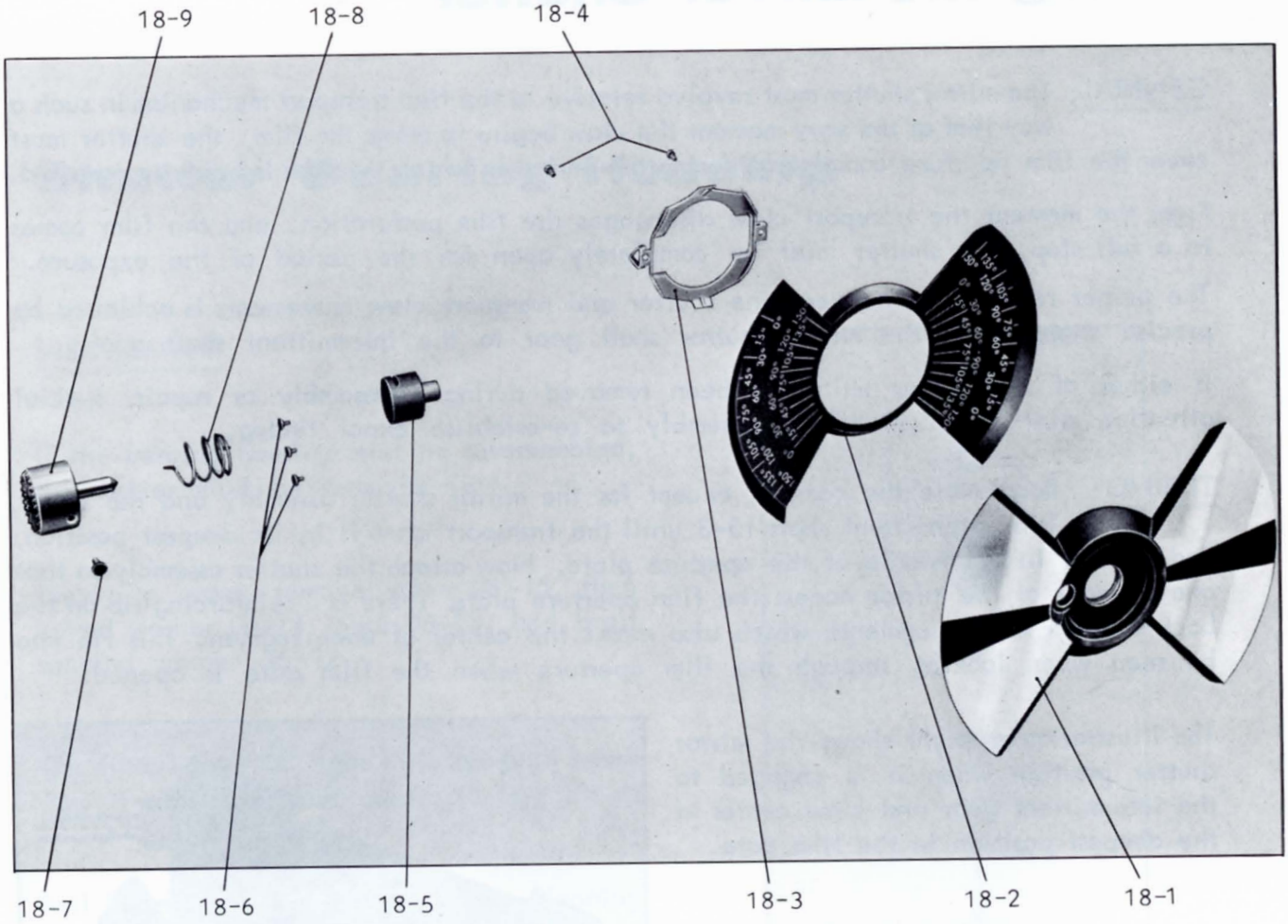


The left edge of the center rib of the shutter should line up with the right edge of the claw. When the claw and mirror are lined up as described, then the timing will be correct.

It may be necessary to disengage the shutter assembly again for a slight change of the shaft gear until the claw and center rib line up as shown in the sketch at left.

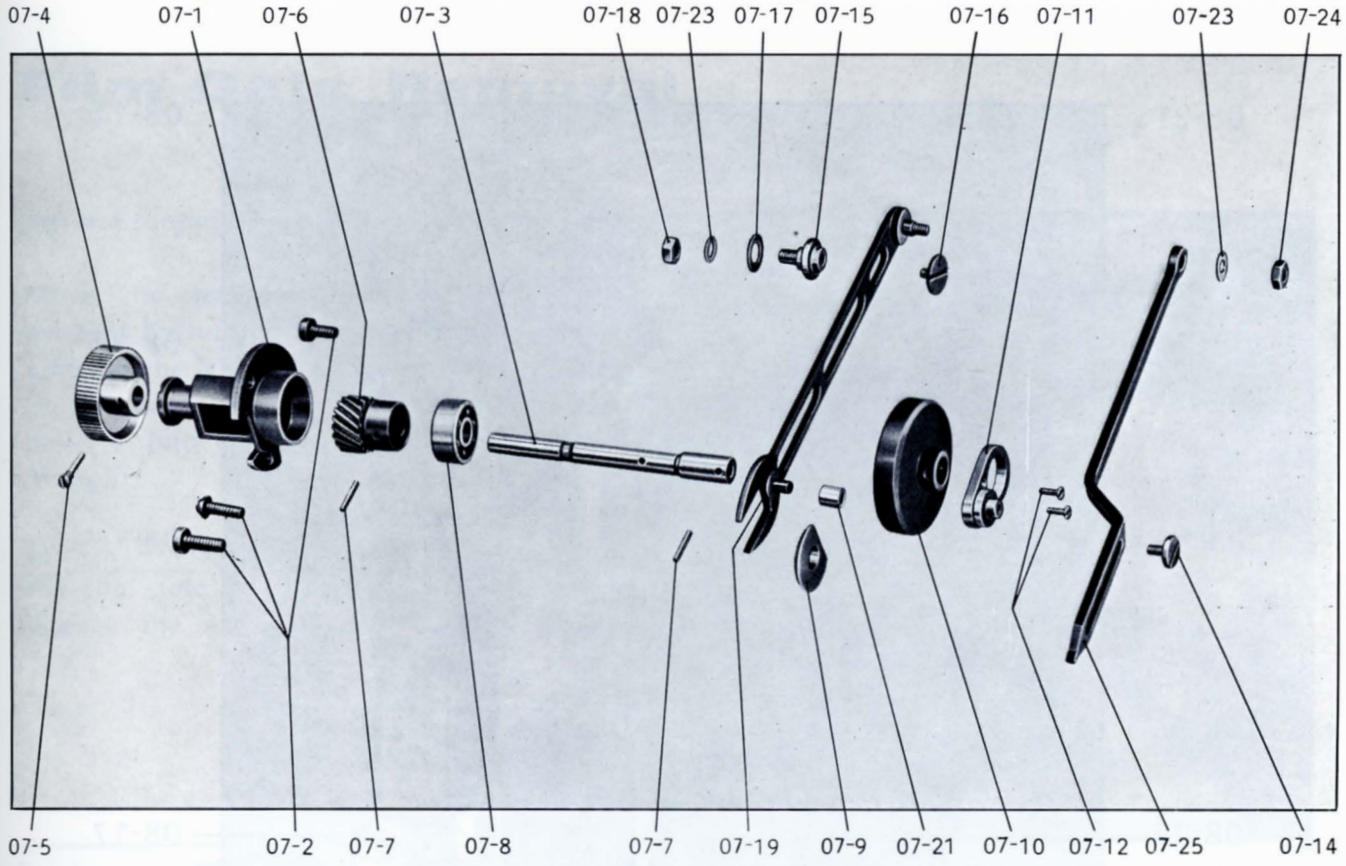
When the timing adjustment is correct, fasten the mirror assembly with screws 06-2 and insert locating pins 06-3.

NOTE: Pins will extend above the flange bearing housing when it is in its correct position, since the holes for locating pins in the camera housing are bottom holes.



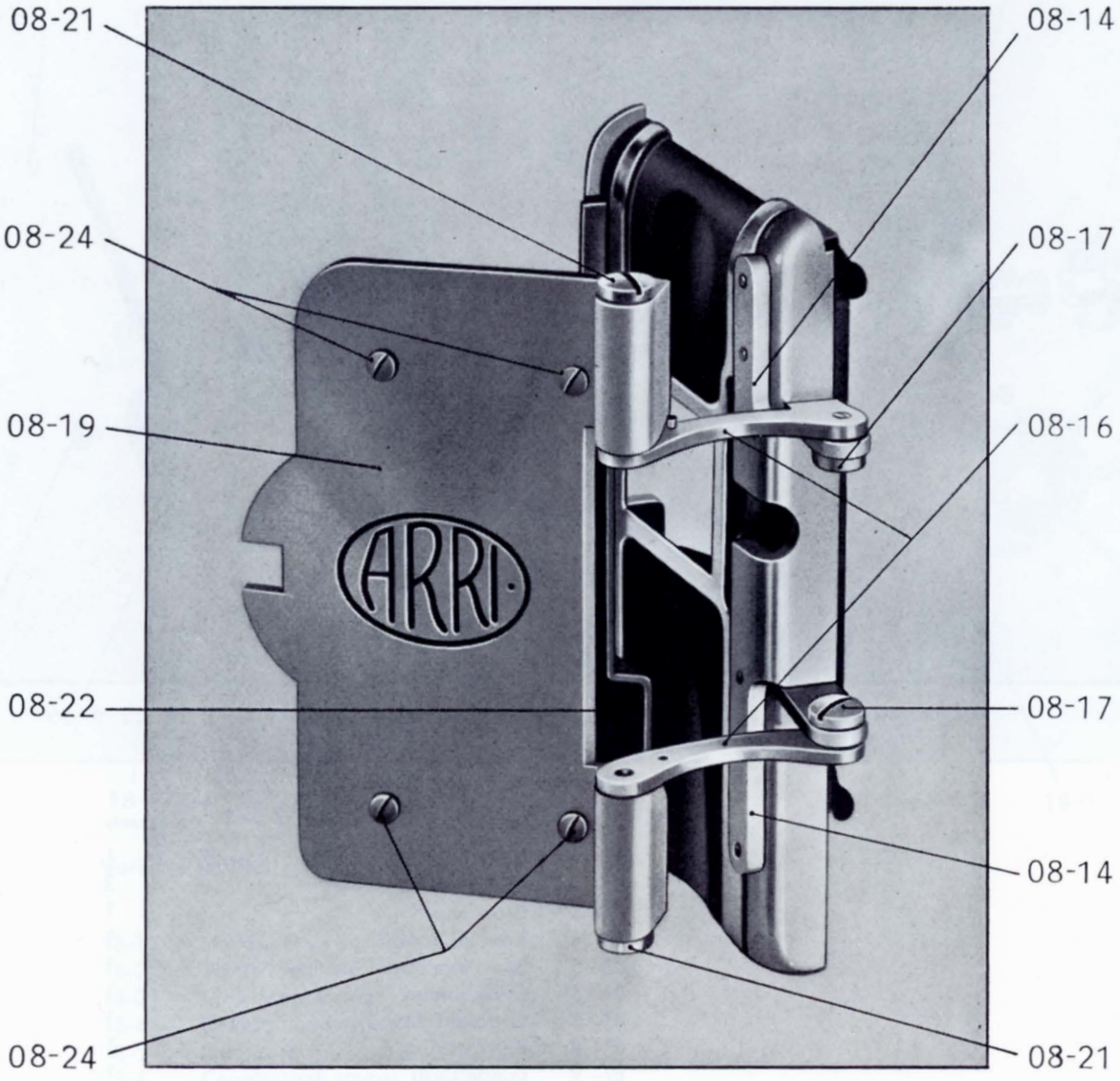
Variable shutter

		Quantity
18–1	Mirror reflex shutter	1
18–2	Shutter segment with scale	1
18–3	Click Stop spring	1
18–4	Cheese head screw M 1.4 x 3	1
18–5	Stop bush	1
18–6	Countersunk screws M 1.4 x 3	3
18–7	Screw	1
18–8	Torsion spring	1
18–9	Knurled knob	1



Claw Assembly for Model II

		Quantity
07– 1	Claw bearing	1
07– 2	Cheese head screws	3
07– 3	Claw shaft	1
07– 4	Knurled knob	1
07– 5	Special screw	1
07– 6	Claw pinion	1
07– 7	Grooved dowel pin	1
07– 8	Ball bearing	1
07– 9	Guide bush	1
07–10	Claw cam	1
07–11	Eccentric with stud	1
07–12	Oval-head countersunk screws	2
07–14	Special screw	1
07–15	Locating stud	1
07–16	Retaining screw	1
07–17	Washer	1
07–18	Hexagon nut	1
07–19	Link with guide pin and pivot pin	1
07–21	Small guide roller	1
07–23	Washers	2
07–24	Hexagon nut	1
07–25	Claw	1
07–28	Claw cover (not shown)	1
07–29	Countersunk screws for 07–28 (not shown)	2



Film Gate, Model II

		Quantity
08–14	Film guide with hinge support	1
08–16	Hinge links	2
08–17	Shoulder screws, short	2
08–19	Film gate	1
08–21	Shoulder screws, long	2
08–22	Pressure plate	1
08–24	Shoulder screws	4

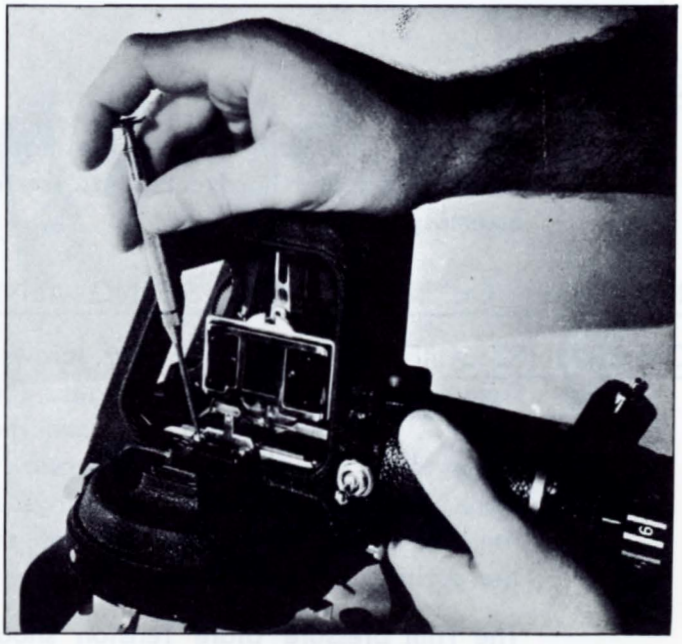
All other parts of the film gate are identical with those listed under group 12.

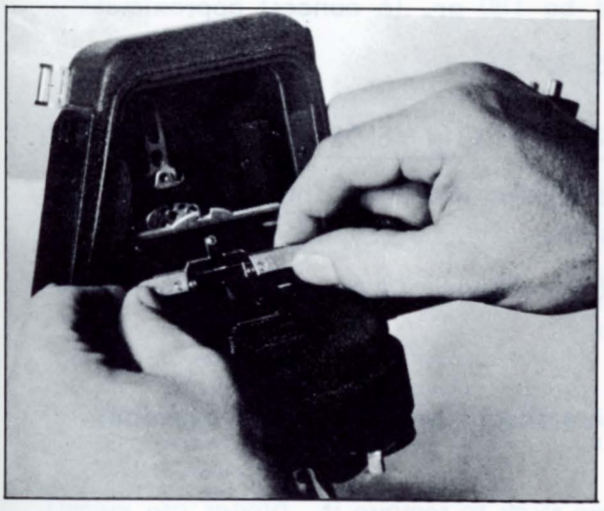
Film Gate Removal

Remove screws 08-28 and the holding clip.

Move the transport claw to its highest position by turning the inching knob shaft. Line up the claw pin to the small groove in the back of the aperture plate, and bring it into opposite position, as shown at right.

IMPORTANT: Only in this position can the film gate be taken out without damage to the claw pin.





Now lift the front of the film gate and slip it out, as shown at left.

The same procedure applies to putting the film gate back into place.

NOTE: The surface of the camera housing, where the film gate is seated, must be clean and smooth, to maintain the correct flange focal distance.

Film Gate Disassembly

GENERAL:

The steel film gate is precision machined, hand lapped and hard chromed. The entire assembly is shown at right.

REPLACING OR READJUSTING SPRING TENSION ON FILM PRESSURE PLATE: Remove four screws 12-9 from the lower and upper hinges. Pressure plate 12-10 and springs 12-8 can then be removed. If the film pressure tension is too weak, replace or stretch the springs. If the tension is too strong, replace or shorten the springs.

The film pressure plate tension should be 180 gr. (6 ounces) approximately.

To check spring tensions use gauge 35-3.

REPLACING OR READJUSTING SPRING TENSION ON SIDE PRESSURE RAIL:

Remove four screws 12-2 from the side tension lock rail. The springs can now be unhooked and replaced or adjusted.

The side pressure rail tension should be 90 gr. (3 ounces) approximately.

CLEANING:

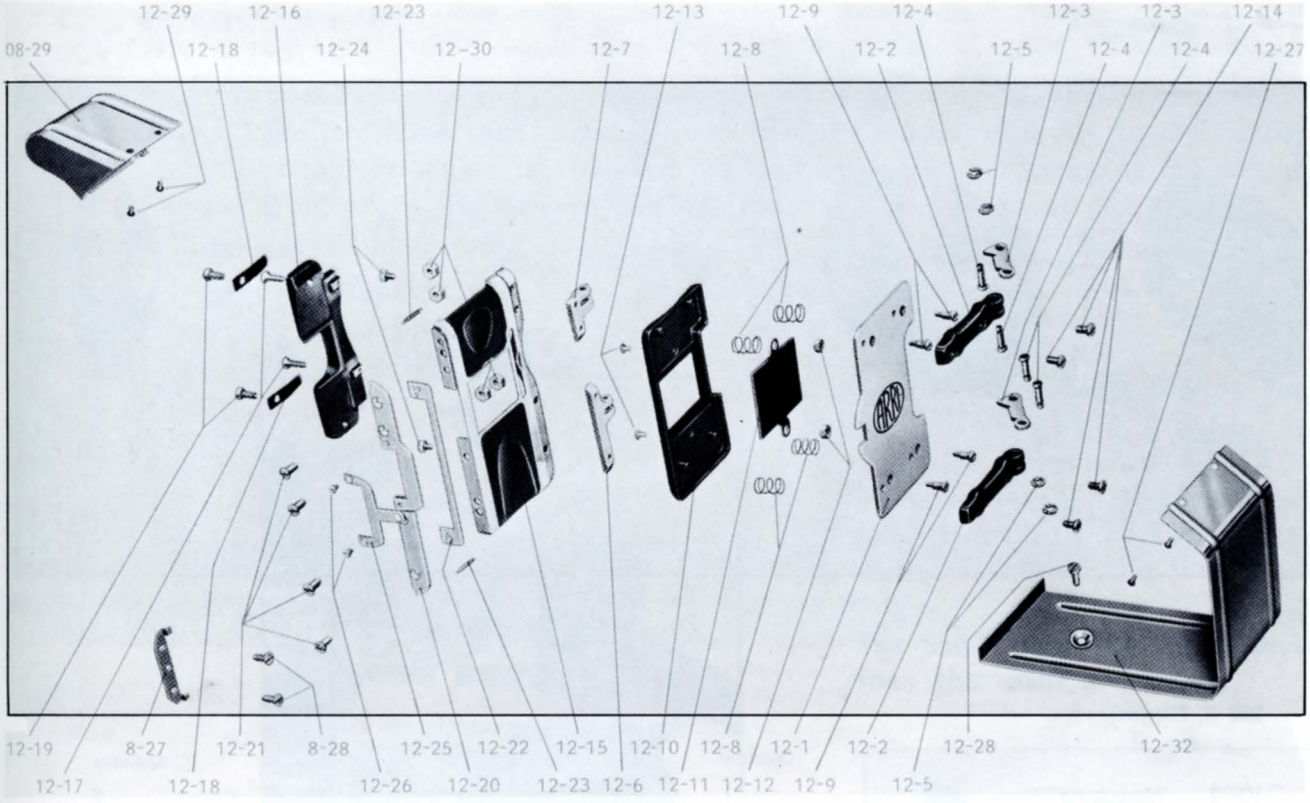
After each magazine run, the film gate should be opened and examined for emulsion deposits.

If emulsion has deposited, use an orange stick to remove it. Never use metal!

The chromium part of the gate should then be wiped with a soft linen cloth, and occasionally receive a very thin layer of vaseline, then wiped off again.

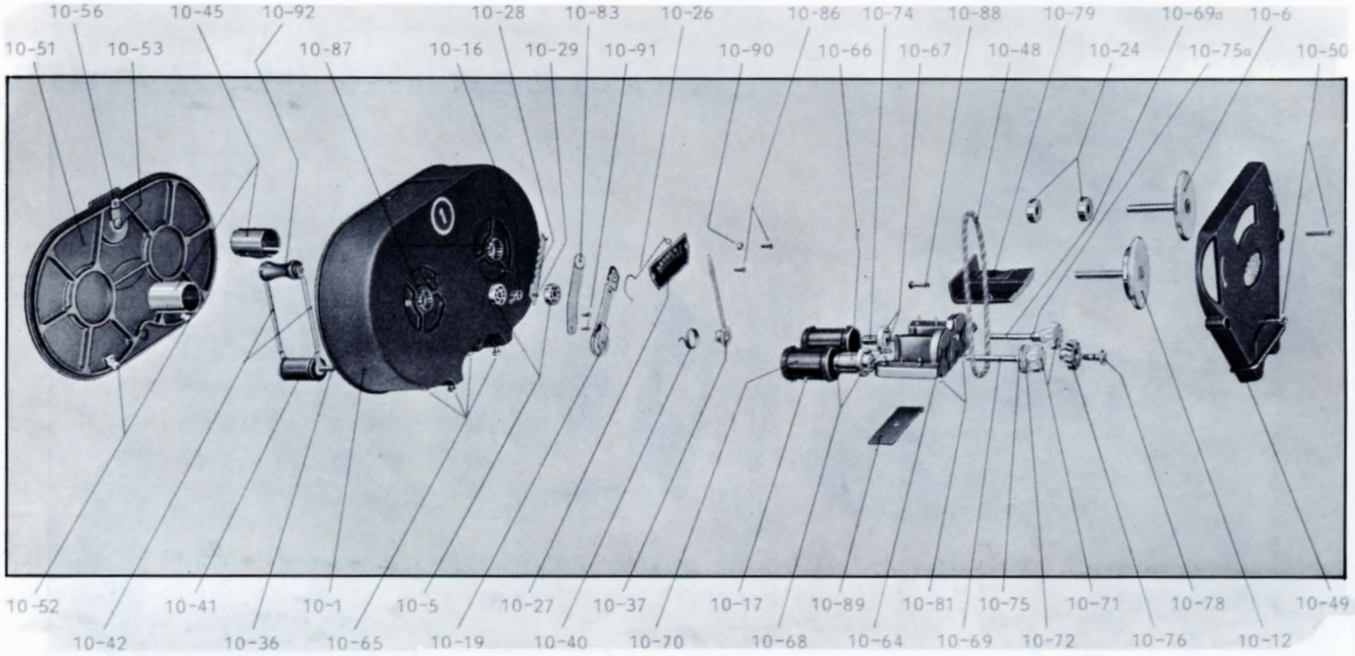
Periodically check the spring loaded pressure rail, located directly behind the gate catch.

Make sure that no emulsion has accumulated behind or in front of the rail, which would prevent its freedom of movement.



180⁰ Film Gate

		Quantity
12– 1	Film gate back plate	1
12– 2	Left lower, right upper hinges	2
12– 3	Hinge links	2
12– 4	Hinge pins	4
12– 5	Retaining clips	4
12– 6	Lower hinge with film guide	1
12– 7	Upper hinge with film guide	1
12– 8	Compression springs for pressure plate	4
12– 9	Screws for pressure plate	4
12–10	Pressure plate	1
12–11	Cover plate	1
12–12	Nuts for cover plate	2
12–13	Countersunk screws for cover plate	2
12–14	Countersunk screws for film gate hinges	4
12–15	Film channel	1
12–16	Gate cover	1
12–17	Countersunk screws for gate cover	2
12–18	Leaf spring	2
12–19	Cheese head screws for leaf spring	2
12–20	Side tension lock rail	1
12–21	Oval-head countersunk screws for 12–20	4
12–22	Side tension rail	1
12–23	Side tension springs	2
12–24	Cheese head screws for film guide	2
12–25	Spring catch	2
12–26	Countersunk screws for locking spring	2
12–27	Countersunk screws for lower film guide	2
12–28	Countersunk screw	1
12–29	Countersunk screws for upper film guide	2
12–30	Hexagon nuts	4
12–32	Lower film guide	1
08–29	Upper film guide	1
08–27	Clip	1
08–28	Cheese head screws	2



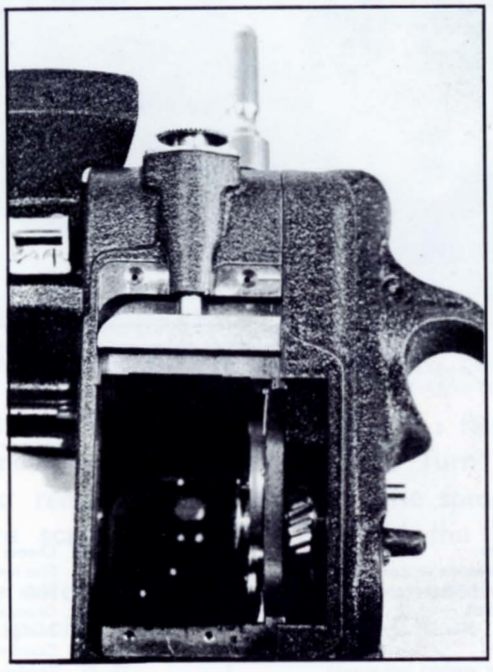
200 ft. Magazine

		Quantity
10– 1	Magazine	1
10– 5	Ball races	2
10– 6	Knurled film tensioning disk and shaft	1
10– 7	Spool holders with driving key, grooved dowel pin, compression spring and grub screw for fastening on shaft	1
10–12	Knurled film tensioning disk with hub, shaft and pulley	1
10–16	Ratchet spring for shaft	1
10–17	Special screw M 3 x 3	1
10–19	Belt tension pulley mounted on studs, tensioning arms secured by rivet	1
10–24	Sintered bearing	1
10–26	Tension spring	1
10–27	Footage indicator	1
10–28	Tension adjusting plate	1
10–29	Grooved dowel pins	1
10–33	Bearing plate (not shown)	1
10–35	Countersunk screws for 10–35 (not shown)	2
10–36	Indicator and intermediate roller shaft	1
10–37	Indicator arm with bush	1
10–39	Grooved dowel pin (not shown)	1
10–40	Torsion spring	1
10–41	Intermediate roller	1
10–42	Film tensioning arm with bush, grooved dowel pin, intermediate roller shaft with hexagon nut	2
10–45	Coreadapters	2
10–48	Endless cotton belt	1
10–49	Magazine mechanism cover	1
10–50	Countersunk screws for 10–49	2
10–51	Magazine lid, with two catches	1

		Quantity
10–52	Catches with rivet only	2
10–53	Pin	1
10–56	Latch	1
10–64	Sprocket housing	1
10–65	Cheese head screws	4
10–66	Sprocket bearing	1
10–67	Countersunk screws	6
10–68	Ball races	2
10–69	Sprocket shaft, smooth-turned with notch	1
10–69 a	Sprocketshaft	1
10–70	Sprockets	2
10–71	Gears	2
10–72	Collar	1
10–74	Sprocket bearing	1
10–75	Pulley	1
10–75 a	Collar for plain bearing	1
10–76	Gear	1
10–78	Bearing screw	1
10–79	Cover plate for 10–64	1
10–81	Cheese head screws	2
10–83	Friction felt with friction spring	1
10–84	Grooved dowel pins	1
10–85	Cheese head screw	1
10–86	Grooved dowel pins	2
10–87	Corrugated strips	2
10–88	Countersunk screw	1
10–89	Cover plate	1
10–90	Hexagon nut	1
10–91	Grooved dowel pins	2
10–92	Tension roll	1

Magazine Lock Assembly

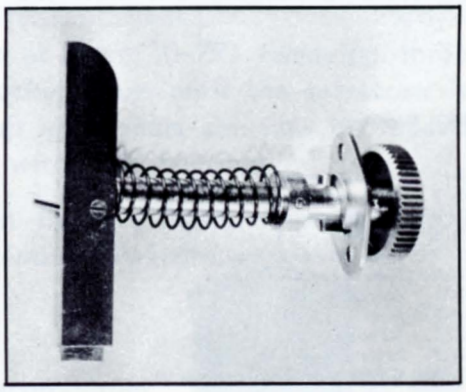
GENERAL: The magazine lock assembly must join the magazine firmly to the camera, so that magazine and camera are one unit. If the magazine is not properly attached to the camera housing, the film may jam or be light-struck.



DISASSEMBLY:

Remove cover plate 01-15. Then remove screw 01-14. Next remove magazine clamp plate 01-13. After punching out pin 01-8, take off knurled knob 01-7. Finally, unscrew magazine fixing plate 01-4.

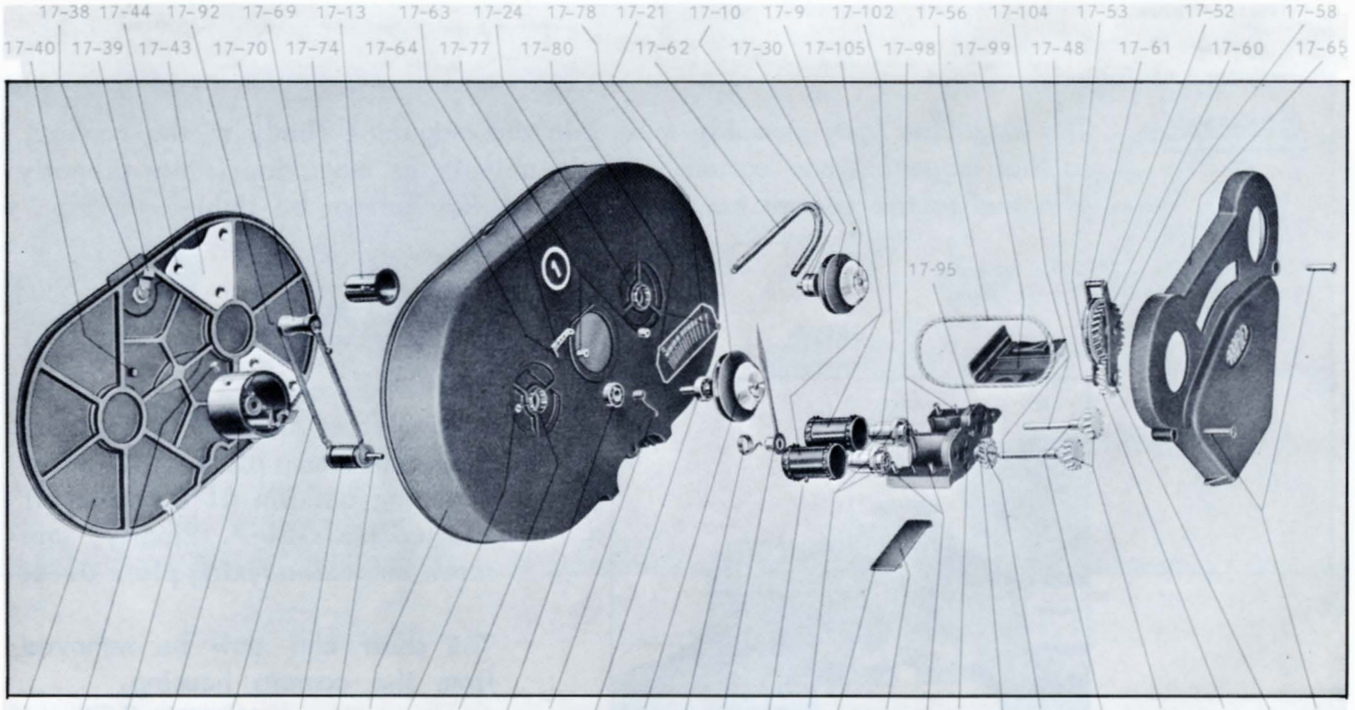
The shaft can now be removed from the camera housing.



ASSEMBLY: Proceed in reverse order. After the spring ends are inserted in the camera housing and shaft collar, wind the spring by turning the assembly about 2-1/2 turns.

CHECKING: To check the locking assembly for proper function, turn knurled knob 61-7 counter-clockwise until it stops turning and remains in the open position. When slight pressure is applied to the knob, the locking assembly should release and snap into closing position. If it fails to do so, spring 01-12, incorporated in the assembly, may not have enough tension, or might be broken or disconnected.

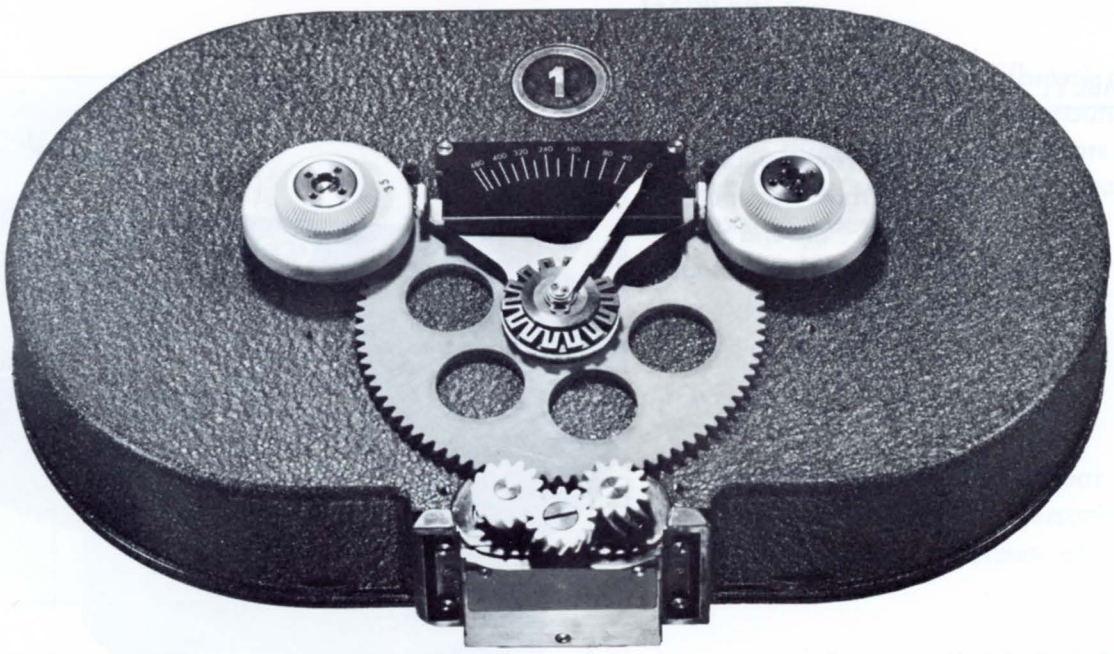
NOTE: When the magazine is being attached to the camera, and the drive gear on the camera doesn't engage properly with the magazine drive gear, turn inching knob 15-10 and the gears will engage.



400 ft. Magazine

		Quantity
17- 1	Magazine casting	1
17- 2	Rib, long	1
17- 3	Rib, medium (not shown)	1
17- 4	Rib, short	1
17- 9	Shaft with knurled knob	1
17-10	Sintered bearings	2
17-11	Spacer bush (not shown)	1
17-13	Bob	1
17-16	Set screws	2
17-19	Spacer washers (not shown)	2
17-20	Cylindrical grooved dowel pin for knurled knob (not shown)	1
17-21	Pulley	1
17-22	Spool holder with tensioning arm and drive studs	1
17-23	Ball bearings	2
17-24	Heat insulating strips	4
17-25	Spacer washers (not shown)	2
17-28	Shaft with knurled knob	1
17-29	Ratchet spring	1
17-30	Guide roller	1
17-31	Cheese head screw	1
17-32	Magazine door	1
17-33	Cover plate (not shown)	3
17-34	Bracket	2
17-35	Button-head rivet	2
17-36	Latch knobs (not shown)	2
17-37	Stop pin	1
17-38	Screw	1
17-39	Latch tongue	1
17-40	Stop	1
17-41	Spring latch lock	1
17-42	Round-head rivet	2
17-43	Brake shoes	2
17- 44	Screws	6
17- 45	Compression springs (not shown)	6
17- 47	Spacer bush (not shown)	1
17- 48	Stay bolt	1
17- 49	Gear	1
17- 50	Screws	1
17-51	Spacer washers (not shown)	1
17- 52	Lever arm	1
17- 53	Pulley	1
17- 54	Ball bearing (not shown)	2
17- 55	Circlip retainer (not shown)	1
17- 56	Endless belt	1
17- 57	Stay bolt (not shown)	1
17- 58	Screws	2
17- 59	Spacer washer (not shown)	2
17- 60	Gear	1
17- 61	Spacer pin	1
17- 62	Tension spring	1
17- 63	Catch/Lug	1
17- 64	Special rivet	1
17- 65	Take-up gear cover plate	1
17- 66	Oval-head countersunk screws	2
17- 67	Countersunk screws (not shown)	3
17- 69	Shaft	1
17- 70	Tensioning roller	1
17- 71	Tensioning arm	1
17- 72	Bushes (not shown)	2
17- 73	Grooved dowel pins (not shown)	2
17- 74	Stop pin	1
17- 75	(not shown)	1
17- 76	Button-head rivet (not shown)	2
17- 77	Spacer bushes	2
17- 78	Meter scale	1
17- 79	Footage scale (not shown)	1
17- 80	Cheese head screws	2
17- 81	Film tension indicator roller	1
17- 82	Scale pointer with bush	1
17- 84	Grooved dowel pin (not shown)	1
17- 85	Torsion spring	1
17- 86	Countersunk screw (not shown)	1
17- 87	Bearing plate with bush (not shown)	1
17- 88	Countersunk screws (not shown)	2
17- 90	Spacing washer (not shown)	1
17- 91	Shaft	1
17- 92	Stop	1
17- 93	Screw (not shown)	1
17- 95	Sprocket housing (not indicated)	1
17- 96	Cheese head screws	4
17- 97	Countersunk screw	1
17- 98	Grooved dowel pins	2
17- 99	Sprocket housing cover	1
17-100	Cheese head screws (not shown)	2
17-101	Countersunk screw	1
17-102	Sprocket bearings	2
17-103	Countersunk screws	6
17-104	Shafts	2
17-105	Sprockets	2
17-106	Set screws	2
17-107	Spacer bushes	2
17-108	Gears	2
17-109	Grooved dowel pins (not shown)	2
17-110	Stay bolt	1
17-111	Gear	1
17-114	Film loop guard (not shown)	1
17-115	Cover plate	1
17-116	Knobs (not shown)	2
17-117	Drive stud	1

480-ft. Color Magazine Disassembly



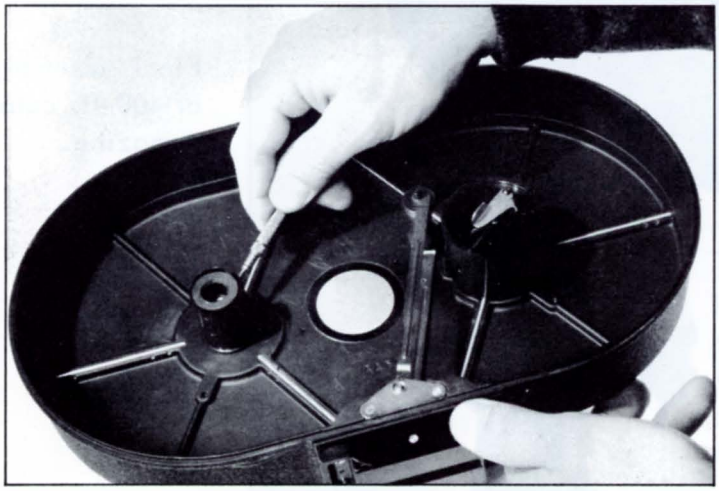
REMOVAL OF SPROCKET HOUSING: Remove four screws 10-65. Unhook spring 10-40. The sprocket assembly as a unit can now be pulled out from the magazine casting.

DISASSEMBLY OF SPROCKET HOUSING: Remove cover plate 10-79, removing three screws. Remove magazine gear 10-76. Turn the sprocket drum until the set-screw is visible, and remove the set-screw. The sprocket shaft with gears can now be tapped out. Remove screws 10-67 which hold the bushing with ball bearings.

NOTE: Pay attention to the washers placed between the bushing and sprocket drum for proper spacing upon reassembly. Check, clean and relubricate.

REMOVAL OF TAKE-UP AND FEED ASSEMBLY:

NOTE: Be careful not to lose the spring-loaded pin incorporated in the spool-holder, when the spool-holder is being removed from the shaft, as shown at right.



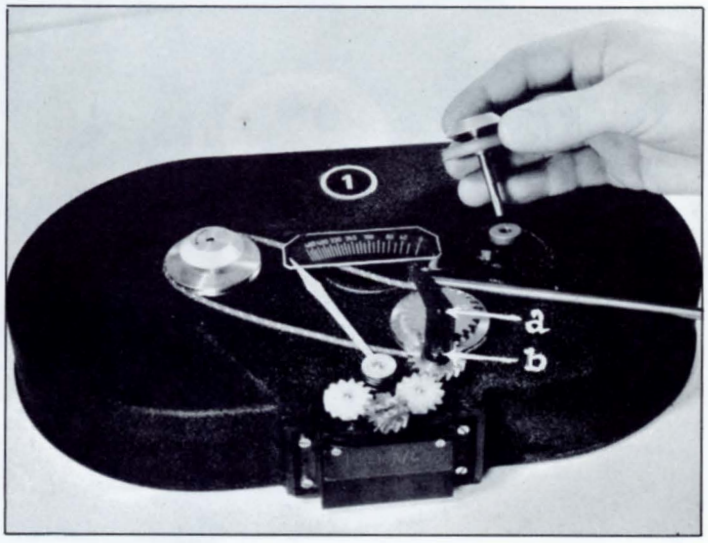
Remove the set-screw from the feed spool-holder, as shown at left. Then remove the set-screw from the collapsible take-up core. Both cores can now be removed from their shafts.

The take-up and feed shaft assemblies can be removed from the magazine bushings. The bushings and ball bearings can now also be removed for cleaning, relubrication or replacement.

480-ft. Color Magazine Reassembly

ASSEMBLY:

Assemble in reverse order. Make sure that the metal strips fitted around the bushings and ball bearings are inserted properly.



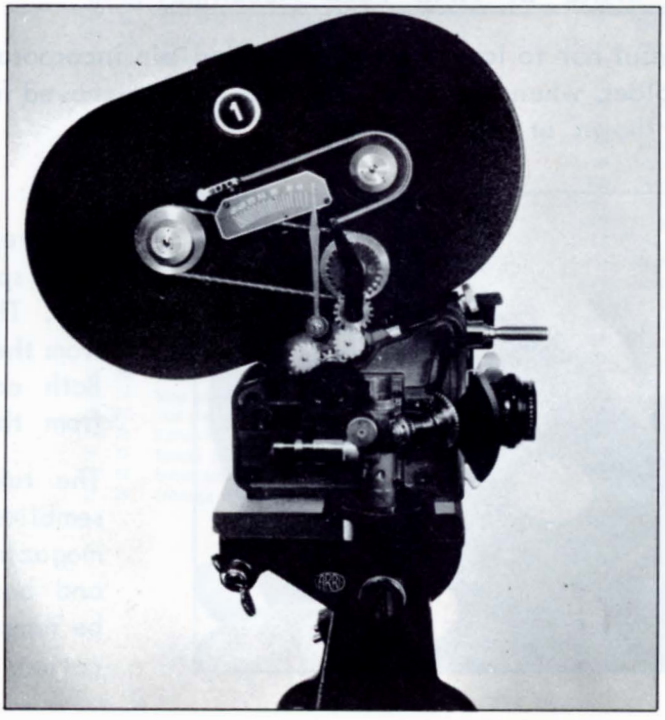
REPLACING BELT: Remove screws (a) and (b), shown above, and lift the connecting metal arm away, so that the belt can be taken off and replaced.

ADJUSTING TAKE-UP FRICTION: If the film winds up too loose, adjust the spring tension by changing the spring-lock position.

If film winds up too tight, adjust the spring-lock for less tension.

For more detailed information, see pages 48-51.

MAGAZINE DOOR: Check proper fit of the magazine door. Check door latches to see that they hold the door securely closed.

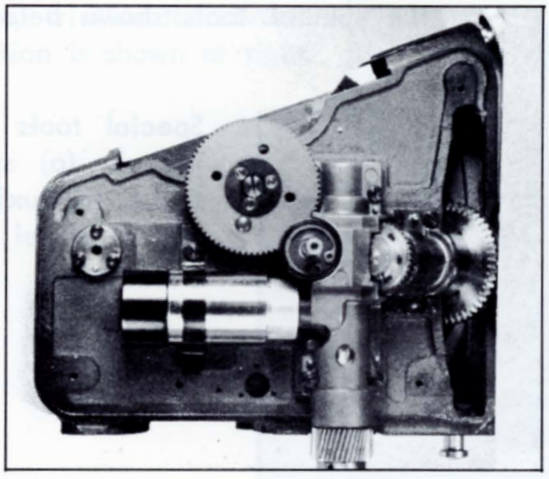


Final assembly of 400-ft. color magazine.

Magazine Gear Drive

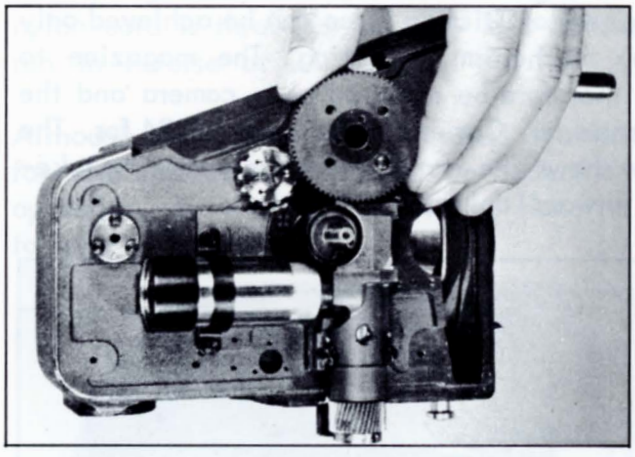
GENERAL:

The magazine drive gear (brass) and the intermediate gear (fiber) are mounted together by three screws. Both gears revolve on the center stud which is mounted on the camera housing.



REMOVAL:

To remove the intermediate gear (fiber), first remove the three countersunk screws and bushing ring, as shown at left.



The intermediate gear can now be taken off, as shown in lower photo at left.

The magazine drive gear will remain on its stud, held by the center stud screws.

To remove the magazine drive gear, first remove the center screw.

Check, clean and relubricate.

ASSEMBLY:

Assemble in reverse order.

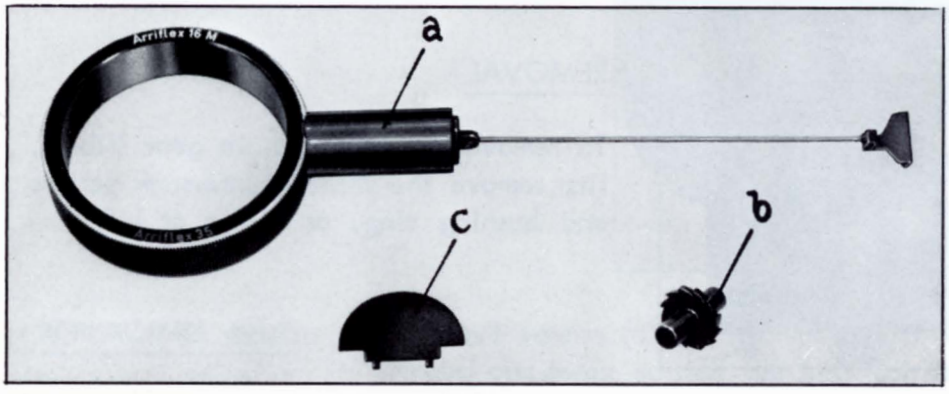
NOTE:

The stud on which the gear revolves is provided with an oil hole, which is marked and accessible from the inner part of the camera housing.

Take-Up Friction Units

GENERAL:

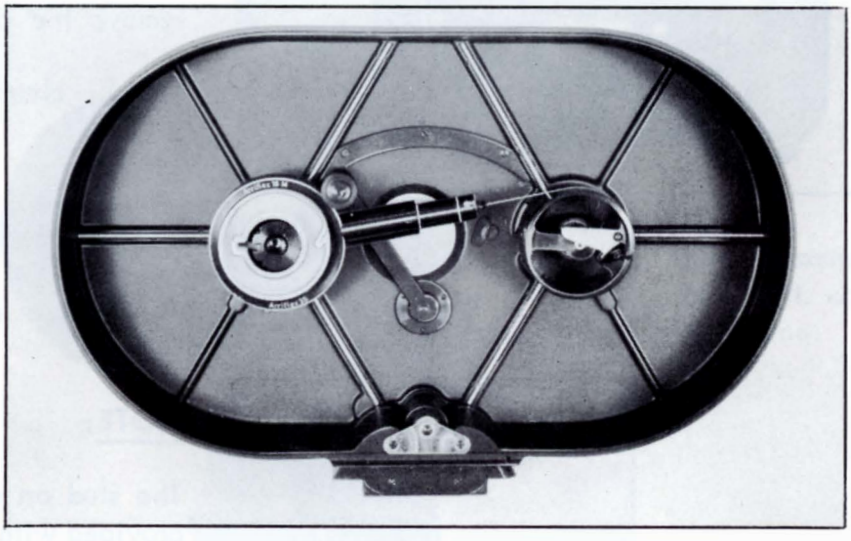
This unit in the 400-ft. V-R magazine is adjusted during production at the factory. If after long usage it becomes necessary to readjust one or both friction units of a magazine, the friction force can be measured and the required adjustment made, using the special tools shown below.



Special tools used include (a) spring scale, (b) auxiliary ratchet wheel, and (c) wrench.

MEASURING FRICTION FORCE:

Accurate measurement of friction force can be achieved only when the take-up mechanism is running. The magazine to be checked must therefore be mounted on a camera and the camera motor turned on. Camera speed must be 24 fps. The illustration below shows the arrangement for measuring take-up friction for forward operation.

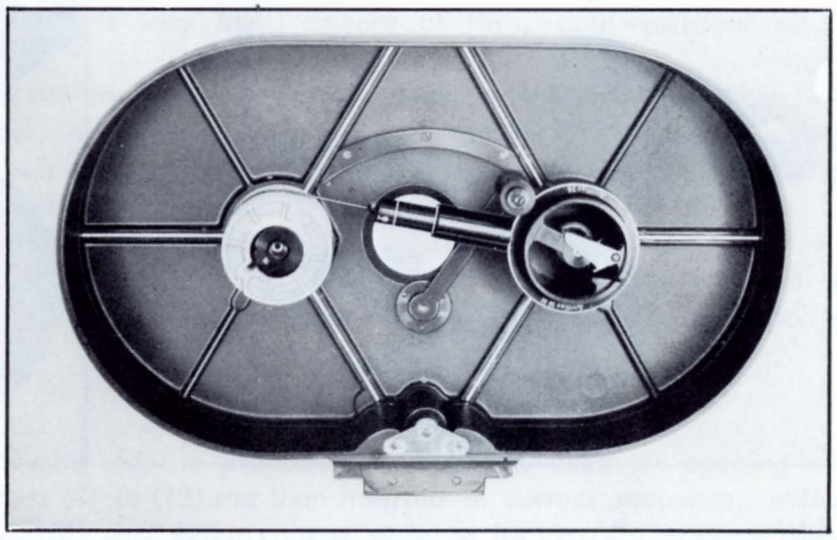


The engraved ring of the spring scale is slipped over the plastic film core (left above). Since the ring doesn't fit tightly, the spring scale can adjust itself to the tangential direction of pull of the take-up friction, as the guide roller lays against the ring.

The flat hook connected to the end of the nylon cord on the scale is then inserted into the film-holding slot of the take-up core and hung onto its clamping device. The nylon cord then winds around the circumference of the take-up core.

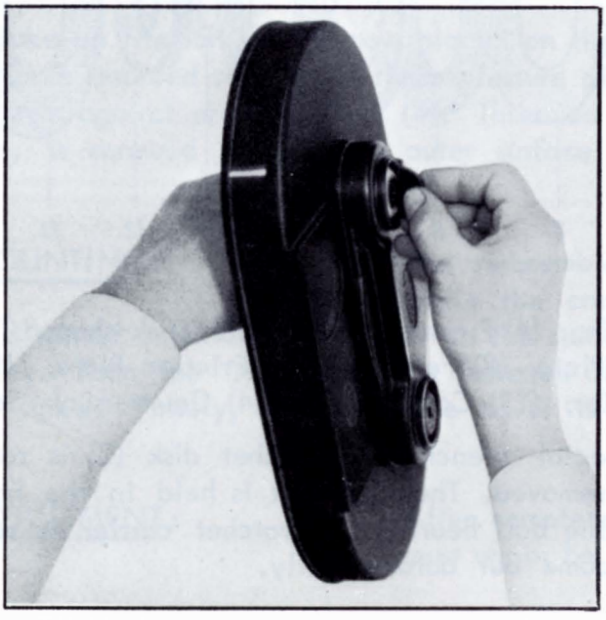
The red calibration on the piston of the spring scale then shows the required friction force. (The white calibration is used for 16mm magazines.)

The method for measuring take-up friction for reverse operation is shown at right.



The spring scale is slid over the right-hand core and the flat hook at the end of the nylon cord is threaded into the film-holding slot of the left-hand core. The motor is run in reverse at 24 fps.

Although the guide roller is rested against the ring of the spring scale while measuring forward operation, it should be hooked in its neutral position while measuring reverse operation, or it may be held by hand in a center position between the supply and take-up spindles.



READJUSTING FRICTION FORCE:

Readjustment of the take-up friction force using the special wrench is shown at left. The threaded disk in the magazine clicks four times each turn, in 90° increments. Turning the disk clockwise increases the friction, while turning counter-clockwise will decrease it. Whether increasing or decreasing, the threaded disk must always be turned until the ratchet disk clicks into the next set of holes.

The friction is adjusted until the red calibration is aligned with the edge of the piston holder, the width of the calibration ring showing the range of tolerance.

(CONTINUED ON NEXT PAGE)

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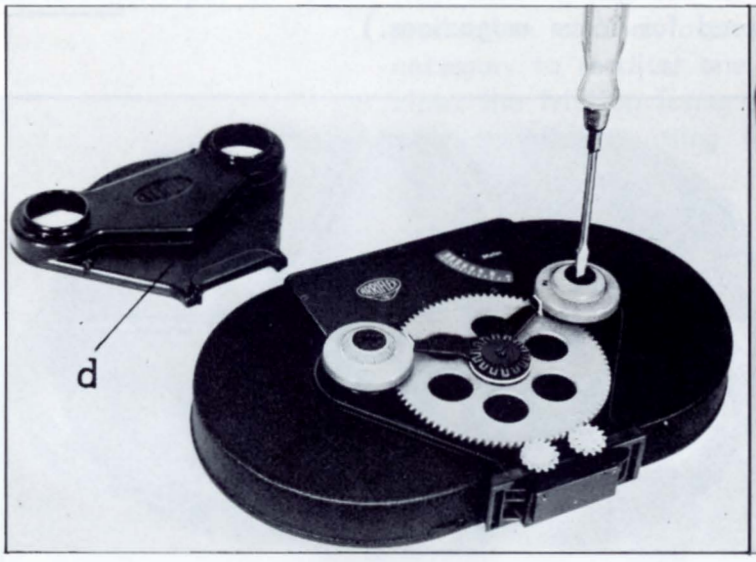
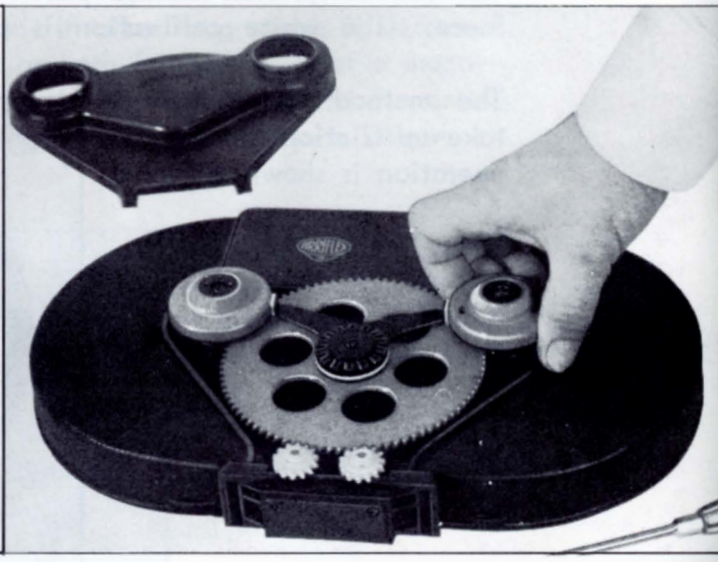
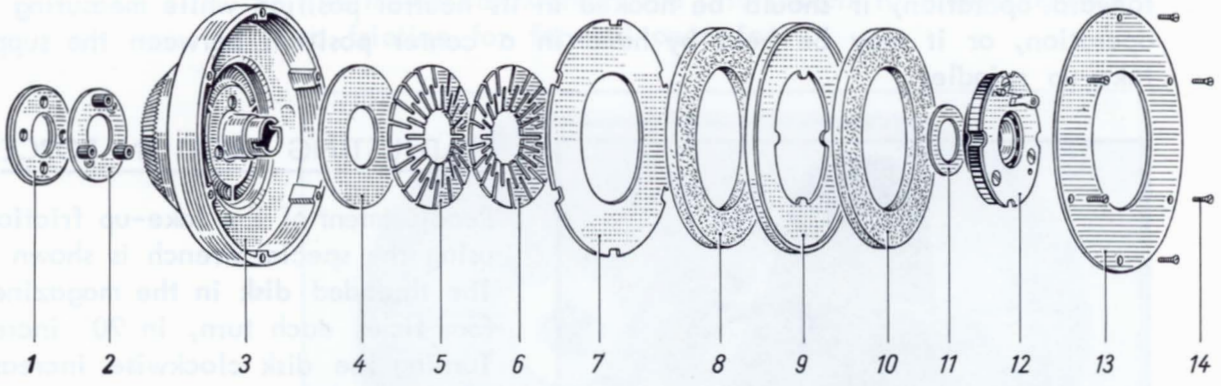
REMOVAL AND DISASSEMBLY: If friction remains irregular during adjustment, or if friction is too low after complete tightening of the threaded disk, then the friction assembly must be disassembled, cleaned and serviced.





The magazine cover (d) is removed by loosening its mounting screws. Then the cylinder head screw which holds the friction unit at the center of the spindle is removed, as shown above left. Finally the unit is lifted up in one piece, as shown above right.

Individual parts of the friction unit assembly are shown below:



(1) Threaded Disk; (2) Ratchet Disk; (3) Housing; (4) Pressure Plate; (5)(6) Disk-shaped Tension Springs, convex surfaces facing; (7) Pressure Plate; (8) Felt Ring; (9) Friction Plate; (10) Felt Ring; (11) Separator Disk; (12) Ratchet Carrier; (13) Cover Disk; (14) Countersunk Screws.

Threaded disk (1) is unscrewed with the special wrench, and ratchet disk (2) is removed. Screws (14) holding the cover disk (13) are removed. Then the unit is held in the hand by the knurled ring and tapped on the bench. The ball bearing and ratchet carrier is released from its position and all other parts will come out automatically.

MAINTENANCE: Except for felt rings (8) and (10), which must be replaced as necessary, all other parts are subject to very little wear, and need only to be cleaned with benzine or benzol. Since trilene tends to cause rust, its use is not recommended.

Pressure plate (7), friction plate (9), cover disk (13) and felt rings (8)(10) must remain free of grease. The ball race inside ratchet carrier (12) may be lubricated lightly if necessary. The ratchet is oiled at its base with a very small amount of thin, cold-resistant oil.

If the fine wire spring attached to the ratchet is either too weak or too strong (ratchet fails to engage securely in ratchet wheel, or it strikes against tooth too strongly, causing noise), the spring can be bent carefully with tweezers and adjusted so that the ratchet head grips as deeply as possible into the teeth of the ratchet wheel without touching the base.

Under all circumstances the play in the spring wire in the slit of the threaded pin must be retained. To check the correct functioning of the ratchet wheel, insert the auxiliary ratchet wheel (tool "b") into the center of the reassembled friction unit and rotate it.

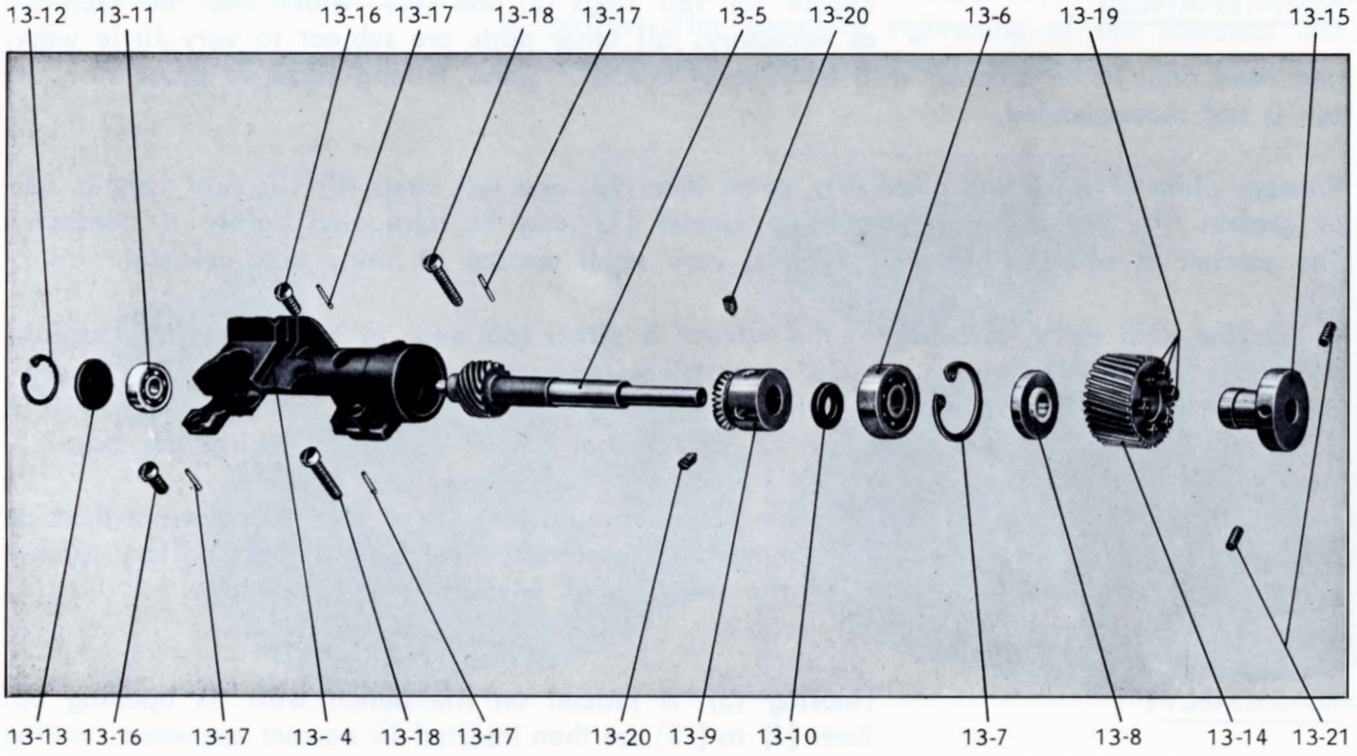
REASSEMBLY: Housing (3) is placed on the bench with its opening up. Parts (4) to (12) are then inserted in correct sequence, noting the following: (a) tension springs (5)(6) must have convex surfaces facing; (b) pressure plate (7) centers itself in housing (3) by means of the six cut-outs on the outside rim; (c) ratchet carrier (12) is centered in friction plate (9) by means of the four projections; (d) felt rings (8)(10) are centered on friction plate (9), not extending over the edge.

Ratchet carrier (12) is set on the ball bearing mounting of housing (3) and rotated until the four projections of friction plate (9) match the four notches of the ratchet carrier, which is then pressed against the mounting until it touches separator disk (11). Cover disk (13) is then placed over housing (3) and secured with screws (14). The ratchet carrier can now be rotated freely in the housing.

The take-up friction unit is now placed on the bench with the knurled side up, and ratchet disk (2) is mounted so that its three pressure pins project through the holes in the housing (3) and press against pressure plate (4). Threaded disk (1), with its bevelled holes facing outwards, is screwed in until its outer surface is flush with the housing.

REMOUNTING: The reassembled friction unit is slid over its spindle, and while the corresponding film core holder is held fast, the unit is turned until the driving pin on the spindle engages keyway grooves inside the friction housing. Then the friction unit is fastened at the center of the spindle, using the cylinder head screw. Finally, the magazine cover is replaced with its mounting screws.

READJUSTMENT: After complete maintenance and reassembly, the friction force must again be measured and adjusted as told on pages 48-49



Camera drive

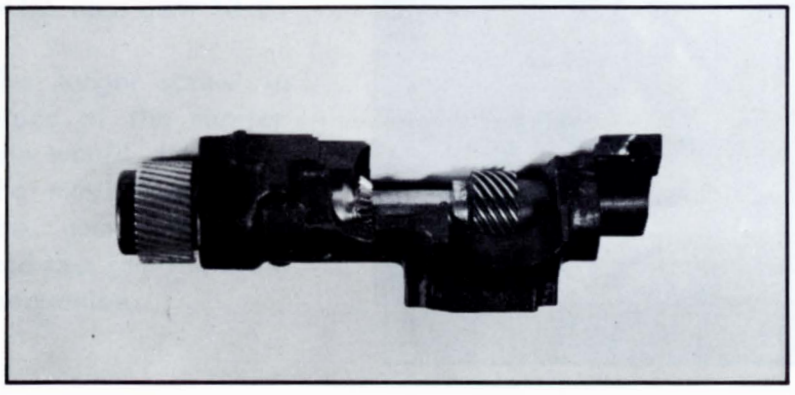
		Quantity
13– 1	Vertical drive assembly, complete	1
13– 4	Housing for vertical shaft	1
13– 5	Vertical shaft with gear	1
13– 6	Ball race, high precision	1
13– 7	Circlip retainer	1
13– 8	Ball race cover	1
13– 9	Bevel gear for tachometer	1
13–10	Thrust washer	1
13–11	Ball race, high precision	1
13–12	Circlip retainer	1
13–13	Spacer	1
13–14	Gear with rubber flexible coupling	1
13–15	Bush for rubber coupling	1
13–16	Cheese head screws	2
13–17	Grooved dowel pins	4
13–18	Cheese head screws	2
13–19	Rubber studs for 13–14	6
13–20	Grub screws 2	2
13–21	Grub screws	2

Vertical Drive Assembly

REMOVAL FROM CAMERA HOUSING:

The vertical drive assembly is mounted to the camera housing with four screws. For its exact location in relation to the connecting gears, four locating pins connect the camera casting with the vertical drive housing.

The complete assembly can be removed from the camera housing by removing the four screws and four pins.

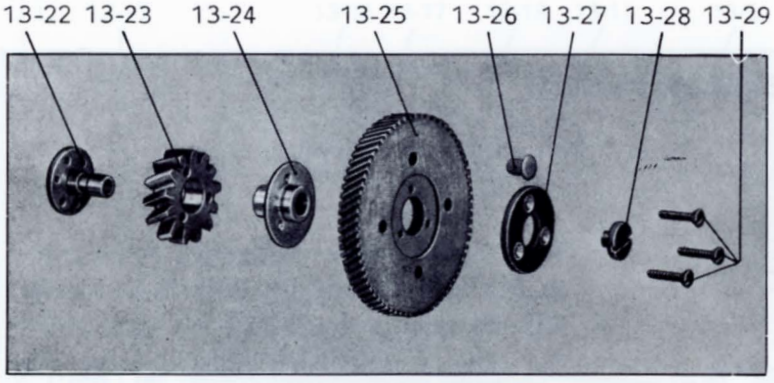


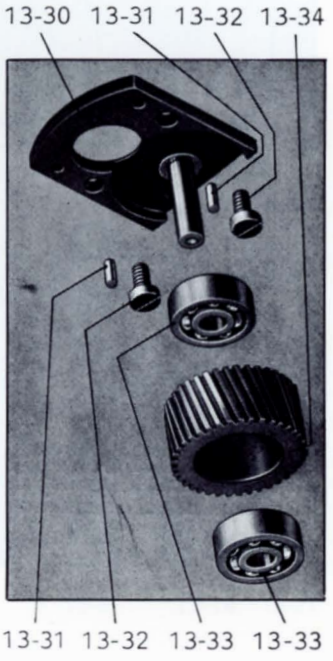
DISASSEMBLY OF SHAFT AND GEAR:

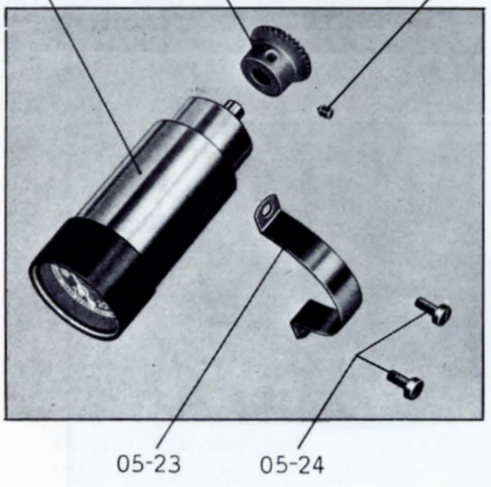
Remove spring retaining clip 13-7. Next, remove ball bearing cover 13-8. Then, remove two set-screws from gear coupling 13-5.
Now remove the brass washer 13-13. Last, remove spring retaining clip 13-12. The vertical shaft with gears and ball bearings can now be removed from the drive housing completely as a unit.

ASSEMBLY:

In reverse order to the above steps.







Camera drive

		Quantity
13–22	Stay bolts	1
13–23	Gear for magazine drive, steel	1
13–24	Bushing, manganese bronze	1
13–25	Intermediate gear	1
13–26	Contact lug	1
13–27	Mounting flange	1
13–28	Cheese head screw	1
13–29	Countersunk screws	3
13–30	Mounting plate with stud	1
13–31	Grooved dowel pins	2
13–32	Cheese head screws	2
13–33	Ball race, high precision	2
13–34	Intermediate gear	1
05–11	Tachometer bevel gear	1
05–22	Tachometer	1
05–23	Tachometer clamp	1
05–24	Cheese head screws for 05–23	2
05–25	Grub screw	1
05–22a	Rubber gasket	1

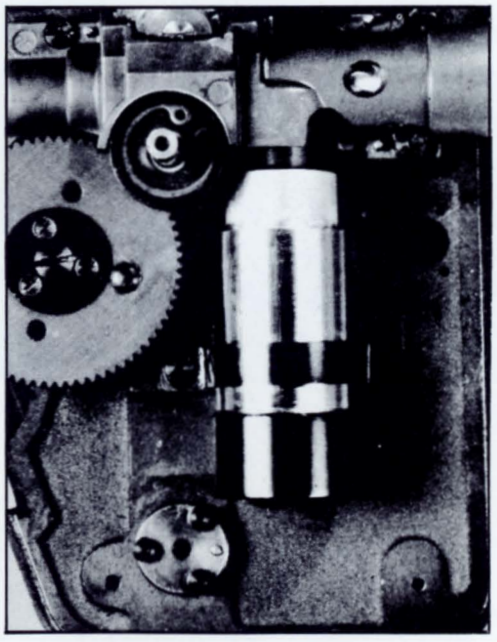
Tachometer

The tachometer as a unit should not be disassembled. If defective, it must be replaced.

REMOVAL: Remove screws 05-24 and the yoke.

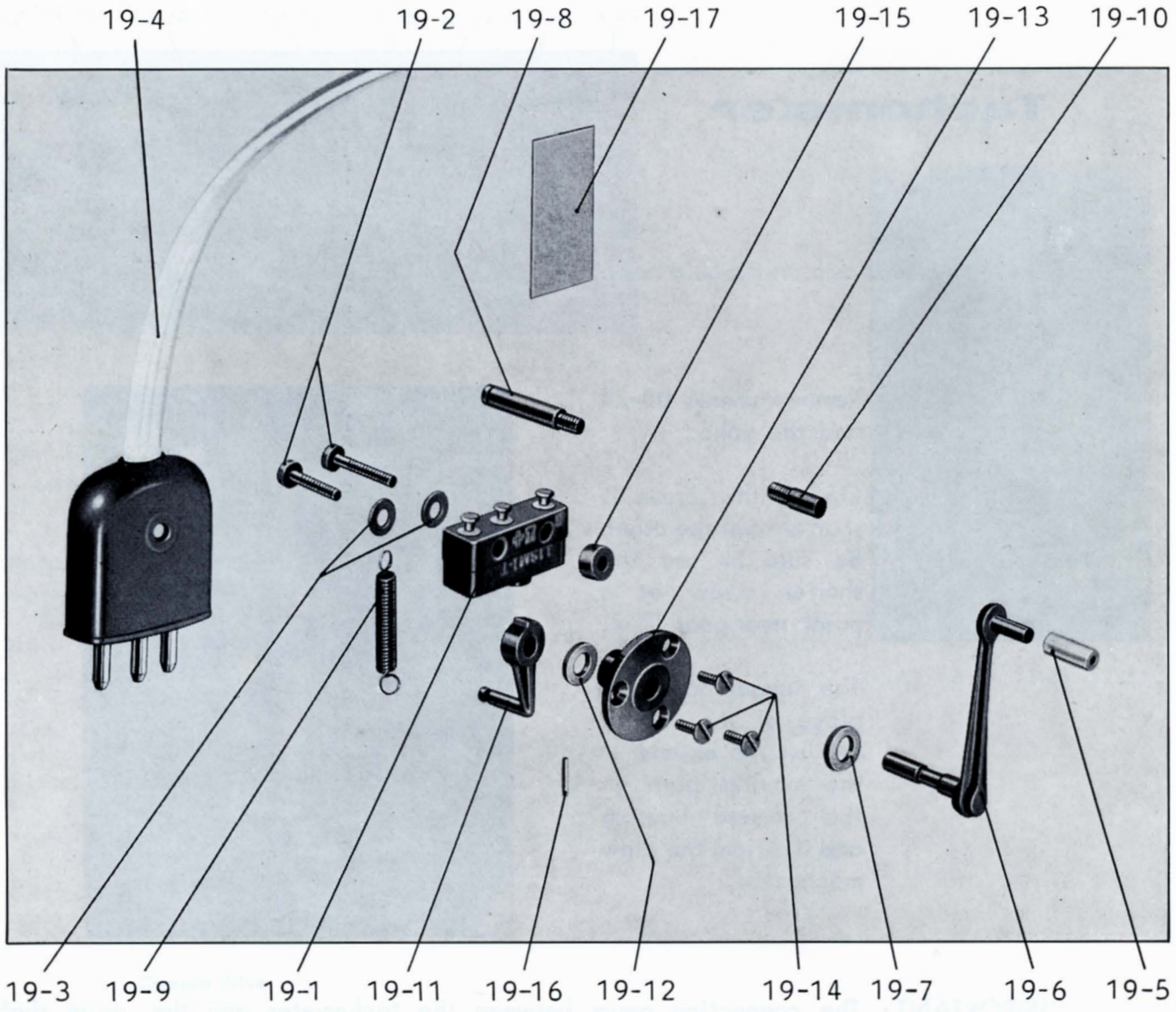
NOTE: One of the screws is shorter than the other. Be sure to use the shorter screw at a point near gear 13-2.

The longer screw in place of the shorter one would extend to the moving parts in the camera housing and thus jam the claw mechanism.



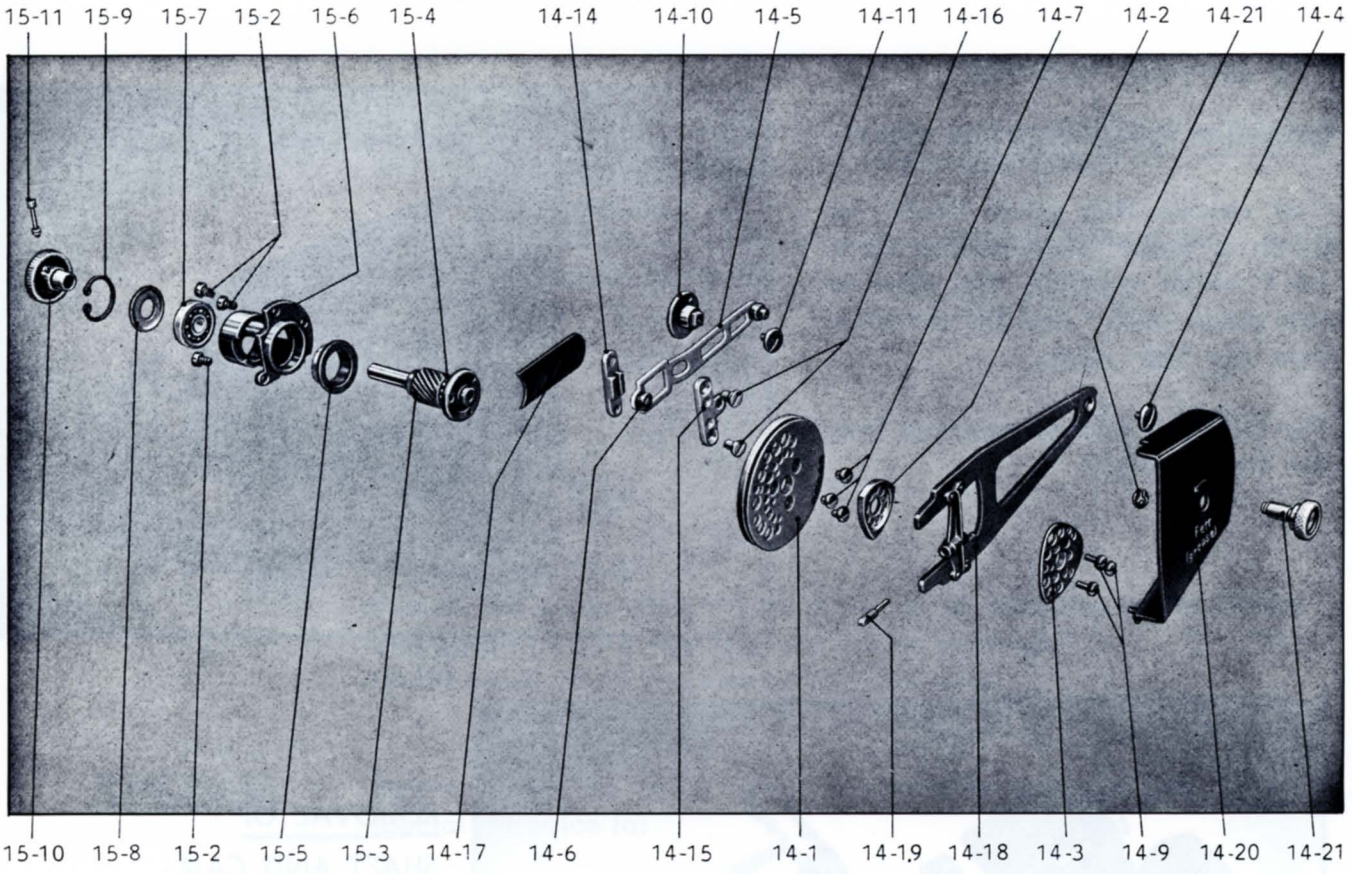
IMPORTANT: The connecting gears between the tachometer and the drive shaft must have proper play.

Be sure the tachometer is in an upright position when it is fastened to the camera. Also check to be sure that the gear on the tachometer shaft is properly secured with a set-screw.



Buckle-switch

		Quantity
19– 1	Micro switch, 1 SM 1–T	1
19– 2	Cheese head screws M 2 x 12	2
19– 3	Washers for 19–2	2
19– 4	Lead with connector and rubber collar	1
19– 5	Rubber tubing	1
19– 6	Switch arm with shaft	1
19– 7	Spacer	1
19– 8	Spring bolt	1
19– 9	Tension spring	1
19–10	Stop pin	1
19–11	Cam arm	1
19–12	Washer	1
19–13	Bearing flange	1
19–14	Countersunk screws M 1.7 x 5	3
19–15	Spacing roller	1
19–16	Grooved dowel pin	1
19–17	Insulating plate	1



Cardioid cam claw system with claw bearing

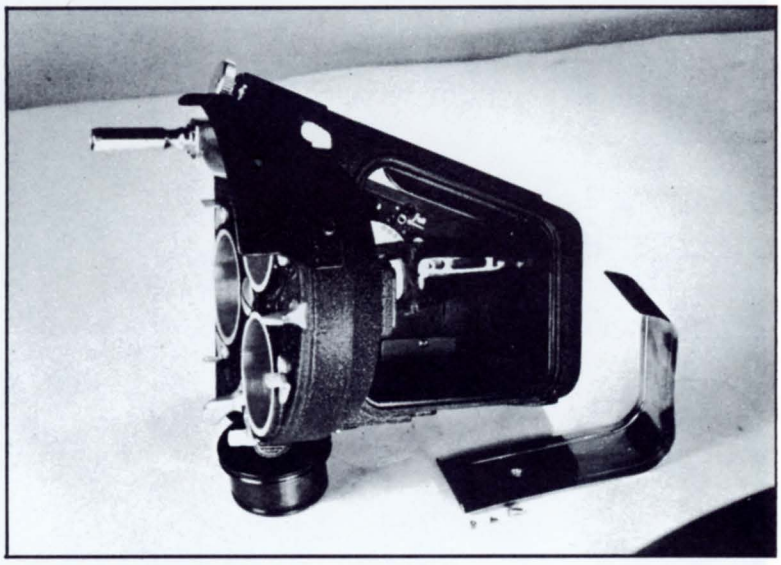
		Quantity
14– 1	Double cam	1
14– 2	Cardioid plate with 2 grooved dowel pins	1
14– 3	Cover plate	1
14– 4	Screw for 14–5	1
14– 5	Link with trunnion	1
14– 6	Guiding roller for link	1
14– 7	Cheese head screw for 14–1	3
14– 9	Cheese head screw for 14–3	3
14–10	Trunnion	1
14–11	Screw for 14–10	1
14–12	Cheese head screws for 14–10	3
14–13	Grooved dowel pin for 14–10	1
14–14	Guide block for link	1
14–15	Retaining strip	1
14–16	Countersunk screws for 14–15	2
14–17	Guide blade	1
14–18	Claw arm with claw pin holder	1
14–19	Claw pin	1
14–20	Drive mechanism cover plate	1
14–21	Knurled head screw with retainer	1
15– 1	Claw bearing assembly, complete	1
15– 2	Screws for 15–1	3
15– 3	Claw shaft with gear	supplied as single unit: 1
15– 4	15 rollers for 15–3	
15– 5	Roller race	
15– 6	Bearing housing	1
15– 7	Ball race, high precision	1
15– 8	Ball race dust cover	1
15– 9	Circlip retainer	1
15–10	Knurled knob	1
15–11	Screw with nut	1

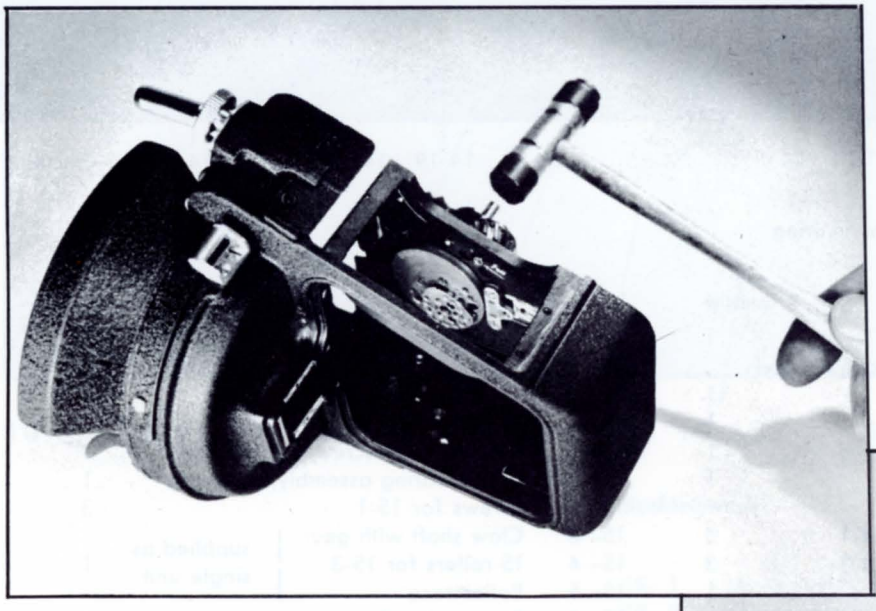
Claw & Claw Bearing Assembly

REMOVAL OF TRANSPORT CLAW:

First remove film guide 08-32, as shown at right. Then remove screw 14-4 which connects the claw to link guide 14-5, and lift the claw from the link stud.

The claw can now be removed from the cam assembly.



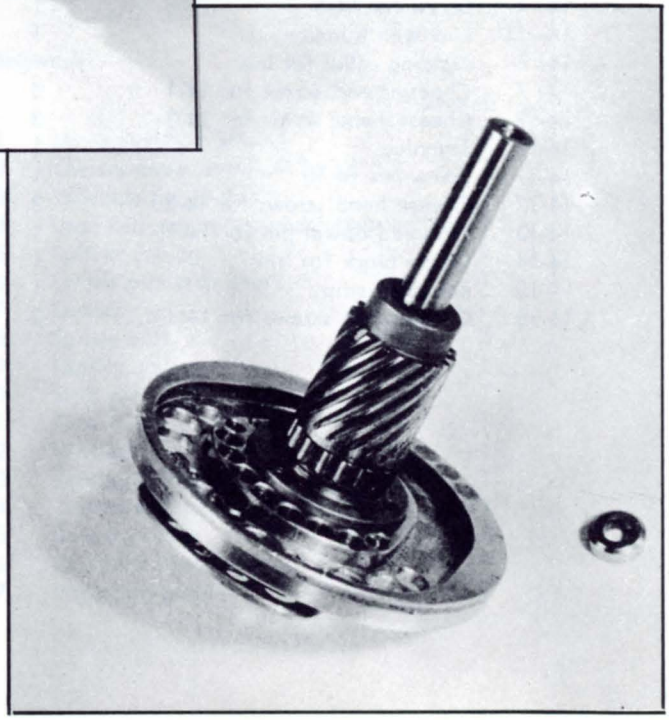


REMOVAL OF SHAFT AND CAM:

The complete cam assembly with shaft can be tapped out as shown at left. Use only a soft mallet.

Be careful not to lose the roller bearings which are located around the cam assembly shaft, as shown at right.

Also be sure not to lose the guiding roller 14-6, which may remain on link arm 14-5, or in cam 14-1, when the cam assembly is being removed.



REPLACEMENT: If the claw shaft and gear, 15-3, must be replaced, the roller bearings and roller bushing must be replaced at the same time.

This unit is individually matched when assembled at the factory, and it can only be supplied as a unit.

REMOVAL OF LINK AND GUIDING TRUNNION:

Remove screw 12-11.
Remove the guide block from link 14-15, by removing screws 14-16.
Link guide 14-15 is now free and can be removed.
Guide blade 14-17 can also be removed now.

CHECKING: Before reassembly, check all moving parts for excessive play, paying special attention to:

Guide roller 14-6, connected to cam 14-1
Link guide 14-5, connected to guiding trunnion 14-10
Link guide 14-5, connected to guide block 14-14
Claw-arm 14-18, connected with cam 14-1 and link guide 14-5

Replace all damaged or worn-out parts.

LUBRICATION: Clean and lubricate all mating and moving parts with grease supplied by Arriflex.

ASSEMBLY: In reverse order.

Frame Line

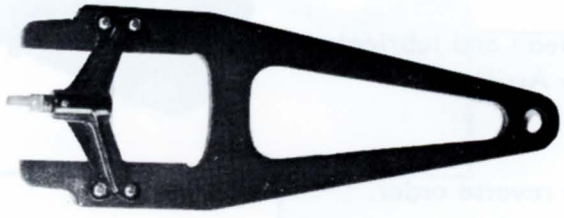
Each frame must be located relative to the film perforations in accordance with ASA specifications, shown on opposite page. Maintenance of these tolerances and dimensions is essential, so that shots made on two or more cameras can be intercut properly.

Since the frame line tolerances are maintained by correct location of the film gate, and by exact film transport in relation to the film aperture, each camera is individually adjusted at the factory to meet the given standards.

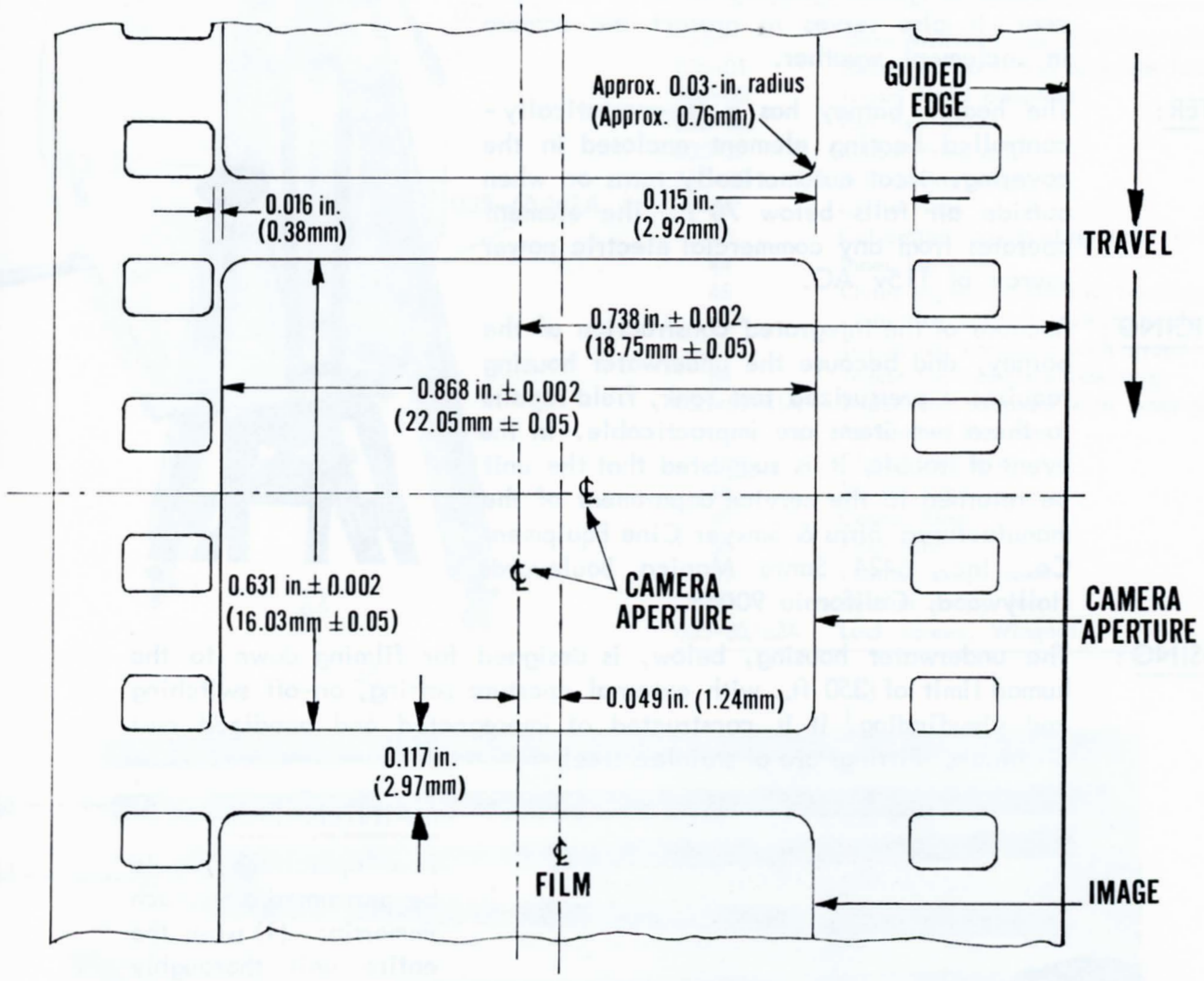
For this reason, for example, each claw pin is individually hand-finished at the factory, for the purpose of accomplishing the correct frame line position.

NOTE: If a disassembled camera has been reassembled properly, therefore, the frame line will remain in its correct position.

REPLACEMENT: If a claw pin or claw arm, shown below, is worn out or has been damaged, field service is not recommended. The camera should be returned to the factory service department for proper alignment.



APERTURE DIMENSIONS FOR 35mm SOUND MOTION PICTURE CAMERAS



Dimensions given (in both inches and millimeters) apply to unshrunk raw stock. Aperture dimensions shown, in combination with an 0.600" x 0.825" (15.25 x 20.95mm) projector aperture, will produce a screened picture with height-to-width ratio of 3 to 4 at a projection angle of 14 degrees.

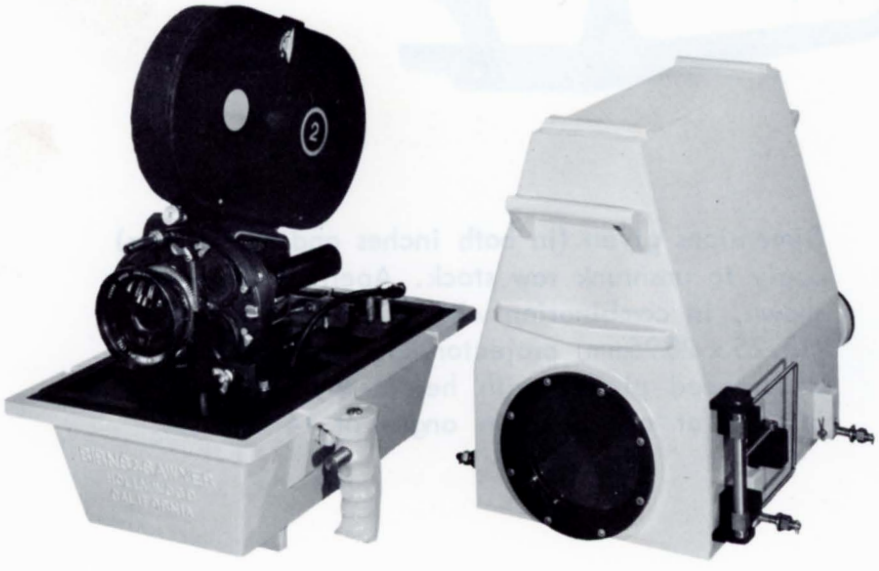
Sound Barney and Underwater Housing

GENERAL: The sound barney, right, is a multi-layered camera-covering which can reduce the transmission of system noise by as much as 60 per cent. It also serves to protect the camera in inclement weather.

HEATER: The heater barney has a thermostatically-controlled heating element enclosed in the covering. Heat automatically turns on when outside air falls below 70°F. The element operates from any commercial electric power source of 115v AC.

SERVICING: Because of the integrated construction of the barney, and because the underwater housing requires a pressurized test tank, field repairs to these two items are impracticable. In the event of trouble, it is suggested that the unit be returned to the service department of the manufacturer: Birns & Sawyer Cine Equipment Co., Inc., 6424 Santa Monica Boulevard, Hollywood, California 90038.

HOUSING: The underwater housing, below, is designed for filming down to the human limit of 350 ft., with external aperture setting, on-off switching and viewfinding. It is constructed of impregnated and anodized cast aluminum. Fittings are of stainless steel.

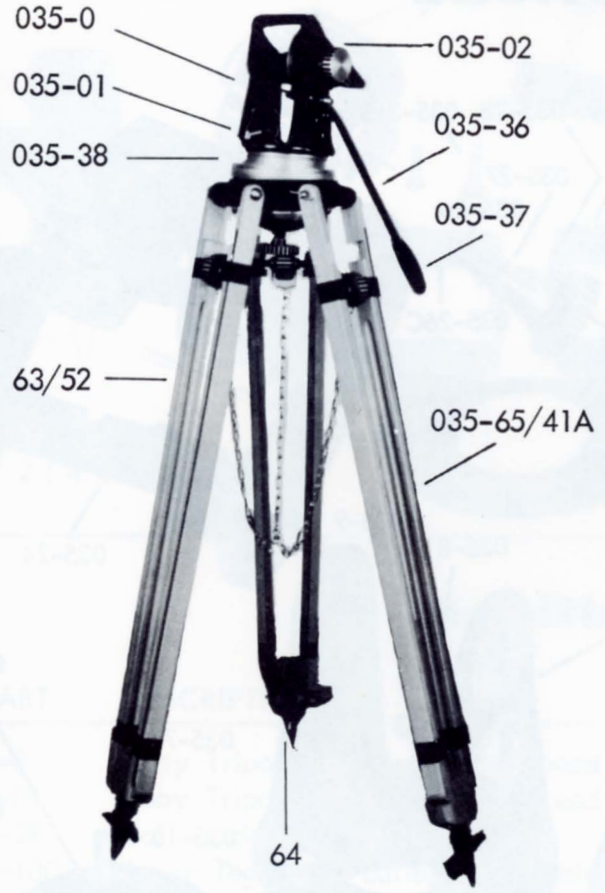


MAINTENANCE:

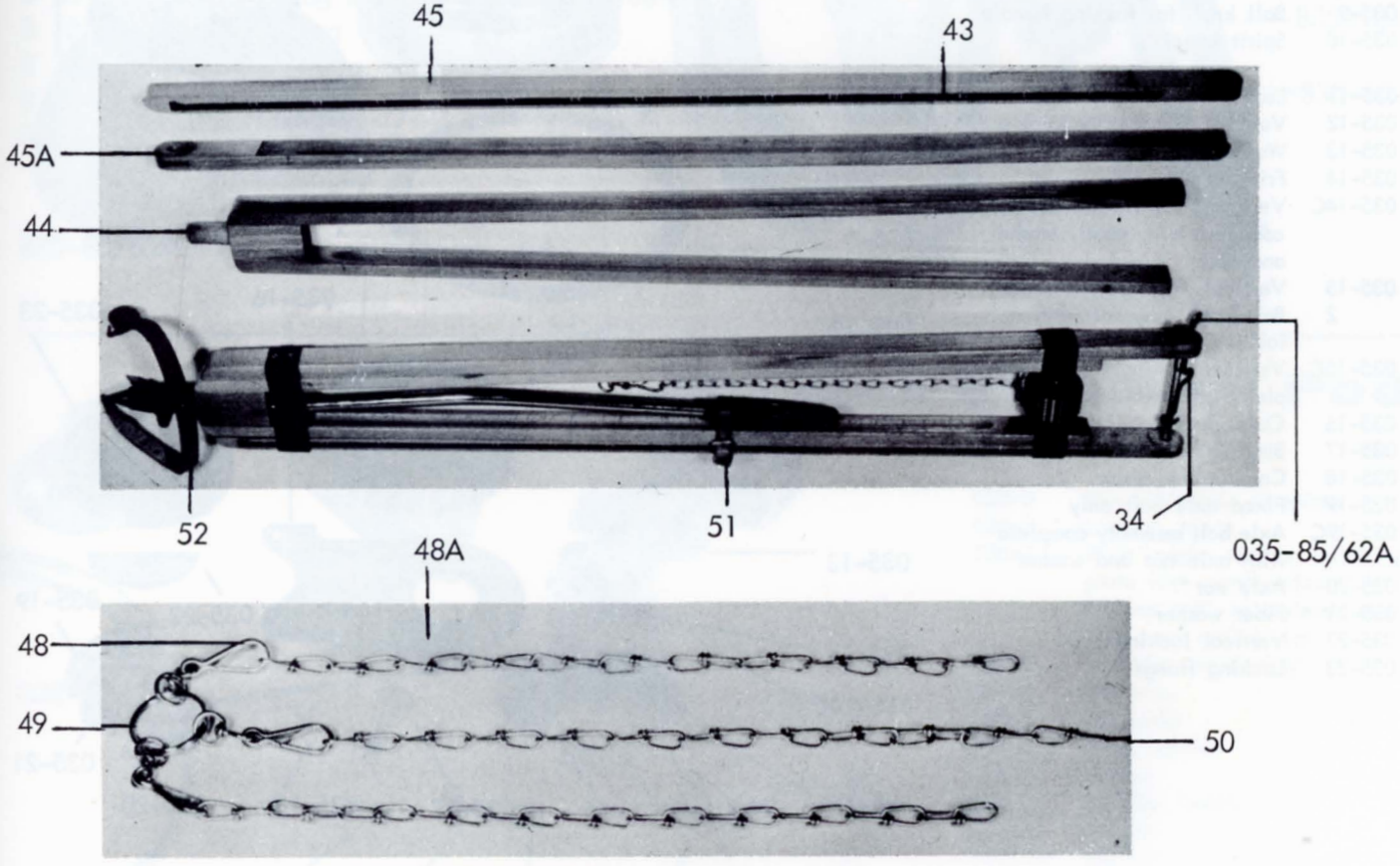
Four operations should be performed after each immersion: (1) wash the entire unit thoroughly with fresh water and dry top before removing it; (2) lubricate four lock-down bolts, joints of the sports finder and arm, and f-stop handle, using machine grease; lubricate f-stop coupling assembly in bottom of the base; (4) coat O-rings with O-ring lubricant.

The O-rings should be replaced at least once a year.

Arriflex 35mm Tripods - Spare Parts



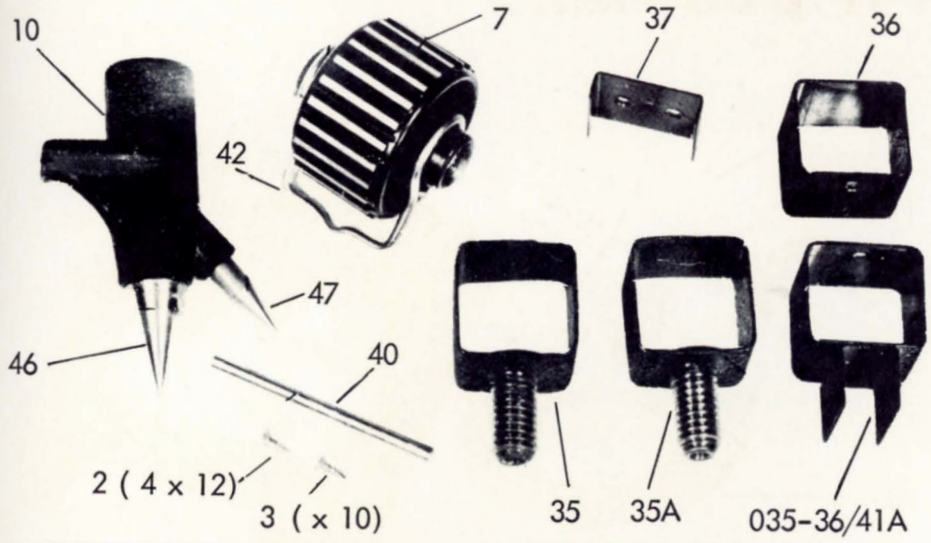
PART NO.	DESCRIPTION
035-0	35mm Arriflex Tripod complete with head
035-01	35mm Arriflex Tripod complete less head
035-02	Tripod Head complete
035-36	Pan Arm only
035-37	Rubber hand grip
035-38	Ball Socket only
34	Chain Hook
43	Calibrated leg-leveling scale (in inches)
44	Inner leg fork
45	Outer leg with calibrated leveling scale
45A	Outer leg without leveling scale
63/52	Tripod leg complete with strap
64	Tripod leg complete less strap
035-65/41A	Tripod leg complete with inner groove for storing Pan Arm
48A	Chain complete
48	Swivel Hook
49	Center Ring
50	Knot Ring
51	Leather strap, short
52	Leather strap, long
035-85/62A	Lock screws, Wingnut



Arriflex 35mm Tripod Head

PART	DESCRIPTION
035-24	Camera mount plate only
035-25	Small screw
035-26	Camera locking screw only
035-26C	Camera locking screw complete with spring, spacer and knob
035-27	Lock screw spring
035-28	Lock screw spacer
4	Camera lock knob only
035-30	Pan Arm locking bolt only
035-30C	Pan Arm locking assembly complete with hex nut, washer, wing nut and truss head screw
035-31	Hex nut
035-32	Washer
035-33	Wing nut
035-34	Truss head screw (large head)
035-35	Side locking plate
035-36S	Large screw
035-1	Forked head only (without locking handle and spirit level)
035-2	Half ball
035-3	Concave washer
035-4	Horizontal axis ring
035-5	Friction washer
035-6	Hold-down ring nut
035-7	Ball locking bolt
035-8	Horizontal locking handle
035-9	Ball knob for locking handle
035-10	Spirit Level
035-11	Large ball locking knob
035-12	Vertical axis friction knob only
035-13	Washer
035-14	Friction bolt only
035-14C	Vertical axis friction assembly complete with knob, washer and bolt
035-15	Vertical locking handle only
2	Ball knob only for vertical locking handle
035-15C	Vertical locking handle complete with ball knob
035-16	Outer locking plate
035-17	Binding head screw
035-18	Countersunk screw
035-19	Fixed axle bolt only
035-19C	Axle bolt assembly complete with axle nut and washer
035-20	Axle nut
035-21	Fiber washer
035-22	Vertical locking pad
035-23	Locking flange

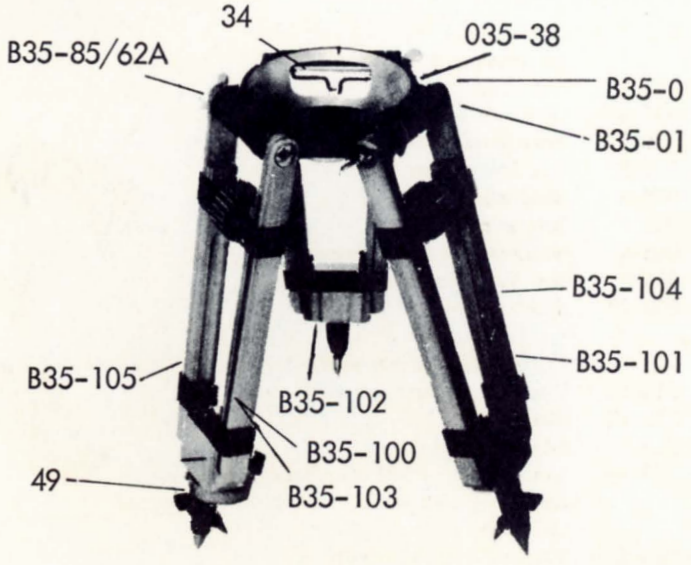
Tripod Leg Hardware



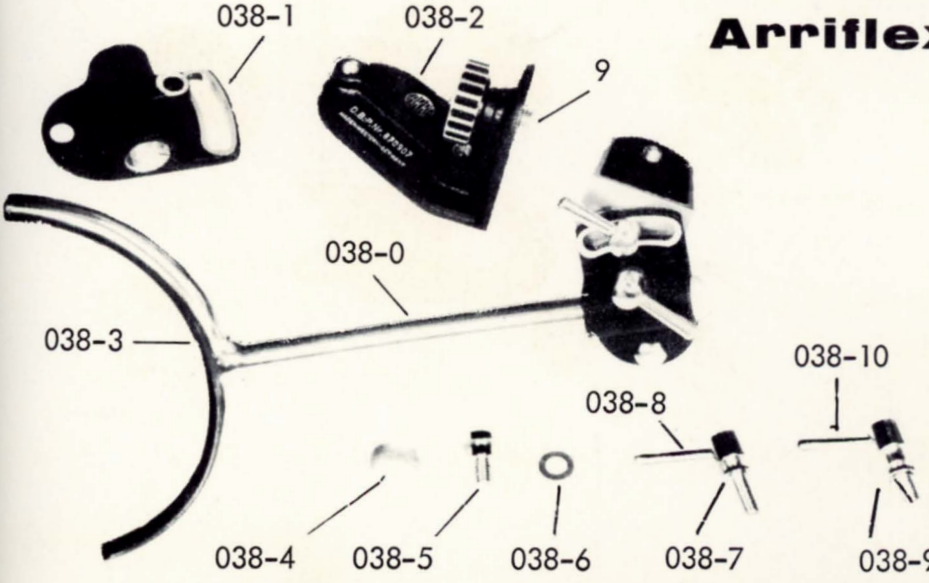
PART	DESCRIPTION
7	Locking knob with right and left threading
10	Tripod shoe with Parts 46, 47
35	Upper ferrule for locking knob, left hand thread
35A	Upper ferrule for locking knob complete with Part 39, right hand thread
36	Lower ferrule for tripod legs
37	Pressure and retaining plate
035-36/41A	Lower ferrule for tripod legs with Pan Arm storage groove
40	Leg lock pressure pin
3 (x 10)	Wood screw, short
2 (4 x 12)	Wood screw, long
42	Chain hanger
46	Point, large
47	Point, small

Arriflex 35mm Baby Tripod

PART	DESCRIPTION
B 35-0	Baby Tripod complete with head
B 35-01	Baby Tripod complete less head
035-38	Ball socket alone
B 35-100	Inner leg with calibrating scale
B 35-101	Inner leg without calibrating scale
B 35-102	Inner leg fork
B 35-103	Calibrating scale only
B 35-104	Tripod leg complete less strap
B 35-105	Tripod leg complete with strap
34	Chain hook
49	Leather strap, long
B35-85/62A	Tie bolt with wing nut



Arriflex Shoulder Pod



PART	DESCRIPTION
038-0	Shoulder pod, complete
038-1	Locking piece
038-2	Right angle camera mounting plate with combination (1/4"-20 and 3/8"-16) thread, lock knob and rubber pad
038-3	Shoulder brace only
038-4	End plug
038-5	Set-screw
038-6	Fiber washer
038-7	Washer
038-8	Locking handle
038-9	Washer
038-10	Locking handle 3/8"
9	Combination knob (1/4"-20 and 3/8"-16 thread)

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Operations Manual for Arriflex 16

Operations Manual for Arriflex 35

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