

TECHNICAL INSTRUCTION

F.6

Eclair Cameflex 16/35-mm Motion-picture Camera

AMENDMENT RECORD

<i>Amendment Sheet No.</i>	<i>Initials</i>	<i>Date</i>	<i>Amendment Sheet No.</i>	<i>Initials</i>	<i>Date</i>
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KEY TO ANNOTATION OF ILLUSTRATIONS

- | | | | |
|----------------------------|---|----|---|
| 1 | Rearmost ring of lens mount | 44 | Take-up spool holder |
| 2 | Focus ring of lens mount | 45 | Magazine cover |
| 3 | Footage indicator | 46 | Extension of sprocket of 16-mm magazine |
| 4 | Plunger housing | 47 | Guide roller panel of 16-mm magazine |
| 5 | Inching knob | 48 | Fibre gearwheel of 16-mm magazine |
| 6 | Shutter exposure angle adjustment knob | 49 | Magazine wall |
| 7 | Plug | 50 | Steel gear wheel of 16-mm magazine |
| 8 | Ears on focus ring of lens mount | 51 | Pin on forward stripper of 35-mm magazine |
| 9 | Aperture ring of lens mount | 52 | Sprocket-spindle-locking lever |
| 10 | Turret locking knob | 53 | Belt |
| 11 | Central projection of lens turret | 54 | Sprocket spindle |
| 12 } Tongues on lens mount | | 55 | Sprocket-spindle pulley |
| 13 } | | 56 | Sprocket-spindle gear |
| 14 | Slating lamp bush | 57 | Sprocket-spindle bearing |
| 15 | Magazine light-trap-actuating lug | 58 | Rear stripper of 35-mm magazine |
| 16 | Magazine brake-releasing pin | 59 | Lower paired rollers in magazine |
| 17 | Aperture plate | 60 | Sprocket of 35-mm magazine |
| 18 | Retaining cover of spring-loaded guide in 16-mm gate | 61 | Fibre gearwheel of 16-mm magazine |
| 19 | Groove in aperture and assembly plates | 62 | Intermediate shaft of 16-mm magazine |
| 20 | Compound gear wheel | 63 | Shaft for fibre gearwheel in footage indicator gear train of 16-mm magazine |
| 21 | Magazine light-trap-actuating lug | 64 | Bearing for shaft 63 |
| 22 | 16-mm film transport claw | 65 | Fibre gearwheel in footage indicator gear train of 16-mm magazine |
| 23 | 35-mm film transport claws | 66 | Right-hand steel plate of 16-mm magazine |
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| 25 | 16-mm gate | 68 | Screw in lubrication bore of intermediate shaft of 16-mm magazine |
| 26 | Prongs of 16-mm-gate-holder | 69 | Screw in lubrication bore of sprocket spindle |
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| 28 | Spring clip | 71 | Forward stripper of 35-mm magazine |
| 29 | Retaining plate for gelatine-filter-holder | 72 | Wedge plate |
| 30 | 16-mm-gate-holder | 73 | Metal rods |
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| 34 | Upper paired rollers in magazine | 77 | Sunshade |
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| 36 | Feed spool holder | 79 | Cover for objective bracket |
| 37 | Core adaptors of 16-mm magazine | 80 | Aperture (disused) |
| 38 | Flange plates of core adaptors of 16-mm magazine | 81 | Upper magazine-fixing post |
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| 41 | Sprocket-retaining boss of 16-mm magazine | 84 | Magazine-release slide knob |
| 42 | Bottom film guide of 16-mm magazine | | |
| 43 | Pin on magazine footage-indicator lever of 35-mm magazine | | |

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85	Knurled knob on feed spool spindle of 35-mm magazine	134	Upper right-hand limb of camera mechanism housing
86	Holes in forward wall of magazine, for fixing posts	135	Ground glass
87	Upper pressure pad	136	Idle lens shields
88	Ridge on forward wall of magazine	137	1st prism of viewfinder optical system
89	Knurled knob on feed spool spindle of 16-mm magazine	138	2nd prism of viewfinder optical system
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131	Shutter extension	180	Fibre gear with collar
132	Mirror shutter		
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ECLAIR CAMEFLEX 16/35-mm MOTION-PICTURE CAMERA

SECTION 1

INTRODUCTION

General

The Eclair Cameflex 16/35-mm motion-picture camera is designed for use with either 16-mm or 35-mm standard film stock, a change of film width involving merely the fitting of a different magazine and the insertion of a 16-mm gate into the 35-mm

aperture. Fig. 1.1 gives a general view of the camera.

The camera is normally used for silent filming, but with slight modifications it forms the picture camera used in the Rank Precision Industries' Double Film Camera (Instruction F.1) for simultaneous recording of pictures and sound.

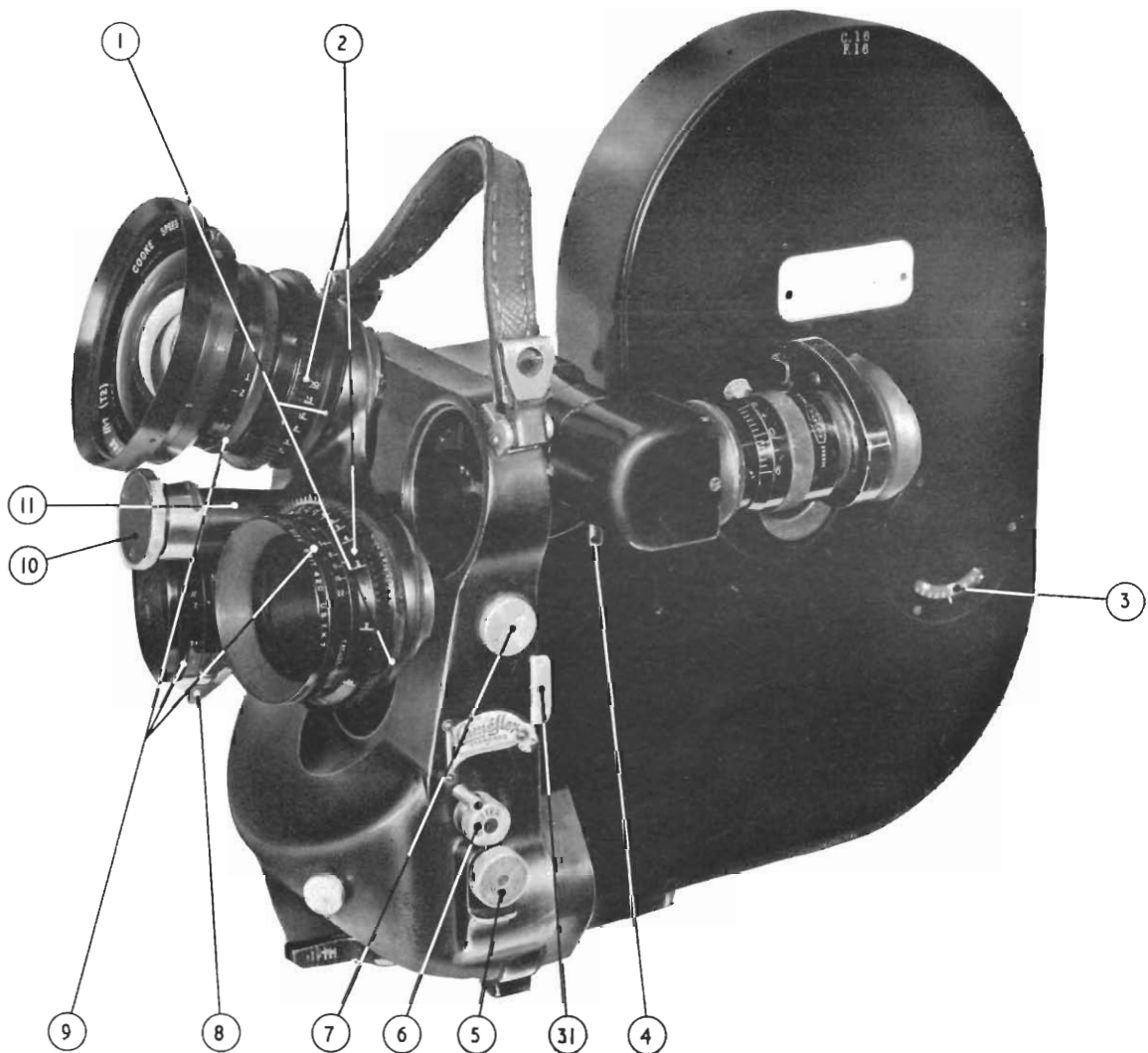


Fig. 1.1. Eclair Cameflex camera: general view, with lens turret withdrawn and rotated slightly from normal position

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CONSTRUCTION

For the purpose of description, the camera can be regarded as made up of the following eight assemblies:

- Camera housing
- Assembly plate
- Camera mechanism
- 35-mm magazine
- 16-mm magazine
- Motor (including battery connections)
- Viewfinder
- Sunshade and wedge plate

Camera Housing

The camera housing is a bronze-finished light-alloy casting, for which the assembly plate forms a rear cover; the housing is flock-lined internally to prevent the reflection of stray light. It is fitted with a base plate 153 (the dovetailed base, Fig. 2.11) to enable the camera to stand firmly on a flat surface. A wedge-shaped dovetailed projection 152 mates with the Cameflex tripod or with an adaptor 72 (the wedge plate); the wedge plate allows other tripods to be used, and permits a sunshade to be fitted when no tripod is required.

On the right-hand side of the housing are a receptacle 94 (Fig. 4.1), provided to receive a bayonet fitting 124 through which the motor is coupled to the camera mechanism, and a tapped insert 93 to receive a screw which locks the motor in position. On the left-hand side are two knurled knobs 5 and 6 (Fig. 1.1), on stub shafts captive in bearings in the wall of the housing; 5 is the inching knob, and 6 is the shutter exposure-angle adjustment knob.

The lens turret is mounted towards the top of the front of the housing. This turret is a simple casting containing three brass sockets (the lens mount receptacles) to accommodate bayonet-fitting lens mounts. A central projection 11 contains a bearing which fits the lens turret post, a fixed shaft projecting from the front of the housing. If the turret is drawn slightly forward from the housing, it can be rotated on the post to any one of three angular positions, each of which brings a lens into use. When the turret is pushed back against the housing,

it is locked by means of a knurled knob 10 (the turret locking knob) at the end of the central projection; a key on the post enters one of the three keyways in the bearing to prevent unwanted rotation and ensure correct alignment. Three holes are provided in the camera housing to accommodate the backward-projecting portions of the lens mounts; shields 136 (Fig. 2.10) on the assembly plate fit around the two upper holes (the idle positions for the lenses) to prevent light from entering the camera through the lenses in these positions.

The lens mount receptacles are set in the turret so as to hold the lenses with their optical axes mutually divergent, to prevent the larger of the lens mounts which may be used from interfering with one another; the front surface of the housing is sloped to offset the angle of the taking lens and bring its optical axis perpendicular to the plane of the film.

The housing is cast with nine tapped internal projections to receive the screws by which the assembly plate is secured, and two pillars, each tapped to receive a further screw, are fitted one on either side of the taking lens position to give additional rigidity to the assembly plate in the region of the camera gate.

The coin-slotted screw plug 7 (Fig. 1.1) gives access for cleaning to the upper surface of the ground glass of the viewfinder system (page 2.13). The plug also retains a clip which secures the gelatine-filter-holder in position (see below).

Assembly Plate

The assembly plate, with the aperture plate which is let into it, forms a detachable back cover to the camera housing. On these plates are mounted most of the assemblies making up the camera.

The aperture plate (17, Figs. 2.1, 2.6) is of polished steel. It is pierced by the aperture of the camera gate, and by slots through which the edge of a gearwheel 20 projects to drive the magazine take-up mechanism; there are also holes for lubrication and to receive pins and screws. The area of the rear surface of the aperture plate over which the

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film passes is recessed, with slightly raised areas to support the film so that there is a minimum of rubbing contact with the picture area. An additional depth of recessing is provided for 16-mm film.

The transport claw slide (page 2.5) runs in guides 171 (Fig. 5.1) consisting of parallel stacks of steel strips, screwed and pinned to the forward face of the aperture plate. Each stack comprises a narrow strip between two slightly wider ones, the unequal

projects through a slot in the side of the camera (Fig. 1.1) and is fitted with a tab 31 by which it can be withdrawn.

Above the aperture of the gate, a bracket 27 (Fig. 2.10) is screwed to the forward face of the aperture plate; this bracket carries a rectangular lens with a ground engraved lower surface (the ground glass, 135) which forms the focusing screen of the viewfinder system.

The rear face of the aperture plate carries a pin

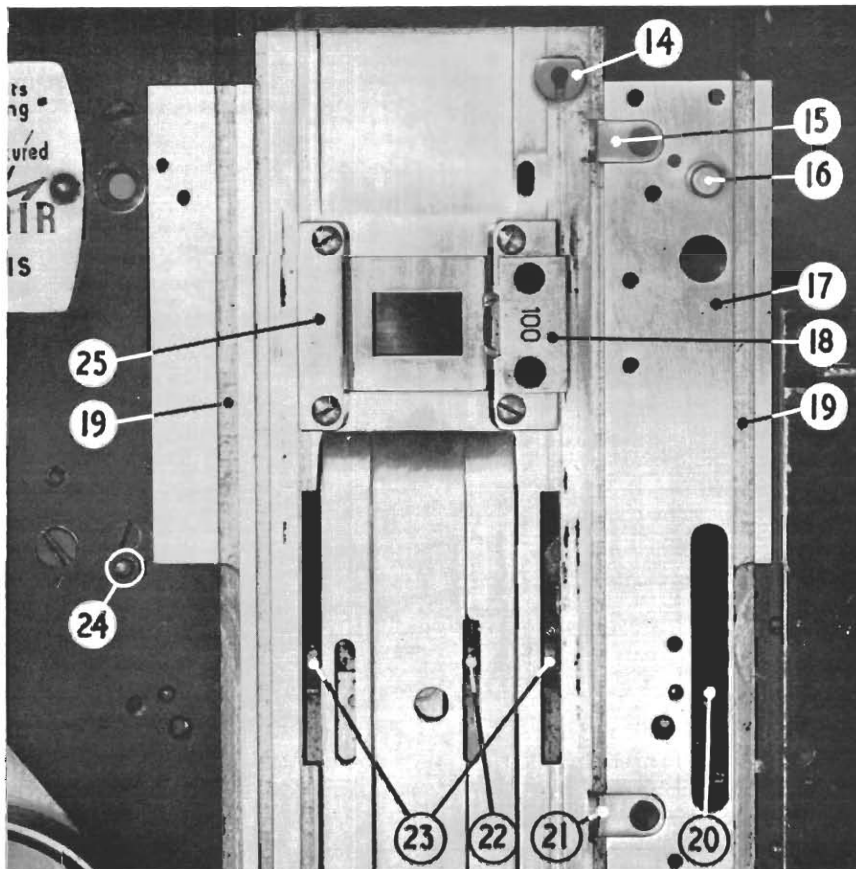


Fig. 2.1. Assembly plate, viewed from rear of camera, showing 16-mm gate in position

widths forming a groove in which an edge of the slide is accommodated.

The gelatine-filter-holder 108 (Fig. 2.6) is a flat slide, fitting into a recess in the forward faces of the assembly and aperture plates and held by the retaining plate 29, the retainer 133 and the spring clip 28 (Fig. 2.3). One end of the filter-holder

16 (the magazine-brake-releasing pin, Fig. 2.1) above and to the right of the aperture. When the magazine is fitted the pin 16 projects into the compartment containing the magazine take-up mechanism and actuates a spring-loaded lever, releasing a brake. Two lugs 15, 21 (the magazine light-trap actuating lugs) are recessed into and

screwed to the plate at points along the right-hand edge of the film path. These lugs depress two plungers which open the spring-loaded light trap seals of the magazine.

A groove 19 machined in the rear surfaces of the aperture and assembly plates receives a corresponding ridge close to the edges of the mating face of the magazine and ensures a light-tight union between the two. The magazine is locked to a pair of slotted fixing posts 81, 161 (Fig. 4.1) on the assembly plate.

135. On the right-hand side of the plate, stowage for the 16-mm gate 25 (Fig. 2.6) and gate-holder 30 is provided in the form of a shallow box-like housing 104 with a projecting bar 105 at its upper end which engages with a bracket 80 near the top of the camera. The housing is secured in place by a captive knurled screw engaging with a tapped insert 106 near the bottom right-hand corner of the assembly plate. This insert is light-proofed by a small cover 176 (Fig. 5.1) screwed to the forward surface of the assembly plate.

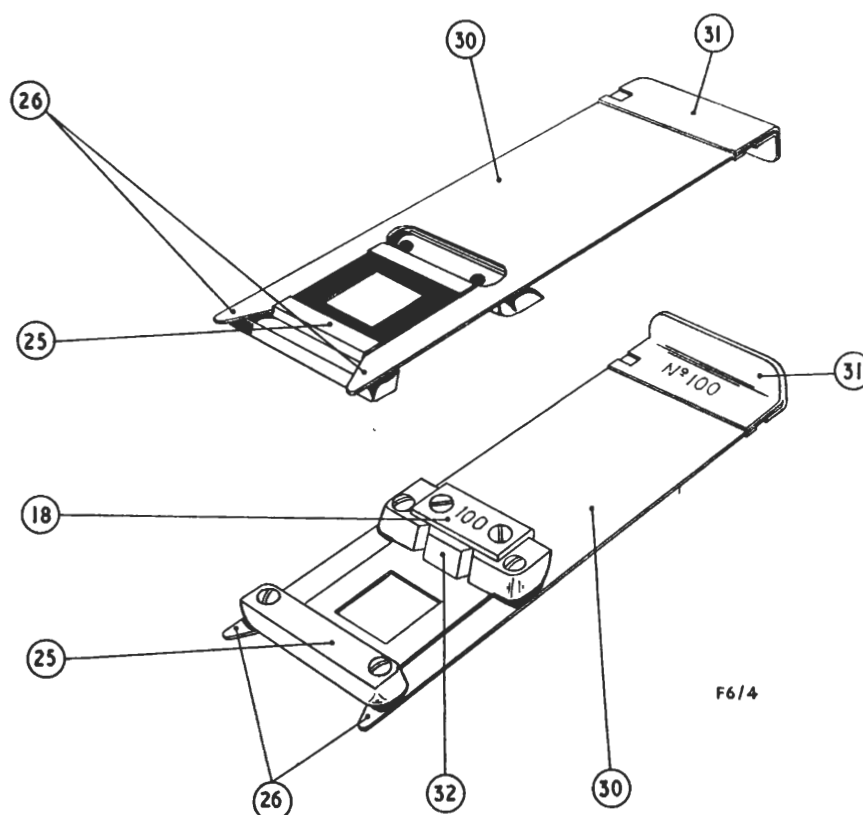


Fig. 2.2. 16-mm Gate and Gate-holder

A slating lamp bush 14 (Fig. 2.1) was originally provided to direct light from a film marking lamp on to the edge of 35-mm film, for sound-and-picture synchronising purposes. The lamp is not fitted in BBC practice, and the bore of the bush is blocked.

At the top of the assembly plate is a circular hole to accommodate the viewfinder, which is screwed and pinned to the rear of the plate with one of its prisms 137 (Fig. 2.10) projecting through the hole into the body of the camera above the ground glass

The 16-mm gate 25 and its holder 30 can be seen in greater detail in Fig. 2.2, where they are shown fitted together. The gate is a small steel block, machined to the form of a plate fitting into the 35-mm aperture in the aperture plate, and containing the 16-mm aperture, with film guides. The right-hand guide contains a spring-loaded section 32 to give positive lateral location of the film against the left-hand guide. The retaining cover 18 of the spring-loaded guide is engraved with the serial number of the camera to which the gate belongs.

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The 16-mm gate holder 30 is a slide resembling the gelatine-filter-holder, but having in place of the aperture of the filter-holder a pair of prongs 26 which fit slots in the horizontal edges of the 16-mm gate. When the gate is placed in position in the 35-mm aperture and the gate holder is inserted in place of the gelatine-filter-holder, the prongs 26 enter the slots in the gate and retain the latter in position. A sketch showing the arrangement viewed from the forward side of the assembly plate is given in Fig. 2.3.

Near the bottom of the forward face of the assembly plate, on the right-hand side, is a fibre block 177 (Fig. 5.1) containing two bearings in which run shafts carrying gearwheels meshing with

can be fitted to enable single-shot and other special work to be undertaken. A small rectangular aperture 82, closed by a further sliding cover let into the assembly plate towards the top of its right-hand edge, is part of the same facility.

The tachometer 109 is mounted in a cut-out near the lower left-hand corner of the assembly plate. The tachometer projects beyond the edge of the plate, and the shape of the camera housing includes a bulge to accommodate it. The shaft of the tachometer is driven from the drive shaft of the camera mechanism via helical gearing. The instrument is protected by a bronze-finished cast light-alloy cover which is screwed to the rear of the assembly plate.

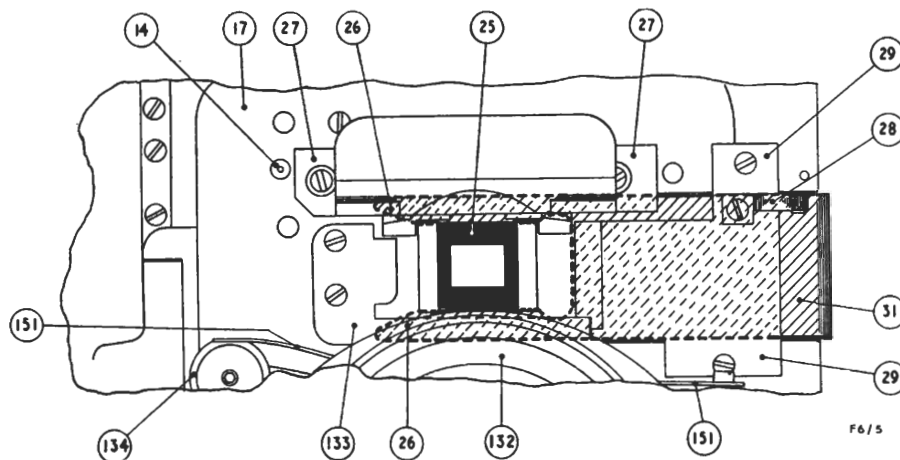


Fig. 2.3. Part of forward sides of assembly and aperture plates, showing fitting of 16-mm gate and gate-holder

others on the drive shaft of the camera mechanism. The fibre block is pinned and screwed in position, and contains two holes, which are in line with corresponding holes in the aperture and assembly plates. Through these holes the spindles can be oiled. The larger gearwheel 20, of steel, projects through the aperture plate to mesh with one in the magazine. This gearwheel is of compound construction, consisting of two members, one of which has obliquely-tipped and the other flat-tipped teeth; the two members are screwed together and to a bush wheel to form a single unit. The smaller gearwheel, of fibre, is positioned behind a sliding cover 107 (Fig. 2.6) in the assembly plate, which is retained by two leaf springs; the fibre gearwheel is provided to drive a contactor (not used by the BBC) which

Camera Mechanism

This mechanism comprises three shafts supported in ballraces in a cast light-alloy housing, and the transport claw slide. The camera mechanism housing consists of two parts screwed and pinned together; it is packed with grease, and has three projecting limbs 134, 150, 173 (Figs. 2.10, 5.1) by which it is mounted on the assembly plate.

The drive from the camera motor is coupled to the mechanism by a clutch of which the female member is a small circular plate 179 (Fig. 5.1) containing a recessed slot. The plate is pinned and screwed to the right-hand end of the drive shaft 175 of the camera mechanism; this shaft is supported horizontally in the camera housing. At its extreme right-hand end, the shaft has an integral

steel gear 178, the face of which is recessed to accommodate the clutch member 179. Close to the gear 178 a second gear 180, of fibre, is pinned to the shaft. The two gears drive those on the fibre block 177 described above (page 2.4). Inside the camera mechanism housing the drive shaft carries a helical gear which drives other gears on the shutter and transport shafts. To the left of the housing, the drive shaft carries a brass crown wheel 168, the purpose of which is described later, and a further helical gearwheel 166 which drives the tachometer. The two last-mentioned wheels are screwed to a flanged sleeve 167 secured to the shaft by a single pin. The left-hand end of the shaft is slotted to receive a blade on the tip of the spring-loaded stub shaft of the inching knob, already described as part of the camera housing.

The shutter shaft is set in the camera mechanism housing at an angle of 45 degrees to the horizontal. Inside the housing this shaft carries a fibre helical gear which is driven by the gear on the drive shaft. The upper end of the shutter shaft projects from the housing and carries the rotating mirror shutter 132. This is of perspex, in the form of a disk having slightly more than 180 degrees of a $\frac{7}{8}$ -inch peripheral band cut away. The remainder of the band has cemented to it a surface-silvered mirror of thin glass. This part of the shutter is backed by a protective shield of thin sheet metal, and has a bevelled edge to enable it to fit closely against the forward face of the aperture plate. A brass counterweight 129 (Fig. 2.10) is fitted opposite the mirror to balance the system mechanically. As the shutter rotates, the mirrored portion alternately exposes and obscures the aperture of the camera gate; when the aperture is obscured, light from the taking lens is diverted by the mirror on to the ground glass 135 to form the viewfinder image.

The shutter is secured to a steel disk at the end of the shutter shaft by screws passing through slotted holes in the shutter into six of eighteen tapped holes in the disk. The slotted holes in the shutter and alternative sets of holes in the disk allow the angular setting of the shutter on its shaft to be adjusted so as to vary its phase of operation with respect to the rest of the mechanism.

To the steel disk on which the shutter is mounted is screwed also a brass retainer which supports a circular mounting plate carrying a thin steel shell 131 (the shutter extension). This is a close fit behind the shutter, and can be rotated with respect to it. A screw 130 is tapped through the steel disk into a separated sector of the retainer; by tightening

this screw, the shutter extension can be locked at a chosen setting.

The shutter extension is calibrated in degrees from 40 to 200. This scale when read against the leading edge of the shutter, which rotates in a clockwise direction as viewed from the rear of the camera, shows the exposure angle to which the shutter is set. In BBC practice, the angle is normally set to 180 degrees, giving an exposure of one-fiftieth of a second when the camera is running at television film speed.

The mounting plate carrying the shutter extension also carries a bevel gear which can be driven by a corresponding gear on a spring-biased shaft (the shutter adjustment shaft). This shaft is coupled by a clutch 165 (Fig. 5.1) to a stub shaft carried by a bearing in the left-hand wall of the camera housing; on the stub shaft is mounted the shutter adjustment knob 6 (Fig. 1.1) marked *Shutter*. The bevel gears can be meshed by pushing this knob. When the knob is pushed, a tooth (the crown-wheel-locking tooth) carried by a sleeve on the shutter adjustment shaft also engages with the brass crown wheel 168 (Fig. 5.1) on the drive shaft, preventing the latter shaft from turning and thus locking the mechanism. The shutter extension can then be moved with respect to the shutter by turning the knob 6. The movement of the shutter is limited by the head of a screw tapped into the counterweight 129 (Fig. 2.10); this screw strikes the heads of two others tapped into a further brass counterweight mounted on the rear of the shutter extension.

The transport shaft 169 (Fig. 5.1) is supported horizontally in the camera mechanism housing; at its rear end it has an integral disk 174 to which the link actuating the transport claw slide 172 is pivoted. Inside the housing the transport shaft carries a helical gear meshing with that on the drive shaft. A flywheel 170 is pinned to the forward end of the transport shaft; in early examples of the camera a brake could be applied to this flywheel.

The transport claw slide 172 runs in the guides 171 described on page 2.2 under the heading *Assembly Plate*. The slide is coupled to the rotating mechanism by a link pivoted to it and to the disk 174 on the transport shaft. It carries two claws 23 (Fig. 2.1) for 35-mm film and a single claw 22 for 16-mm film. The claws act through slots in the aperture plate and are spring-loaded so as to engage in the sprocket holes of the film with a ratchet-like action, pulling the film down through the gate of the camera as the slide descends and trailing along it to other sprocket holes as the slide

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rises. Because all three claws are mounted on the slide, they move together; to obtain the shorter stroke required to pull down 16-mm film, the slot through which the claw 22 operates is made shorter than those for the claws 23. Thus the claw is held out of contact with the film during part of its travel, and is in mid-stroke, moving with considerable velocity, when it engages in a sprocket hole. The film is subjected to sudden high acceleration, and as a result of this the adjustment of the

depth of recessing does not extend to the region of the aperture, so that 16-mm film is exposed in the same focal plane as 35-mm film.

35-mm Magazine

Magazines are obtainable in sizes to accommodate 100, 200 or 400 ft of film, but only the 400-ft size is used by the BBC. The magazine is a cast light-alloy box containing two spool spindles, a simple mechanism to drive the take-up spool

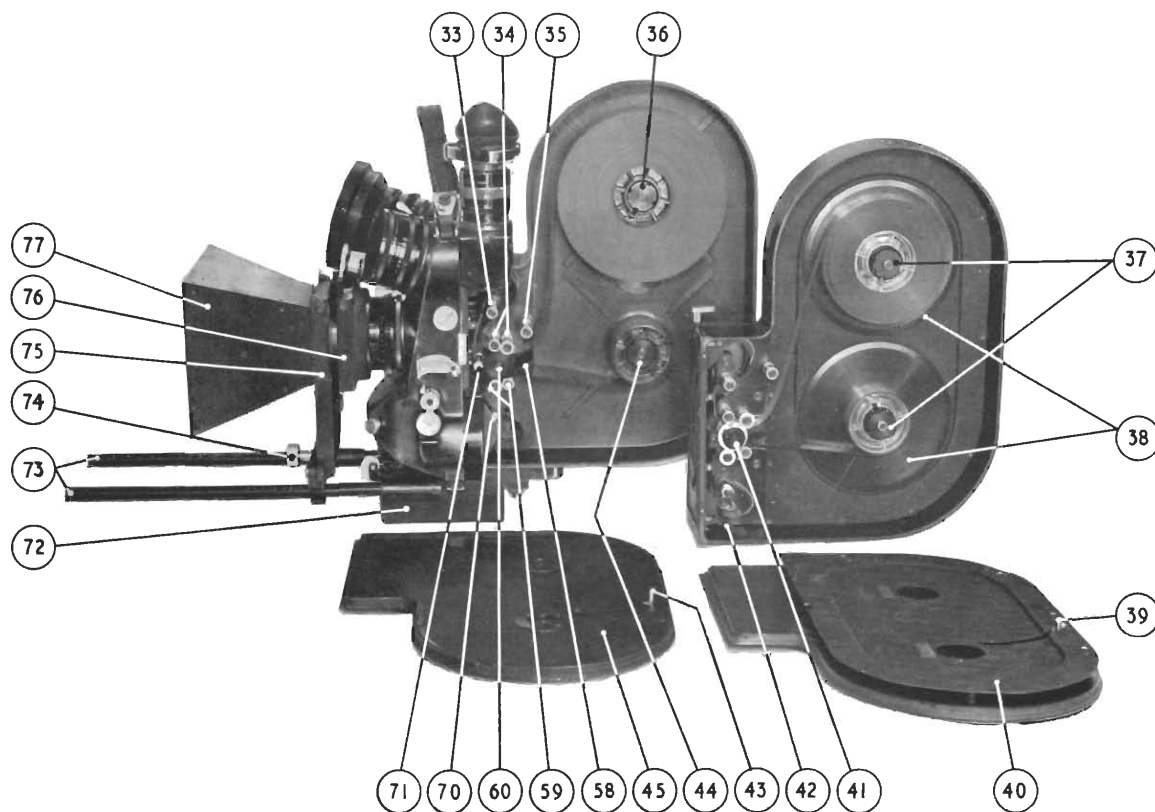


Fig. 2.4. Camera, viewed from left-hand side, showing sunshade and 35-mm and 16-mm magazines

film transport mechanism to obtain a steady 16-mm picture is somewhat critical. Because this mechanism is partly in the magazine, 16-mm magazines issued with a particular camera should not be used with any other.

The 16-mm film claw projects a shorter distance through the aperture plate than the other two claws, to avoid scratching 35-mm film; 16-mm film fits into a deeper recess in the aperture plate, and is thus within reach of the claw. The additional

spindle and a sprocket and guide rollers to feed the film to and from the camera gate. The magazine also carries the pressure pads which thrust the film against the aperture plate of the camera. A footage indicator is fitted to show the length of unexposed film on the feed spool. To conserve space, the magazine is designed on the displacement principle, i.e., as the take-up spool increases in diameter it occupies space vacated by the correspondingly shrinking feed spool.

The spool spindles are carried in brass tubular bearings screwed to the right-hand wall of the magazine. The feed spool holder 36 (Fig. 2.4) contains spring-loaded fibre friction washers to control the unwinding of the spool. Outside the magazine, the feed spool spindle is fitted with a knurled knob 85 (Fig. 2.6) to enable the tightness of wind of the spool to be checked during operation, and the take-up spool spindle carries a pulley 163 (Fig. 4.1) which is driven by a slipping spring-cord belt from a pulley on the sprocket spindle. Cast projections are provided in a recess in the right-hand face of the pulley to afford a finger hold, allowing the winding tension of the take-up spool to be checked during operation.

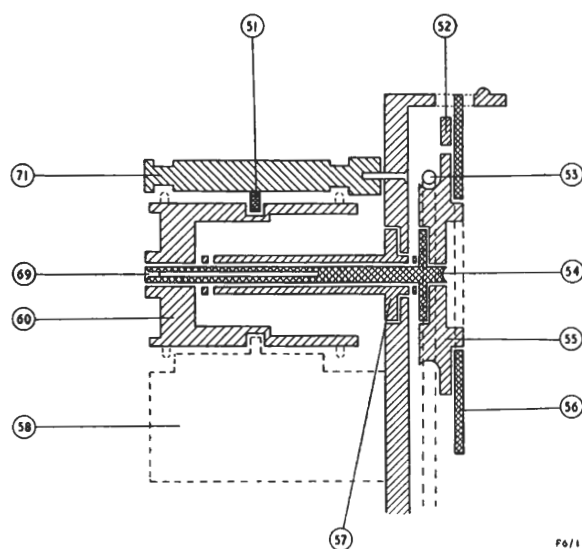


Fig. 2.5. Construction of Mechanism of 35-mm Magazine

Details of the sprocket 60 and sprocket spindle 54 are shown in Fig. 2.5. The sprocket spindle is carried in a steel tubular bearing 57 screwed to the right-hand wall of the magazine. Outside the magazine the spindle has a flange to which is screwed the pulley 55 from which the take-up spool spindle is driven via the belt 53. One edge of the pulley is extended in diameter to form a disk, the edge of which is notched to receive a spring-loaded lever 52 (the sprocket-spindle-locking lever, Fig. 4.1) which prevents the spindle from rotating unless the magazine is in place on a camera. When the magazine is fitted to a camera, the magazine-brake-releasing pin 16 (Fig. 2.1) described on page 2.2 projects through a hole in the front wall of the magazine, striking the lever 52

and lifting it clear of the notched disk to release the sprocket spindle. The gear 56 (Fig. 2.5) by which the magazine mechanism is driven from the camera mechanism is screwed to the notched disk, and a slot in the forward wall of the magazine allows it to mesh with the gear 20 (Fig. 2.1) of the camera mechanism (see page 2.4).

The mechanism on the exterior of the magazine is protected by a cast light-alloy cover 83 (the magazine mechanism cover, Fig. 2.6) screwed into place on the right-hand wall, and pierced by holes to accommodate the finger grip of the take-up spool spindle pulley and the screws securing the pressure pad plate (see page 2.8).

Strippers are provided to prevent the film from clinging to the sprocket and winding round it. One of these strippers, 71 (Fig. 2.5) is a pillar screwed to the right-hand wall of the magazine, forward of the sprocket 60, carrying a transverse pin 51 which projects into a groove in the sprocket. The other stripper 58 is a metal plate, having a flange by which it is screwed to the magazine wall at the rear of the sprocket, and a forward edge shaped to project into the groove in the sprocket and to clear its teeth.

Both the spool spindles and the sprocket spindle have axial bores for lubrication, tapped at their left-hand ends and closed by red-painted counter-sunk screws 69.

The film passes over seven guide rollers. One roller 35 (Fig. 2.4) ensures that the film is not rubbed against the angle of the forward wall of the magazine as it is drawn from the feed spool. Two pairs of rollers 34, 59 hold the film in contact with the sprocket before and after it passes through the camera gate. One roller of each of these pairs is flanged to give lateral location to the film. Two further rollers 33, 70 control the loops between the sprocket and the gate.

The groups of rollers 33, 34 and 59, 70 are each mounted on a plate secured to the right-hand wall of the magazine by screws passing through slotted holes; this arrangement allows the groups of rollers to be moved vertically for the purpose of inserting the film between rollers and sprocket when lacing the magazine, and then moved back to retain it in place on the teeth of the sprocket. The spindles carrying the rollers 33, 70 contain pins which engage in holes in the wall of the magazine when the groups of rollers are in their working positions. The pins can be withdrawn by pulling the rollers 33 and 70 laterally to the left; the plates

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carrying the groups of rollers can then be slid away from the sprocket.

The pressure pads are carried by a cast plate forming a removable section of the front wall of the magazine. Pins through projections at the ends of the plate locate its left-hand edge on the body of the magazine; the right-hand edge carries two threaded studs which engage with screwdriver-slotted tapped bushes 162 (Fig. 4.1) captive in

and the other (92) to press it against the lower part of the aperture plate, where it is engaged by the transport claws. The pads are of fibre with metal bushes to receive the shoulder screws by which they are retained on the pressure pad plate. The pads are recessed into the plate so that their surfaces are only slightly proud of it, and each is sprung away from the bottom of the recess by an H-shaped leaf spring to provide the necessary thrust against the

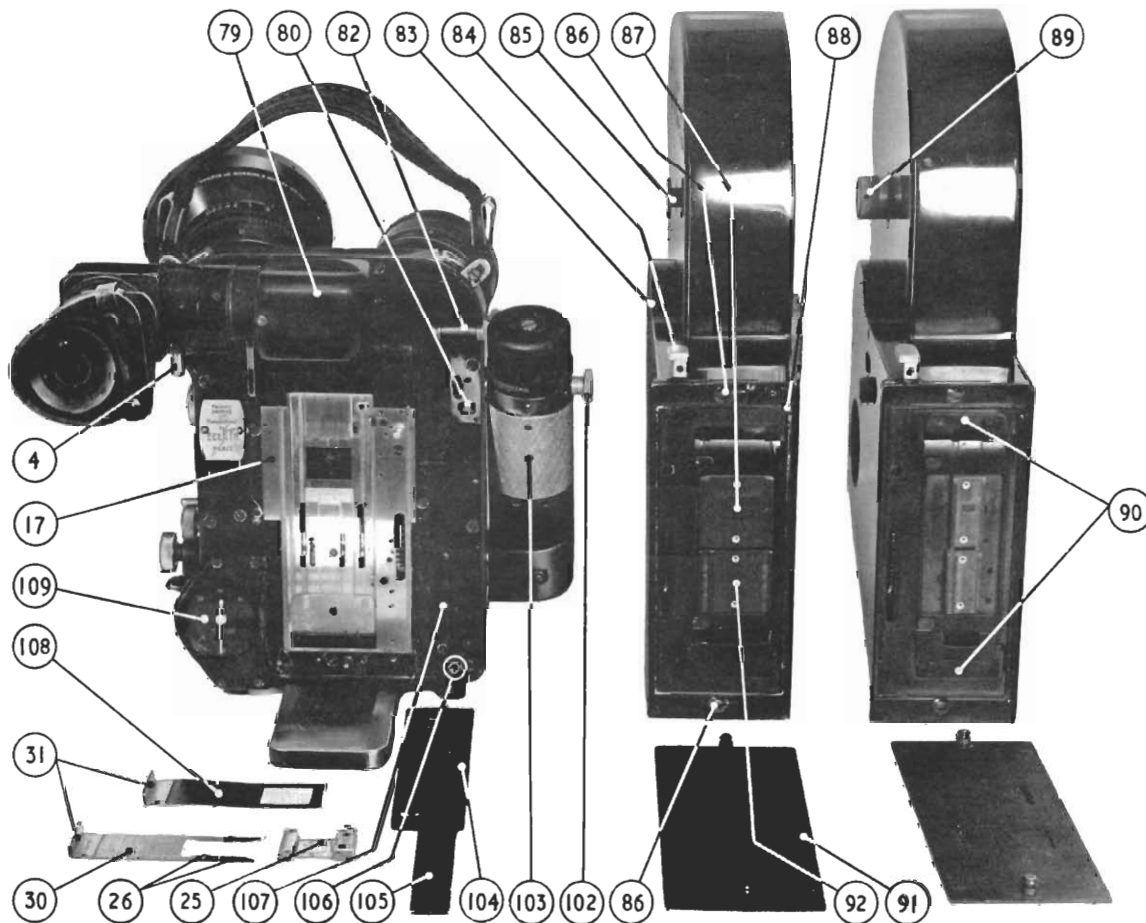


Fig. 2.6. Camera, viewed from rear, with 35-mm and 16-mm magazines

supports screwed to the right-hand wall of the magazine. Holes in the protective cover over the external mechanism of the magazine give access to the slotted ends of the bushes, and the removal of the pressure pad plate for cleaning is thus a simple operation.

Two pressure pads are provided, one (87, Fig. 2.6) to press the film against the aperture of the gate,

film. The pressures of the pads are critical for the correct operation of the camera, and therefore the springs should not be disturbed so long as the magazine is functioning satisfactorily.

The pressure pad plate is fitted with a pair of pivoted metal flaps (the light-trap seals) which are spring-loaded to close the slits between the plate and the magazine body through which the film

leaves and re-enters the magazine. When the magazine is fitted to the camera, the two magazine light-trap-actuating lugs 15 and 21 (pages 2.2, 2.3) depress plungers captive in the pressure pad plate to lift the light-trap seals from the slits and allow free passage of the film.

Locking catches are provided at the slits to provide lateral location of the left-hand edge of the film as it enters and leaves the camera gate. The catches are attached to the ends of pins riding in holes which are part of the cast shape of the magazine body. The pins thread compression springs which thrust the catches against the edge of the film. The tension in the springs is variable by means of screwdriver-slotted nuts screwed on to the right-hand ends of the pins; these are accessible when the cover on the right-hand side of the magazine is removed. The locking catches are accommodated in recesses cast in the magazine body which normally prevent them from turning, but they can be withdrawn from these recesses against the pressure of their springs and turned clear of the pressure pad plate to allow the plate to be withdrawn.

The right-hand edges of the film are located at points opposite the locking catches by small plates of hard steel screwed to the right-hand wall of the magazine.

The forward wall of the magazine contains two holes 86 near the upper and lower edges of the area which fits against the camera. The slotted fixing posts 81, 161 on the assembly plate (page 2.3) project through the holes 86 and are locked by a pair of blades which engage with their slots. The blades are parts of a spring-loaded slide (the magazine release slide) which is supported on two shoulder screws passing through slotted holes in the slide and tapped into the rear surface of the forward wall of the magazine. The magazine is released from the camera by pressing a knob 84 on the upper end of the slide.

The cast shape of the forward wall of the magazine includes a raised ridge 88 which mates with the corresponding groove 19 (Fig. 2.1) in the aperture and assembly plates of the camera, and ensures a light-tight union between camera and magazine.

A protective cover 91 (Fig. 2.6) is provided to fit over the pressure pads and film loop when the magazine is not attached to the camera; the cover is attached to the magazine by means of a pair of slotted posts similar to the magazine fixing posts on the assembly plate.

The left-hand wall of the magazine is a completely detachable cover 45 (Fig. 2.4) consisting of a light-alloy casting with an inner steel plate spaced slightly from it to form a cavity containing the latch mechanism and the footage indicator. The latch mechanism consists of two levers in sliding bearings, adjusted by a central cam coupled to a handle outside the cover. These levers engage with slots in the magazine body to retain the cover in position. The footage indicator is a dial 3 (Fig. 1.1), visible through an aperture in the cover and geared to a spring-loaded arm (the magazine footage indicator lever) carrying a pin 43 (Fig. 2.4) which projects through a curved slot in the inner steel plate to ride on the edge of the feed spool. Provision is made for the arm to be lifted from the feed spool automatically when the handle is turned to unlock the cover from the magazine; this avoids the possibility of the pin being forced between turns of the roll of film when the cover is placed in position.

16-mm Magazine

The 16-mm magazine is a development of the 35-mm model, and much of the previous description therefore applies. The following account covers those features of the 16-mm magazine which are different.

The external dimensions of the magazine are similar to those of the 35-mm version, and to provide an interior space of suitable width for 16-mm film, steel plates are supported inside the magazine at suitable distances from the right-hand wall and the magazine cover. The right-hand plate 66 (Fig. 2.7) is screwed to eight angle brackets mounted on the walls of the magazine body and to the rear edge of the guide roller panel 47 (see below, page 2.10). The left-hand plate 40 (Fig. 2.4) is screwed to seven pillars mounted on the interior of the magazine cover.

The magazine will hold 400-ft darkroom-loading rolls or 100-ft and 200-ft daylight-loading spools. The spool spindles are shaped to receive the daylight-loading spools, and core adaptors 37 are provided which fit the spool spindles and take standard 16-mm centres for the darkroom loads. The core adaptors are fitted with flange plates 38.

Fibre washers are fitted between steps in the cross-section of the spool spindles and the left-hand ends of the spool spindle bearings. In place of the spring and friction washers in the feed spool holder of the 35-mm magazine, the 16-mm magazine is fitted with a compression spring inside the knurled knob 89 (Fig. 2.6) on the feed spool

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spindle; the spring exerts a longitudinal thrust on the spindle towards the right, causing the fibre washer on this spindle to be gripped and so to serve as a friction washer.

The sprocket must run more slowly than that of the 35-mm magazine, and it is therefore not secured to the sprocket spindle, but retained on it by the sprocket retaining boss 41 (Fig. 2.7), and driven via gearing with a step-down ratio of 2.5 : 1.

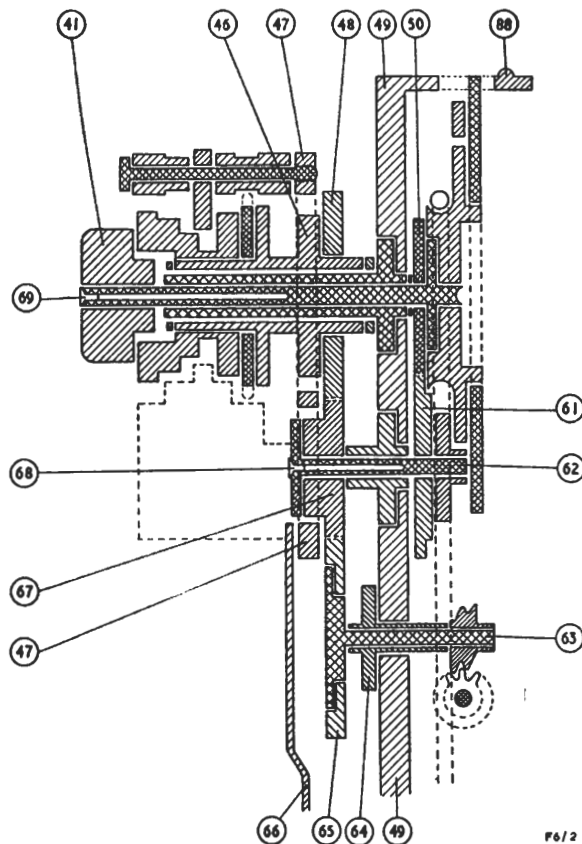


Fig. 2.7. Construction of Mechanism of 16-mm Magazine

A steel gearwheel 50 on the sprocket spindle between the pulley and the right-hand wall of the magazine meshes with a fibre gearwheel 61 carried by an intermediate shaft 62 running in a bearing through the magazine wall 49. Inside the magazine, the intermediate shaft carries a steel gearwheel 67 which meshes with a fibre one 48 screwed to the right-hand face of an extension 46 of the sprocket.

The intermediate shaft has an axial lubrication bore, tapped at its left-hand end and closed by a

red-painted countersunk screw 68.

The steel gearwheel 67 also meshes with a fibre gearwheel 65 on a further shaft 63 carried by a bearing 64 in the magazine wall, from which a simple footage indicator dial 164 (Fig. 4.1) is driven via two stages of worm gearing mounted on the exterior of the magazine under the cast protective cover 83. The dial is friction-coupled to a fibre gearwheel driven by a second worm gear, and is fitted with a knurled knob by which it can be reset by hand. The knob projects through a hole in the cover 83, and an adjacent hole with a cursor line engraved on its edge reveals a portion of the dial.

The guide rollers and strippers are mounted on a guide roller panel 47 (Fig. 2.7), supported on the right-hand wall of the magazine by four pillars, to which the panel is secured by four screws. The rear edge of the panel supports part of the forward edge of the right-hand steel plate 66, as mentioned on page 2.9. The panel is pierced by a hole to accommodate the extension 46 of the sprocket carrying its fibre gear 48, and by a further hole to accommodate the flanged left-hand end of the intermediate shaft 62 and part of its gear wheel 67 by which the sprocket is driven.

The pressure pads and light-trap seals on the pressure pad plate are suitably dimensioned to work with 16-mm film. The locking catches fitted to the 35-mm magazine body are absent, but fixed guides are secured to the rear of the pressure pad plate to locate the left-hand edge of the film. The hard steel plates opposite them on the right-hand side of the film are spaced from the right-hand wall of the magazine by light-alloy blocks. U-shaped steel plates 90 (Fig. 2.6) are recessed into the front surface of the forward wall of the magazine to narrow the slits through which the film emerges and re-enters.

The pin (39, Fig. 2.4) on the magazine footage indicator lever is longer than that (43) in the 35-mm magazine, and projects through a curved slot in the left-hand steel plate 40. The footage indicator cannot function when daylight-loading spools are used, and for this reason the second footage indicator described above is provided on the 16-mm magazine.

Motor

The motor 103 (Fig. 2.6) is a two-pole d.c. machine fitted with a variable resistor by which its speed can be controlled, and a three-position switch by which it can be started, run at a chosen speed, and stopped. The motor forms a grip for

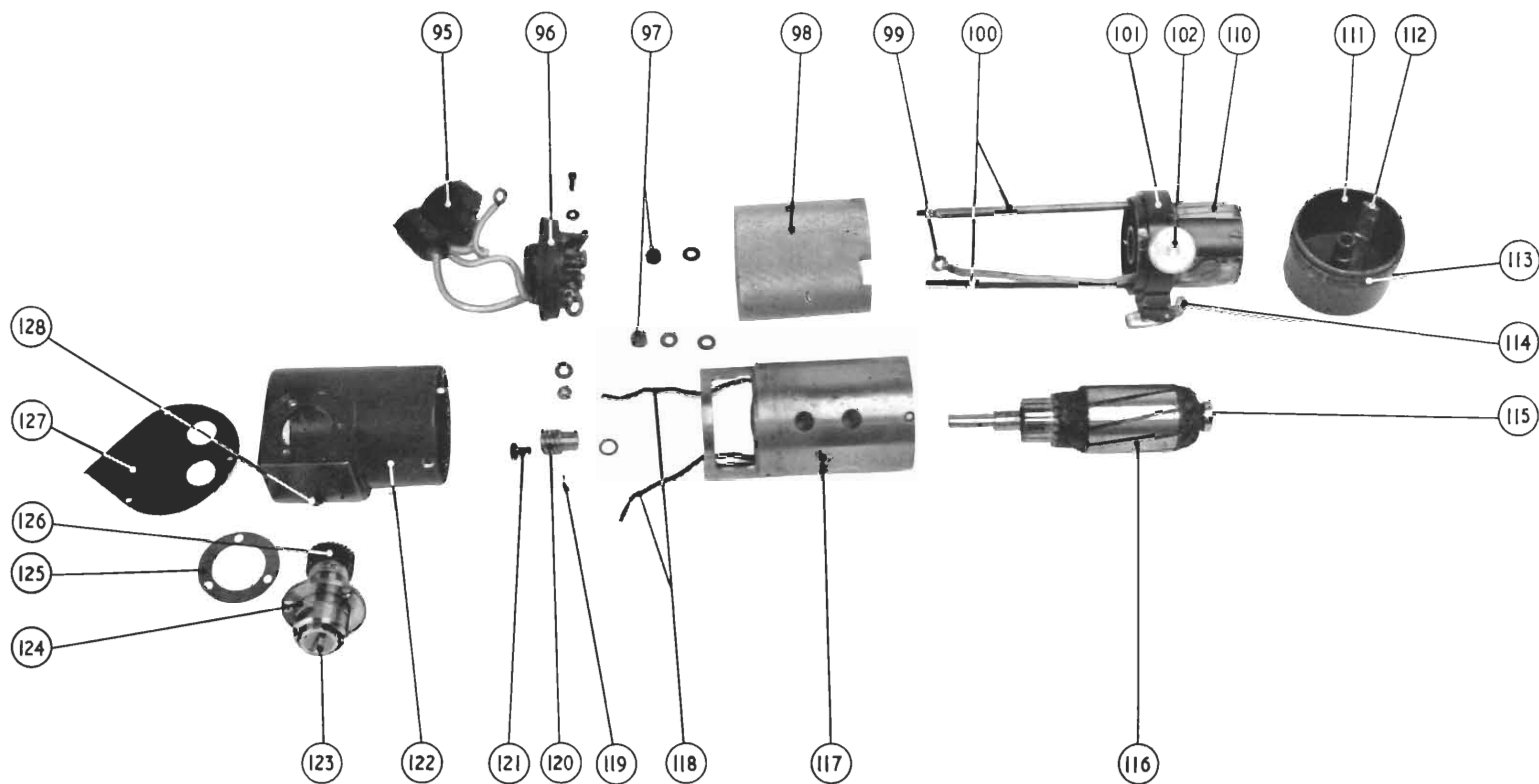


Fig. 2.8. Motor, Dismantled

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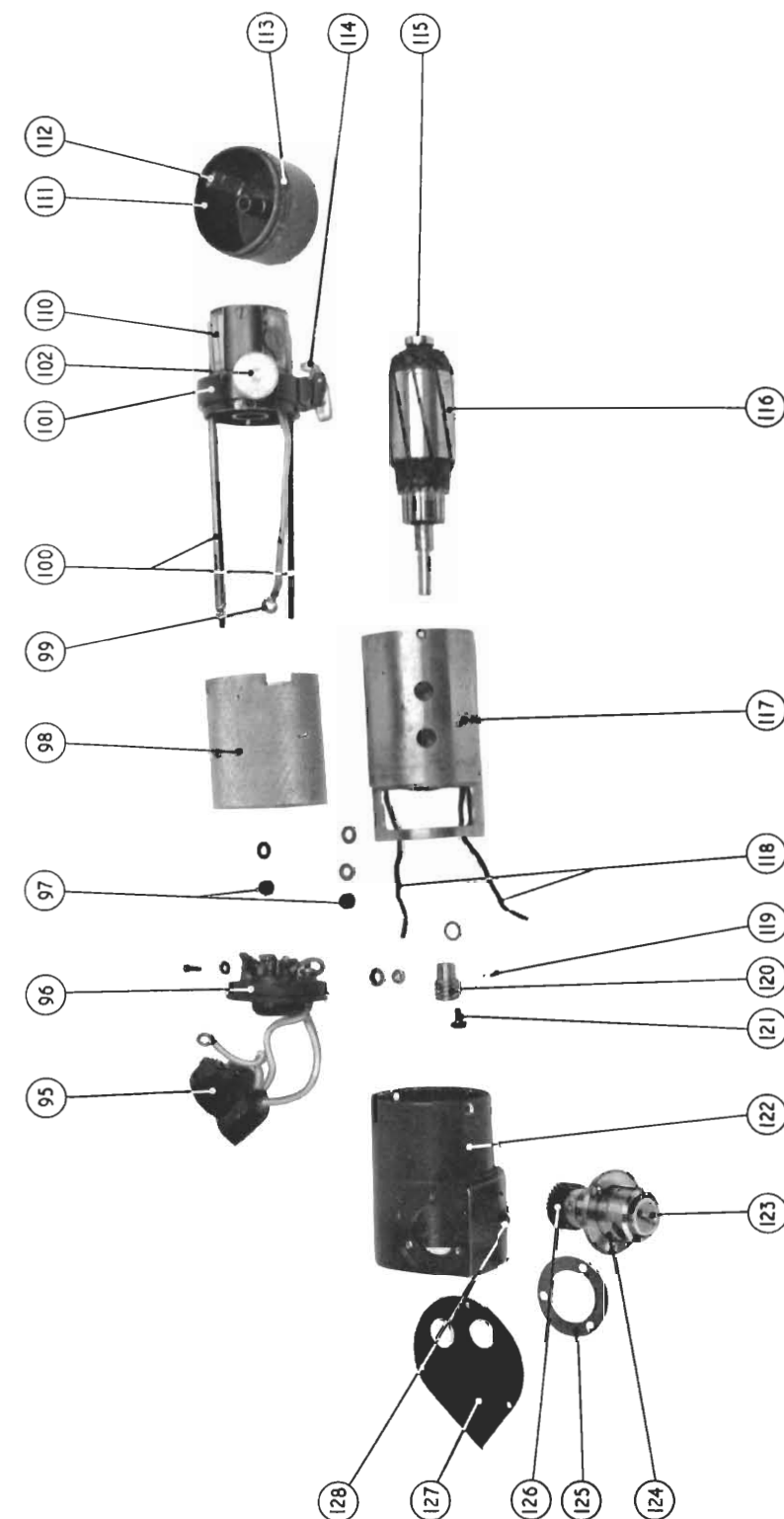


Fig. 2.8. Motor, Dismantled

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the operator's right hand when the camera is hand-held, and a knurled outer shell 98 (Fig. 2.8) is provided on the body 117 of the motor to afford a comfortable grip. The body 117 is a cylinder forming part of the magnetic circuit of the field, the poles of which are screwed to its interior surface.

The armature 116 of the motor is mounted on the motor shaft, which runs in ballraces; one of these 115 is a fixture on the shaft and is supported in a cavity in the upper end-cap 101 of the motor. The other ballrace (not visible in the illustration) is carried by the brush-holder support 96, a fibre insert which fits into the lower end of the motor body and carries also the brush-holders. This insert and the upper end-cap 101 are secured to the motor body 117 by threaded rods 100, extend-

contains the bearing for the shaft by which the drive is transmitted to the camera mechanism; this shaft carries a fibre gearwheel 126 which meshes with a worm gear 120 on the motor shaft, and the spring-loaded clutch member 123 by which the motor is coupled to the drive shaft 175 (Fig. 5.1) of the camera mechanism. The end of the lower end-cap 122 (Fig. 2.8) is closed by a removable plate 127 containing holes to permit the entry of the battery-lead connector.

The motor is secured to the camera by the bayonet fitting 124 on the lower end-cap which mates with a receptacle 94 (Fig. 4.1) in the camera housing and is locked to it by a suitable movement of the motor. A screw 102 (Fig. 2.6) captive in the upper end-cap of the motor is then tightened into a tapped insert 93 (Fig. 4.1) in the camera housing

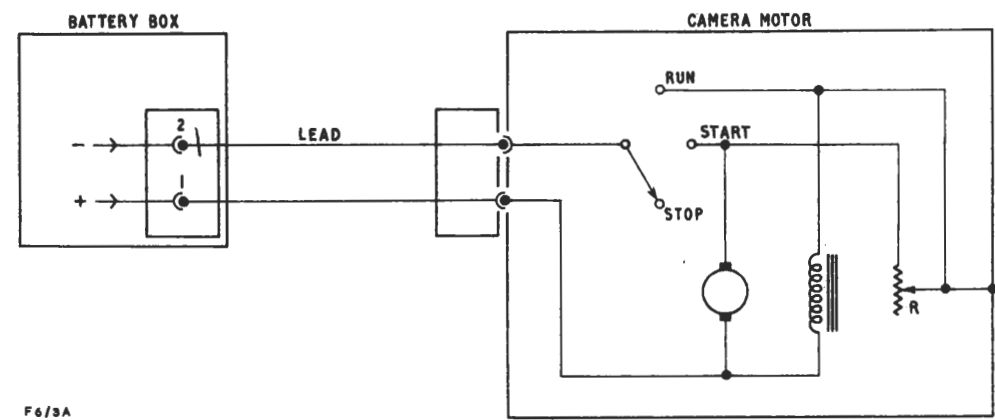


Fig. 2.9. Circuit Diagram

ing through the body, and screwdriver-slotted nuts 97.

The upper end-cap carries the winding 110 of the variable resistor forming the speed control of the motor; a rotatable control-cover 111 encloses the resistor and carries its sliding contact 112. An arbitrary scale on the control cover can be read against a mark in the end-cap to note the setting of the control, and a ribbed band 113 is engaged by a spring-loaded blade 114 to prevent unwanted rotation.

Gaps in the motor body give access to the brushes and commutator of the motor, as shown in Fig. 5.2, and are normally covered by the lower end-cap 122. This carries the bayonet fitting 124 (Fig. 2.8) coupling the motor to the camera housing (see below) and the motor switch 95 which incorporates the battery-lead connector. The bayonet fitting

to retain the motor in position. The screw 102 is a spring-loaded plunger to which is pinned a knurled knob.

Both end-caps of the motor have oiling points, indicated by red paint. The oiling point on the lower end-cap is filled by a small screw 128 (Fig. 2.8). Note, however, that as mentioned in Section 5 of this Instruction, the motor does not normally require lubrication.

The battery-lead connector 159 (Fig. 4.1) is a hybrid type, having one male and one female member; the male member can be expanded by means of a knurled-headed screw 160 to grip its socket in the switch, so anchoring the battery-lead firmly in place. The other end of the lead is fitted with a two-way male Cannon connector Type EP-2-CG12 which can be plugged into a female connector on a box containing an eight-volt

battery of Varley dry secondary cells Type VP7/7 or VP7/9.

The circuit diagram of the motor and battery is given in Fig. 2.9. The switch has two On positions, labelled *Start* and *Run*. The *Start* condition connects the variable resistor R in series with the field and applies the full battery voltage to the armature; this causes the motor to develop maximum torque on starting. The *Run* condition places the variable resistor in series with the armature and applies the full battery voltage to the field; thus, speed control is by variation of the armature current.

Viewfinder

The viewfinder system is of the reflex type. When the mirror shutter (page 2.5) is closed, light from the taking lens is directed by the mirror on to the focusing screen, which is the ground engraved lower surface of a rectangular lens (the ground glass 135, Fig. 2.10), supported in a horizontal plane above the aperture of the camera gate on the forward side of the aperture plate. Light from this image is directed by two prisms 137, 138 out of the body of the camera through a hole in the assembly plate, then towards the left. The prisms are mounted on a machined steel bracket 141 (the objective bracket) pinned and screwed to the rear surface of the assembly plate, with the first prism projecting through a hole in the plate. The second prism is mounted on a subsidiary bracket (or prism holder) 139 secured to the objective bracket; the holder also carries the twin objective lenses of the system. One of these is screwed directly into the holder, between the first and second prisms; the other is screwed into a support tube 140 which in turn is screwed into the prism holder and projects towards the left-hand side of the camera through an aperture in the objective bracket.

The prism holder is secured to the objective bracket by screws tapped into the bracket through slotted holes in the holder; this arrangement enables the distance between the second objective lens and the eyepiece of the system to be adjusted over a small range.

A sheet metal cover 79 is screwed to the edges of the objective bracket for protection and to exclude light.

A barrel is attached to the objective bracket,

joining it to a further bracket 147 (the eyepiece bracket) on which is mounted a third prism 148 in its holder and the eyepiece of the system. A rotatable joint between the objective bracket and the barrel enables the eyepiece to be turned either towards the rear of the camera or vertically upwards or downwards; the eyepiece has a definite seating position in each of these directions, being held by a spring-loaded plunger which is contained in the plunger housing 4 (Fig. 1.1) and engages in indentations in the rotatable member. The third prism is protected by a further sheet-metal cover 149 (Fig. 2.10).

The eyepiece of the system consists of two lenses, each mounted in one of two concentric tubes, one of which can slide in the other to allow the distance between the lenses to be varied in order to adjust the focus of the eyepiece. The sliding motion is imparted by means of a rotatable focusing ring 146 carrying a screw 142 which engages with slots in the tubes; the slot in the inner tube lies in a plane perpendicular to the axis of the tube, but that in the outer tube is helical, so that when the screw 142 is moved by the rotation of the focusing ring, relative movement of the tubes occurs. The ring carries a focus scale which can be read against a cursor line engraved on the outer tube. A knurled ring on the screw enables the focusing ring to be tightened against the outer tube, locking it at a chosen focus setting.

The eyepiece of the viewfinder is fitted with a rubber eye piece 144, rotatable for the convenience of the operator. The rubber eye piece is mounted on a plate 143, in such a manner that its aperture can be shifted slightly from the optical axis; this movement is arranged to close a shutter which prevents light from any source behind the camera from entering via the viewfinder and fogging the film. The eye piece is spring-loaded to the position which closes the shutter; a locking catch 145 is provided by which it can be retained in the position which opens the shutter, when the viewfinder is in use.

The downward-projecting flap 78 (Fig. 4.1) screwed to the underside of the viewfinder is the magazine locating bracket, which serves to aid the location of the magazine when this is being fitted to the camera.

Sunshade and Wedge Plate

The sunshade is a sheet-metal hood 77 (Fig. 2.4), lined with black velvet to avoid the reflection of light from its interior surface into the camera lens. It is supported on a machined metal frame

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which incorporates a filter-holder receptacle, and which carries a second filter-holder receptacle rotatable axially with respect to the first. A knurled knob on the mounting rings of the second receptacle, below the sunshade, enables this receptacle to be secured in any position. The receptacles are fitted with hinged flaps along their top edges to exclude light.

entry of stray light through the gap between lens mount and sunshade.

The sunshade is supported on two metal rods which screw into the platform of the Cameflex tripod, or when this tripod is not used, into an adaptor 72 (the wedge plate) provided to receive them and/or to enable the camera to be mounted on a different tripod. A machined transverse bar

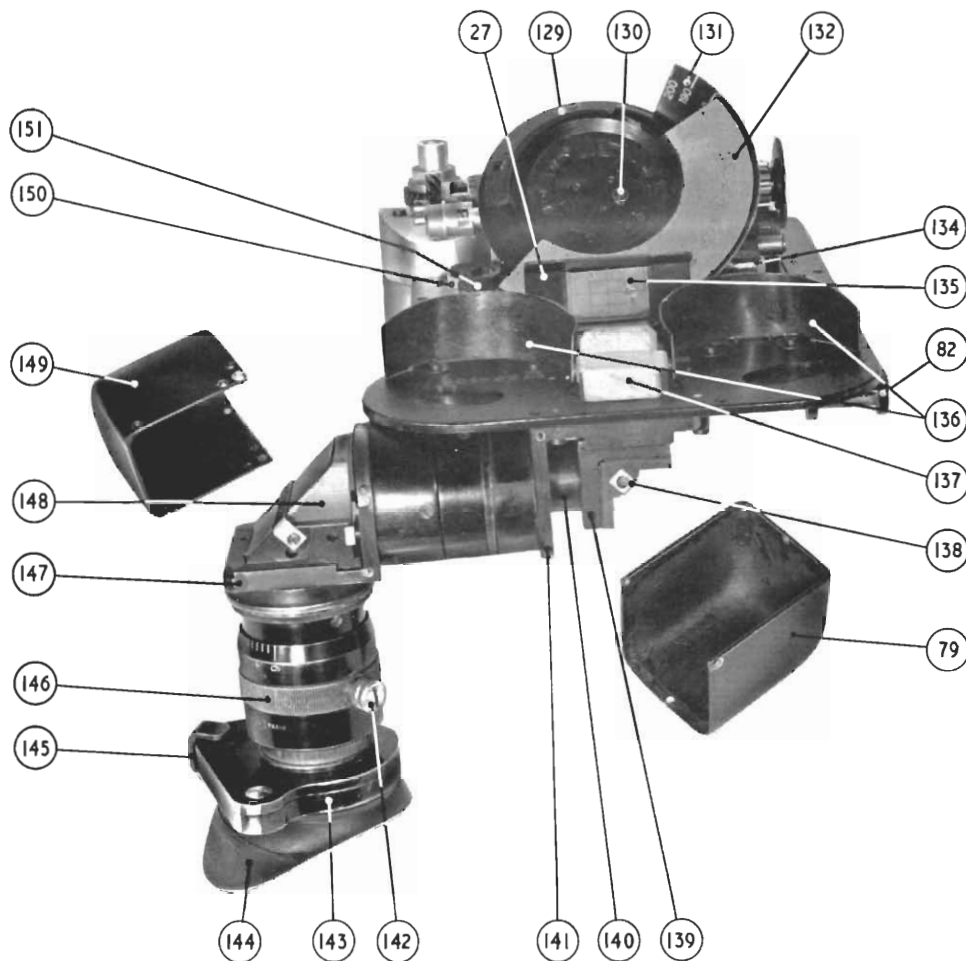


Fig. 2.10. Viewfinder Optical System

A metal ring (the sunshade ring) fits into the rear opening of the filter-holder receptacle; three spring clips are screwed to this ring to grip the inner surface of the opening and retain the ring in position. The rear side of the ring is shaped to fit over the forward end of the smaller-sized lens mount used with the camera and prevent the

fitting between the rods has a guide at its right-hand end and a notch at its left-hand end which enable it to slide on the rods; by this means the position of the sunshade can be adjusted to accommodate the different sizes of lens mount. The bar can be secured in a chosen position by means of a knurled screw attached to the guide.

The frame carrying the sunshade is retained on the transverse bar by three screws tapped into it through slotted holes in the bar; the centre screw carries a knurled knob 74 by means of which the two members can be clamped together. This arrangement permits a small range of lateral adjustment of the sunshade with respect to the camera lens.

platform contains sockets 156 to receive the two rods supporting the sunshade; in the sockets are co-axial threaded studs which mate with tapped holes in the ends of the rods. The dovetailed base 153 of the camera mates with the platform, and the camera is retained in place by a spring-loaded plunger 155 at the rear of the platform which engages with the edge of a steel latch 154

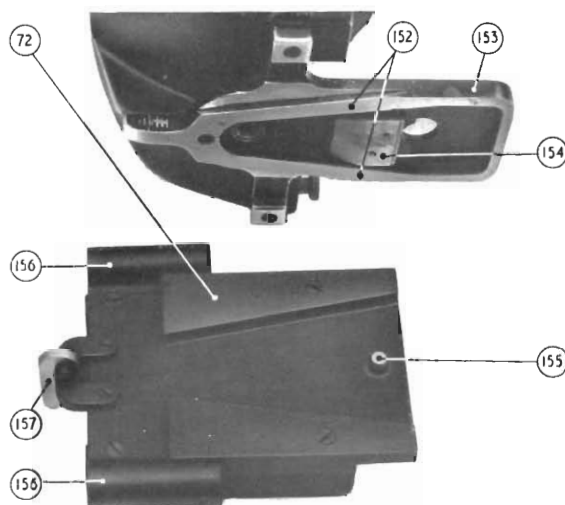


Fig. 2.11. Camera Base and Wedge Plate

The wedge plate 72 (Fig. 2.11) consists of a machined U-sectioned member which has a series of tapped holes in its underside to accept the inserting screws of most tripods, and has a dovetailed platform similar to that of the Cameflex tripod screwed to the edges of its upturned sides. The

screwed to the underside of the camera base. A small lever 157 is mounted at the front of the platform to assist in the removal of the camera from the wedge plate if the two dovetailed members should become jammed.

SECTION 3

LENS MOUNTS

General

Lenses for use with the Cameflex camera must be fitted in the Cameflex type of lens mount, which is illustrated in Fig. 3.1. Within the BBC, the camera is normally issued with a set of Taylor, Taylor and Hobson Cooke lenses in this type of mount, of various focal lengths in the range between 18 mm and 150 mm. This corresponds to a range of horizontal angles of view between 63 degrees and 8 degrees for 35-mm working, or between $31\frac{1}{2}$ degrees and 4 degrees for 16-mm working.

The lens mounts are supported in receptacles formed by brass inserts in the lens turret of the camera and retained in place by a bayonet locking action. The mounts are fitted with two calibrated rotatable rings 2, 9 controlling the focus and aperture respectively of the lens. Two alternative types of focus ring are available, and lens mounts fitted with both are shown in Fig. 1.1. One type carries pairs of metal ears 8 to provide a finger grip by which the ring can be manipulated easily when the camera is operated normally, i.e., without the blimp. The other type is toothed to mesh with the follow-focus gearing of the Double Film Camera (Instruction F.1). The aperture ring is knurled, and may be calibrated in either *T* or *f* numbers; it is coupled to an iris mechanism in the lens mount. A further knurled ring 1 is a fixture on the cell of the mount and provides a grip by which the lens mount should be grasped when being fitted to or removed from the lens turret.

Lens mounts must not be dismantled, but should be returned to the manufacturers for any repair.

Cleaning and Lubrication

Dust must be removed from the front and rear surfaces of the lenses with a camel-hair brush; if the brush becomes greasy, it should be washed in ether and allowed to dry at ambient temperature. When the lens surfaces have been freed from dust they can be wiped clean with a Selvyt cloth, which must itself be clean. (If no Selvyt cloth is available, a cotton handkerchief or some similar well-washed lint-free cloth can be used.) If grease is present the cloth should be moistened with ether or with a

proprietary lens cleaner (e.g., May and Baker's Solution 10); industrial methylated spirit should not be used because it has a fairly high water

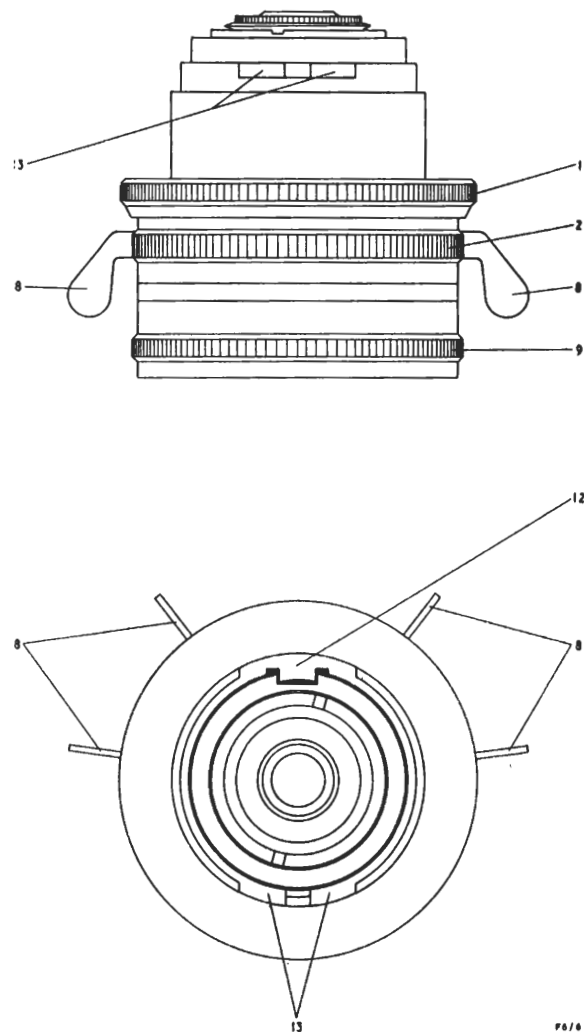


Fig. 3.1. Eclair Cameflex Lens Mount

content. If the greasy deposit is heavy it may be necessary to use benzine first and then to remove the residual smear with ether or lens cleaner. The

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minimum practicable quantity of any solvent must be used. The cleaning process should be completed by a final wipe with a clean dry cloth and the removal of lint particles by means of the camel-hair brush.

The focus and aperture rings should be lubricated with Ragosine Molydest 50 grease.

Damage to the matt black surfaces of the lens mounts must be avoided (see p. 5.6).

SECTION 4

OPERATION

1. To Load the Magazine

Operators who are not familiar with the camera are advised to practice the following procedure several times in daylight, using scrap film. After such trial loadings, the loops of film inside the magazine should be checked against the white lines marked on the interior of the magazine body.

Operations 1.4 to 1.10 inclusive must normally be carried out in a darkroom or with the aid of a changing bag.

- 1.1 Depress magazine release slide knob 84 (Fig. 2.6) and remove protective cover 91 over the pressure pads.
- 1.2 Turn the magazine cover locking handle anticlockwise and remove the cover.
- 1.3 Grasp guide rollers 33, 70 (Fig. 2.4) and, pulling them away from the right-hand wall of the magazine, slide the groups of rollers 33, 34 and 59, 70 away from the sprocket.
- 1.4 Place a roll of film wound on a standard spool centre on feed spool holder 36 so that as the free end is drawn downwards the emulsion-coated side is towards the forward edge of the magazine. Ensure that the roll of film is flat and tightly wound. (Rolls wound with the emulsion either inwards or outwards may be used.)
- 1.5 Raise and turn the upper locking catch. Hold the upper light-trap seal open and pass the end of the film through the slit at the upper end of the pressure pad plate. Release the light-trap seal and restore the locking catch to its normal position.
- 1.6 Grasp the end of the film and draw a length of about thirty inches out of the magazine. Raise and turn the lower locking catch and, holding the lower light-trap seal open, pass the end of the film back into the magazine through the slit at the lower end of the pressure plate. Restore the locking catch to its normal position.
- 1.7 Fit the length of film between the feed spool and the upper light-trap seal under roller 35 and on to the teeth of the sprocket below the pair of guide rollers 34. Slide the upper group

of rollers into position against the sprocket so as to retain the film in position.

- 1.8 Determine the length of the loop of film outside the magazine by placing a finger level with the top of the forward-projecting front edge of the magazine and drawing the film in through the lower slot so that it is taut over this finger. Then fit the film on to the teeth of the sprocket above the pair of guide rollers 59 and slide the lower group of rollers against the sprocket to retain the film in position.
- 1.9 Place a spool centre on the take-up spool holder 44. Fit the end of the film into the slit of the spool centre, and turn the take-up spool spindle anticlockwise (as viewed from the left-hand side of the magazine) until the surplus film between the sprocket and the take-up spool spindle is tightly wound on to the spool centre.
- 1.10 Replace the magazine cover and turn the magazine cover locking handle clockwise to lock the cover in position. Check that it is secure.

The cover will not fit on to the magazine body unless the groups of guide rollers 33, 34 and 59, 70 are in their correct working positions close to the sprocket, and their spring-loaded locking pins properly home. If difficulty is encountered in fitting the cover, do not use force, but check the rollers.

- 1.11 By means of a finger, hold the loop of film outside the magazine against a central point on the pressure pad plate, dividing the loop into two equal parts. Maintaining the finger pressure, feed each of the two loops of film so formed through the pressure pad plate slot from which it emerges into the interior of the magazine.
- 1.12 If the magazine is not required for immediate use, re-fit the protective cover over the pressure pads.

2. To Fit the Magazine to the Camera

- 2.1 Grasp the raised lug on the aperture-plate cover locking bar and the adjacent grip on the

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cover between finger and thumb; squeeze lug and grip together to release the locking bar from the magazine fixing posts, and remove the cover from the camera.

- 2.2 Depress the knob 84 (Fig. 2.6) of the magazine release slide, and remove the protective cover over the pressure pads.
- 2.3 Pull the strip of film now revealed and draw as much film as possible from the magazine through both slits. Then carry out operation 1.11.

that the magazine fixing posts enter the appropriate holes in the forward wall of the magazine. Apply slight pressure, so that the blades of the magazine release slide are forced upwards by the conical tips of the magazine fixing posts and then fall into place in the slots of the posts to retain the magazine in position.

- 2.5 Apply (moderate) sideways pressure to the rear of the magazine to check that it is firmly attached to the camera.

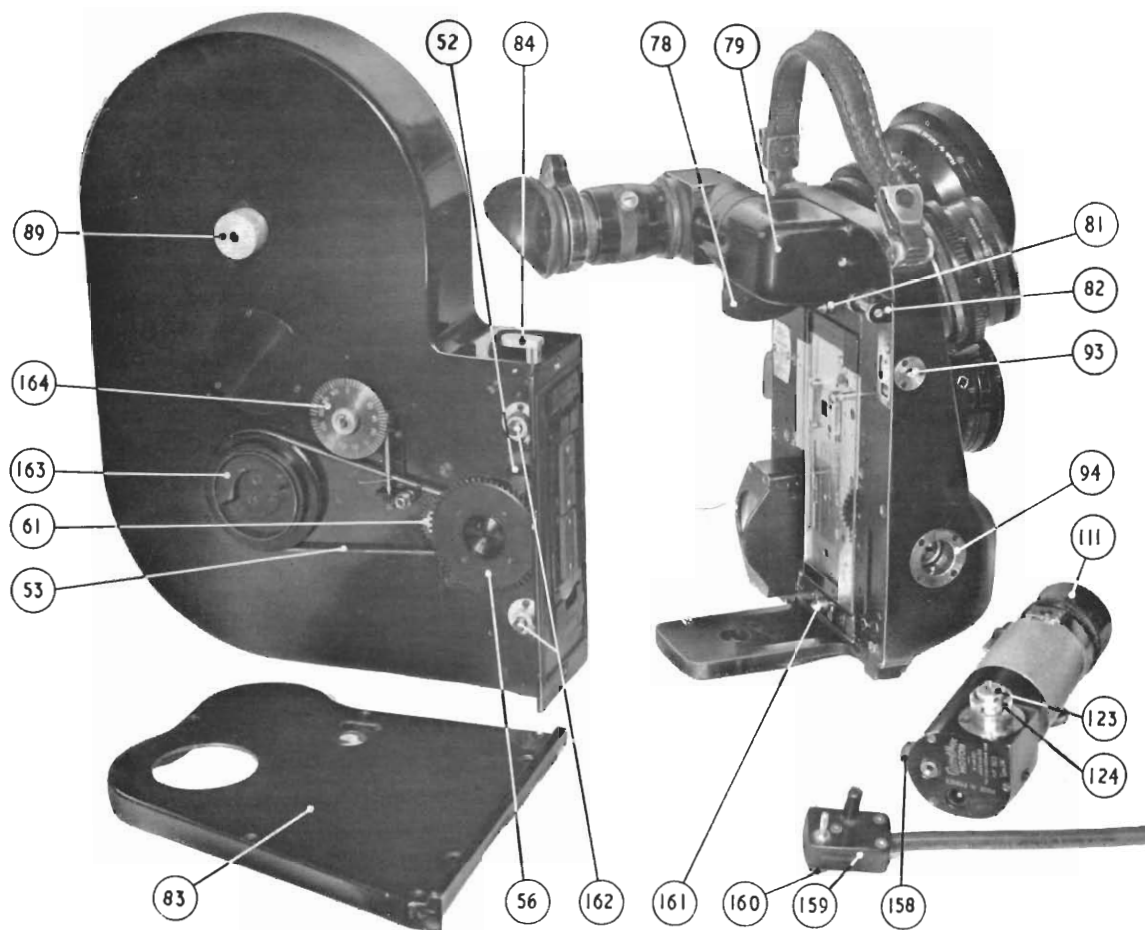


Fig. 4.1. Camera, with motor and 16-mm magazine shown detached

NOTE:—Operation 2.3 is precautionary only, and may be omitted in the event of operational pressure.

- 2.4 Grasp the lower front region of the camera housing in the left hand, and the rear edge of the magazine in the right. Fit the two together, and locate them with the aid of the magazine locating bracket 78 (Fig. 4.1) so

3. To Fit the Motor to the Camera

- 3.1 Remove the dust-excluding plug (if present) from the bayonet receptacle 95 (Fig. 4.1).
- 3.2 Holding the motor in a vertical position with the end carrying bayonet-fitting projection 124 downwards, insert the projection into receptacle 94 and swing the upper end of the

motor towards the rear of the camera until the studs on the inner surface of the receptacle can be felt to enter the slots in the wall of the projection. Then, thrusting the motor towards the camera housing, swing the upper end forward until the tip of the motor locking screw 102 (Fig. 2.6) is adjacent to the tapped insert 93 (Fig. 4.1) in the camera housing. Engage the screw with the insert and tighten it.

3.3 Couple the hybrid connector 159 at one end of the battery lead with its mating pin and socket in the lower end-cap of the motor, and tighten the knurled screw 160 into the pin of the connector to expand the pin and make it grip the socket.

3.4 Couple the Cannon connector at the other end of the battery lead with the corresponding connector on the battery box.

4. To Fit Lenses to the Turret

- 4.1 Turn the dust cover in one of the lens mount receptacles of the lens turret anticlockwise, and withdraw it.
- 4.2 Take the lens which is to be fitted, remove the rear protective cap from the lens mount, and inspect the rear of the mount. Note that on one side of it there is a projecting tongue extending round a 50-degree arc of the rear edge of the mount, and on the opposite side a pair of smaller tongues which are separated by a gap and together extend round a similar arc. Note also that the rear end of the interior of the lens mount receptacle in the turret there is a rim broken by gaps corresponding to the tongues on the lens mount.
- 4.3 Insert the lens mount into the receptacle so that the tongues on the mount enter the gaps in the internal rim of the receptacle. The rearmost knurled ring 1 (Fig. 1.1) of the lens mount should then lie immediately against the forward edge of the receptacle. Grasp this ring *and not any other part of the lens mount* and turn it clockwise to lock the mount in position in the turret.
- 4.4 Remove the forward protective cap from the lens mount.

5. To Remove Lenses from the Turret

- 5.1 Grasp the rearmost knurled ring 1 of the lens mount (that immediately against the forward end of the lens mount receptacle of the turret) and turn it anticlockwise to unlock the mount.

- 5.2 Insert a dust cover in place of the lens.

6. To Adjust the Focus of the Viewfinder Eyepiece

- 6.1 Remove the dust cover or lens mount from the lowermost receptacle of the lens turret.
- 6.2 Turn the inching knob 5 (Fig. 1.1) until the mirrored area of the shutter, seen through the empty lens mount receptacle, covers the aperture of the camera gate (i.e., until the shutter is closed).
- 6.3 Swing the pivoted plate 143 (Fig. 2.10) carrying the rubber eye piece 144 of the viewfinder eyepiece to open the internal shutter, and lock the plate in position against the pressure of its spring by means of the locking catch 145.
- 6.4 Loosen the knurled clamping sleeve on the screw 142 of the eyepiece focus ring 146, and adjust the focus of the eyepiece by rotating the focus ring to obtain the sharpest possible image of the engraved pattern on the ground glass. Retighten the clamping sleeve.
- 6.5 Re-fit the lens mount or dust cover to the lens turret.

7 To Adjust the Focus and Aperture of a Lens

- 7.1 Adjust the focus of the viewfinder eyepiece, as described in 6 above.
- 7.2 Adjust the focus of the lens by rotating the middle ring 2 (Fig. 1.1) of the three on the lens mount.

This ring may be either knurled or toothed, the toothed type being fitted to enable the lens mount to be used in the Double Film Camera (Instruction F.1). When the knurled type of ring is fitted, pairs of metal ears 8 (Fig. 3.1) are screwed to it to provide for greater ease of manipulation when the camera is operated hand-held and the focus adjusted while the scene is viewed through the lens by means of the reflex shutter viewfinder. If nothing is seen, the shutter may be open, and can be closed by turning the inching knob. The focus ring is calibrated, and the scale can be read against an engraved mark forward of the ring on the lens mount.

- 7.3 Adjust the aperture of the lens by rotating the forwardmost knurled ring 9 on the mount. This ring is calibrated, and can be read against the same mark as is the focus ring.

8. To Fit the Sunshade

The Cameflex tripod has provision for the sunshade; if the camera is to be hand-held or used

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Section 4

with any other tripod, it must be mounted on the wedge plate (page 2.15).

- 8.1 Stand the camera on the platform of the tripod or wedge plate so that the wedge-shaped dovetailed projection from the base plate of the camera lies in the corresponding recess of the platform. Then push the camera forward so that the dovetailed edges of the base plate and platform engage, and the spring-loaded plunger 155 (Fig. 2.11) overrides the latch 154 and locks the two together.
- 8.2 Screw the metal rods 73 (Fig. 2.4) into the sockets 156 (Fig. 2.11) of the wedge plate or tripod.
- 8.3 If one of the smaller-sized lens mounts is to be used, fit the sunshade ring into the rear opening of the rotatable filter-holder receptacle of the sunshade.
- 8.4 Set the aperture of the lens in the taking position, as described in 7 above.
- 8.5 Fit the sunshade on to the metal rods as shown in Fig. 2.4 and slide it into position against the lens in the taking position. If necessary, loosen the screw 74, adjust the metal frame of the sunshade laterally and re-tighten the screw on the guide at the right-hand end of the transverse bar.

9. To Insert Filter-holders into the Filter-holder Receptacles of the Sunshade

Standard three-inch square filters can be inserted into either of the filter-holder receptacles, as follows:

- 9.1 Raise the pivoted sheet-metal flap which covers the slot on the top edge of the receptacle; insert the filter-holder, and replace the flap.

10. To Sight the Camera (Hand-held Operation)

- 10.1 Adjust the focus of the viewfinder eyepiece as described in 6 above.
- 10.2 Fit the required lens(es), the motor, a loaded magazine, and if necessary the wedge plate and sunshade to the camera, as described in 4, 3, 2 and 8 above.
- 10.3 Set the aperture of the lens in the taking position, as described in 7 above, if this has not already been done as part of operation 8.
- 10.4 By means of the knurled knob 89 and the finger grips on the pulley 163 (Fig. 4.1), check the feed and take-up spools of the magazine for tightness of wind, as a precaution against possible film breakage due to 'snatching'.

- 10.5 Grasp the camera motor firmly in the right hand, and supporting the camera housing in the palm of the left hand, raise the camera to eye level. Rest the magazine on the right shoulder, and apply the right eye to the eye piece of the viewfinder.
- 10.6 Aim the camera at the scene to be photographed, and adjust the focus of the taking lens as described in 7 above, using the fingers of the left hand.
- 10.7 Start the motor by moving the switch lever 158 through the *Start* position to the *Run* position, using the little finger of the right hand.
- 10.8 Observe the film speed as indicated by the tachometer. If necessary, adjust the control cover 111 of the motor (using the index finger of the right hand to disengage the spring-loaded locking blade 114 (Fig. 5.2) and the thumb to turn the control cover) until the correct speed of 25 frames per second is obtained.

11. Tripod-mounted Operation

- 11.1 Carry out operation 8.1 above, mounting the camera on the wedge plate if a tripod of other than the Cameflex type is to be used.
- 11.2 If the sunshade is required, carry out operations 8.2 to 8.5.
- 11.3 Adjust the focus of the viewfinder eyepiece as described in 6 above.
- 11.4 Fit the required lens(es), the motor, and a loaded magazine as described in 4, 3 and 2 above.
- 11.5 Carry out operations 10.3 and 10.4.
- 11.6 Apply the right eye to the eye piece of the viewfinder, aim the camera at the scene to be recorded and adjust the focus of the taking lens as described in 7 above.
- 11.7 Start the motor by moving the switch lever 158 (Fig. 4.1) through the *Start* position to the *Run* position.
- 11.8 If the nature of the scene being photographed is such that it is not necessary to observe it constantly through the viewfinder, close the internal shutter of the viewfinder eyepiece by releasing the locking catch 145 (Fig. 2.10) so that the pivoted plate 143 swings to the closed position under the action of its spring.

12. 16-mm Working

- 12.1 Load the 16-mm magazine as described in 1 above, with the following differences:

- (a) If daylight-loading spools are to be used, pull the core adaptors 37 (Fig. 2.4) off the spool spindles after carrying out operation 1.3, and disregard the final sentence of 1.4.
 - (b) Ignore the references to locking catches in 1.5 and 1.6, because these catches are not fitted to the 16-mm magazine.
 - (c) If daylight-loading spools are to be used, proceed as follows instead of carrying out operation 1.9: Place an empty daylight-loading spool on the take-up spool spindle. Fit the end of the film into the slit in the hub of the spool, and turn the take-up spool spindle anticlockwise (as viewed from the left-hand side of the magazine) until the surplus film between the sprocket and the take-up spool is tightly wound on to the spool.
 - (d) After carrying out operation 1.10, set the footage indicator dial on the right-hand wall of the magazine to zero by means of its knurled knob.
- 12.2 Withdraw the gelatine-filter-holder 108 (Fig. 2.6) from its slot in the camera housing.
 - 12.3 Unscrew the knurled retaining screw by which the housing 104 containing the 16-mm gate and holder is secured to the assembly plate of the camera. Remove the housing and take the gate 25 and gate-holder 30 from it.
 - 12.4 Fit the 16-mm gate into the aperture of the aperture plate, as shown in Fig. 2.1. (Note that the spring-loaded film guide should be on the right-hand side.)
 - 12.5 Insert the 16 mm-gate-holder into the slot formerly occupied by the gelatine-filter-holder, with the upturned flap 31 (Fig. 2.6) at its left-hand end turned towards the rear of the camera.
 - 12.6 Lay the gelatine-filter-holder in the housing 104, and refix the latter to the assembly plate of the camera.
 - 12.7 Proceed in accordance with 10 above. When using the viewfinder, remember that only that part of the image enclosed by the rectangle engraved on the ground glass falls on 16-mm film.
- 13. To Adjust the Exposure Angle**
- This operation is not normally necessary, because in BBC practice a constant exposure angle of 180 degrees is used. If, in exceptional circumstances, the exposure angle must be altered, the procedure is as follows:
- 13.1 Remove the lens mount or dust cover from the lowermost receptacle of the lens turret.
 - 13.2 Turn the inching knob 5 (Fig. 2.1) to rotate the shutter and bring the screw 130 (Fig. 2.10) into view close to the bottom side of the receptacle.
 - 13.3 Preventing the shutter from rotating by depressing the knob 6 (Fig. 2.1) marked *Shutter*, loosen the screw 130 by one half-turn.
 - 13.4 If necessary, release the knob 6 and turn the inching knob to bring the leading edge of the shutter and the calibrated shutter extension into view.
 - 13.5 Depress and turn the knob 6 to move the shutter extension until the leading edge of the shutter indicates the required exposure angle on the scale of the shutter extension.
 - 13.6 If necessary, release the knob 6 and turn the inching knob to bring the screw 130 into view.
 - 13.7 Preventing the shutter from rotating by depressing the knob 6, re-tighten the screw 130.
 - 13.8 Replace the lens mount or dust cover in the lens mount receptacle of the turret.

SECTION 5

MAINTENANCE

Dismantling the Camera

1. To Remove the Assembly Plate

The assembly plate must not be removed unless a camera focus auto-collimator or some other means of checking the accuracy of focus on re-assembly is to hand. The procedure is as follows:

- 1.1 Unscrew the knurled-headed screw 102 (Fig. 2.6) close to the upper end of the motor. Swing the upper end of the motor towards the rear of the camera as far as it will go, and remove the motor by withdrawing the bayonet projection on the side of the lower end from its receptacle in the camera housing.
- 1.2 Withdraw the four small screws by which the cover 79 is secured to the objective bracket of the viewfinder, and remove the cover.
- 1.3 Withdraw the four cheese-headed screws by which the viewfinder is secured to the assembly plate, and remove the viewfinder.
- 1.4 Withdraw the four countersunk screws by which the tachometer cover is secured and remove the cover.
- 1.5 Remove the detachable housing 104 containing the 16-mm gate and gate-holder from its stowed position to the right of the assembly plate.
- 1.6 Withdraw the nine countersunk screws distributed around the edge of the assembly plate, that immediately to the right of the manufacturers' label, and that immediately below the magazine brake releasing pin 16 (Fig. 2.1).
- 1.7 Turn the upper of the two knurled knobs on the left-hand side of the camera housing (6, Fig. 1.1) until the word *Shutter* engraved on it is at either its top or its bottom position.
- 1.8 Lift out the assembly plate.

2. To Remove the Camera Mechanism

This operation should be attempted only if really necessary. The link by which the transport claw slide 172 (Fig. 5.1) is actuated is permanently pivoted both to the slide and to the wheel 174 on the camera mechanism, by which it is driven. Hence the slide and the mechanism housing must be

removed together, great care being taken not to strain either slide or link. However, the slide can only be released after the removal of components to which access is hindered by the presence of the rest of the mechanism, and this renders the operation somewhat difficult. The procedure is as follows:

- 2.1 Carry out operations 1.1 to 1.8.
- 2.2 Withdraw the screws tapped into the fibre inserts at the extremities of the three limbs 134, 150, 173 (Figs. 2.10, 5.1) of the camera mechanism housing.
- 2.3 Withdraw the two countersunk screws securing the female member 179 (Fig. 5.1) of the motor clutch to the integral steel gear 178 of the drive shaft, and remove the clutch member.
- 2.4 From the rear side of the assembly plate (i.e., the side opposite to that on which the camera mechanism is mounted), push out the pin 24 (Fig. 2.1) locating the upper left-hand limb 134 (Fig. 5.1) of the camera mechanism housing.
- 2.5 Remove the two cheese-headed screws securing the tachometer 109 (Fig. 2.6) to the assembly plate and remove the tachometer.
- 2.6 Turn the mechanism to bring the mirror shutter to its lowest position.
- 2.7 Lifting the upper right-hand limb 150 (Fig. 2.10) of the camera mechanism housing slightly away from the assembly plate, swing the housing clockwise about the pin locating its lowest limb 173 (Fig. 5.1) to unmesh the teeth of the gears on the drive shaft from those carried by the fibre block 177. (This movement should leave the steel gear 178 of the drive shaft over the fibre block, between the two gears on it.)
- 2.8 Remove the fibre block 177 by withdrawing the two cheese-headed screws by which it is secured and *gently* levering up the two ends alternately until it is just clear of its locating pins, exerting as little pressure as possible on the drive shaft in the process. The block, with its gears, can then be manoeuvred towards

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- the top and to the right of the assembly plate, and lifted away.
- 2.9 Withdraw the small countersunk screw securing the lower magazine fixing post 161 (Fig. 4.1) to the assembly plate. Lift the lowest limb 173 (Fig. 5.1) of the camera mechanism housing *slightly* away from the assembly plate to allow the locating pin to clear its hole in the plate. Move the limb of the housing slightly towards the left-hand side of the plate, to allow the magazine fixing post to be lifted away.
 - 2.10 Insert scraps of film between the transport claw slide 172 and the aperture plate, so as to prevent the claws from entering any of the slots or holes in the plate.

- 3.3 Push out the pin which secures to the drive shaft the flanged sleeve 167 (Fig. 5.1) carrying the brass crown wheel 168 and the helical gear 166, and slide the sleeve off the shaft.
- 3.4 Remove the washer between the crown wheel and the left-hand ballrace carrying the drive shaft.
- 3.5 Remove the anti-reflection mask 151 (Figs. 2.3, 2.10) from the mechanism by withdrawing the two screws securing it to the upper limbs 134, 150 (Fig. 2.10) of the camera mechanism housing.
- 3.6 Withdraw the three cheese-headed screws securing together the two parts of the camera mechanism housing.
- 3.7 Gently separate the two parts of the housing,

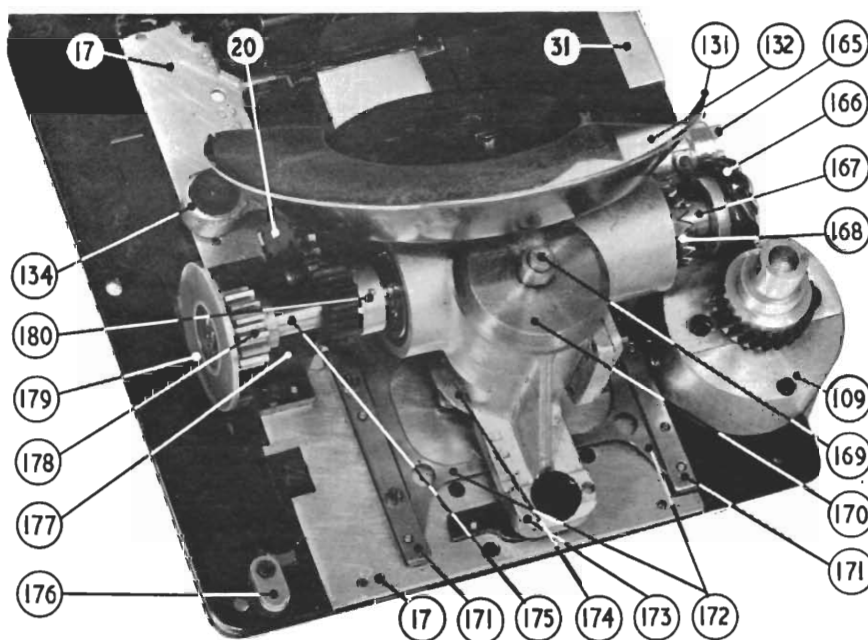


Fig. 5.1. Assembly plate viewed from front, showing camera mechanism

- 2.11 Keeping the camera mechanism housing as close as possible to the assembly plate, move the mechanism downwards, until the transport claw slide is clear of its guide strips 171.

3. To Open the Camera Mechanism Housing

- 3.1 Carry out operations 2.1 to 2.11.
- 3.2 Withdraw the two small countersunk screws securing the crown-wheel-locking tooth to the spring-loaded sleeve on the shutter adjustment shaft, and remove the tooth.

and slide the left-hand part off the end of the drive shaft.

The helical gearing coupling the drive, shutter and transport shafts is now revealed for inspection.

4. To Dismantle the 16-mm Magazine

- 4.1 Remove the magazine cover.
- 4.2 Unscrew the tapped bushes 162 (Fig. 4.1) securing the pressure pad plate and remove the plate.
- 4.3 Pull off the spool adaptors 37 (Fig. 2.4).

- 4.4 Withdraw the twelve countersunk screws securing the right-hand steel plate and remove the plate.
- 4.5 Withdraw the two countersunk screws securing the bottom film guide 42, and remove the guide.
- 4.6 Withdraw the two countersunk and two flat-headed screws securing the guide roller panel to its supporting pillars.
- 4.7 Withdraw the red-painted screw 69 (Fig. 2.7) from the left-hand end of the sprocket spindle.
- 4.8 Loosen the grub screw securing the sprocket-retaining boss 41 to the sprocket spindle, and remove the boss.
- 4.9 Lift out the washer between the boss and the sprocket on the sprocket spindle.
- 4.10 Carefully lift out the guide roller panel, sliding the sprocket, on its extension 46, from the sprocket shaft in the process.
- 4.11 Lift out the washer on the sprocket spindle between the sprocket extension and the right-hand wall of the magazine.
- 4.12 Withdraw the two countersunk screws securing the rear stripper to the guide roller panel, and the single screw securing the forward stripper to the panel.
- 4.13 Withdraw the four shoulder screws securing the groups of guide rollers 33, 34 and 59, 70 (Fig. 2.4) to the guide-roller panel.
- 4.14 Withdraw the three countersunk screws securing the fibre gear 48 (Fig. 2.7) to the extension of the sprocket, pull off the gear, and lift the sprocket out of its hole in the guide-roller panel.
- 4.15 Withdraw the six countersunk screws securing the cast protective cover 83 (Fig. 4.1) over the external mechanism of the magazine.
- 4.16 Withdraw the four countersunk screws securing the gear 56 to the pulley on the sprocket spindle, and remove the gear.
- 4.17 Remove the spring-cord belt from the pulleys and slide the sprocket spindle from its bearing.
- 4.18 Knock out the pin securing the fibre gear 61 (Fig. 2.7) to the intermediate shaft 62 of the sprocket gearing, pull off the gear, and slide the shaft, with the steel gear 67 mounted on it inside the body of the magazine, from its bearing.
- 4.19 Withdraw the flat-headed screw concentric with the knurled re-setting knob of the footage indicator dial 164 (Fig. 4.1), and lift the dial and the final gearwheel of the footage indicator gear train off their retaining pin.

A slit bush attached to the dial fits into the bush of the gearwheel, forming a friction coupling; the two can be pulled apart.

5. *To Dismantle the Motor*

- 5.1 If necessary, remove the motor from the camera by unscrewing the knurled-headed screw 102 (Fig. 2.6), swinging the upper end of the motor towards the rear of the camera as far as it will go, and withdrawing the bayonet projection 124 (Fig. 4.1) from its receptacle 94 in the camera housing.
- 5.2 Withdraw the three countersunk screws securing the bottom plate 127 (Fig. 5.2) of the lower end-cap, and remove the plate.
- 5.3 Withdraw the three countersunk screws securing the bayonet fitting 124 to the lower end-cap 122. Remove the bayonet fitting, with its shaft and gearwheel, and lift out the brass shim 125 under the flange of the bayonet fitting.
- 5.4 Withdraw the two countersunk screws securing the switch 95 to the lower end-cap.
- 5.5 Withdraw the four countersunk screws securing the lower end-cap to the motor body 117. Slide off the end-cap, taking care that the switch, which is attached to the motor body by its leads, does not become jammed in the cap. The brushes and commutator are now accessible.
- 5.6 Withdraw the large-headed screw in the centre of the rotatable control cover 111 at the upper end of the motor, and pull off the cover. The winding 110 (Fig. 2.8) of the variable resistor forming the speed control of the motor is now revealed.
- 5.7 Withdraw the two countersunk screws securing the knurled outer shell 98 of the motor body, and slide off the shell over the lower end of the motor.
- 5.8 Withdraw the two countersunk screws securing the upper end-cap 101 to the motor body.
- 5.9 Remove the two screwdriver-slotted nuts 97 at the lower ends of the threaded rods by which the motor is held together, and lift off the washer and electrical connections under them.
- 5.10 Remove the nut by which the lead of the right-hand brush is connected to its holder, and by which an internal lead 99 to the speed-control resistor is also connected; free the latter lead.
- 5.11 Pull the upper end-cap away from the motor body, drawing out in the process the two

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threaded rods 100 and the lead 99.

- 5.12 Withdraw the screw securing one of the switch leads and one of the field winding leads to the left-hand brush-holder.
- 5.13 Pressing the upper end 115 of the motor shaft, push the fibre brush-holder support 96 out of the end of the motor body, taking the utmost care that the flexible leads to the brushes are not damaged in the process. Lift the armature and the brush-holder support clear of the motor body, threading the field winding leads 118 through their holes in the brush-holder support.

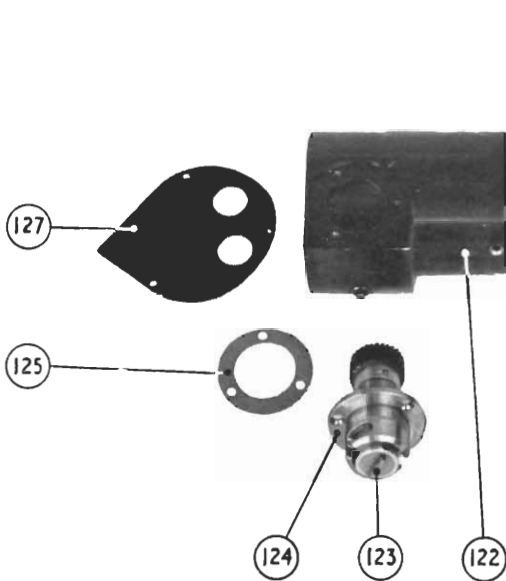


Fig. 5.2. Motor, with Lower End Cap removed

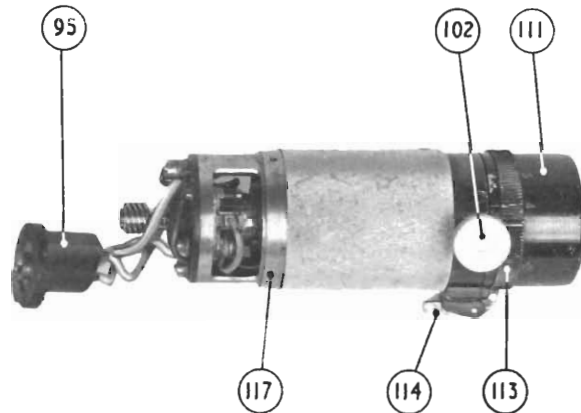
- 5.14 Grip the collar of the worm gear 120 on the motor shaft to prevent the shaft from turning, and withdraw the screw 121 in the end of the shaft by which the worm gear is secured. Pull off the worm gear.
- 5.15 Knock out the pin 119 through the motor shaft by which the worm gear was located, and lift off the washer under it.
- 5.16 Slide the motor shaft out of its ballrace in the brush-holder support.

To re-assemble the motor, reverse the above procedure, taking particular care that the brushes are not damaged when the armature is slid back into position, and that when re-assembly is completed, none of the internal leads is fouled by rotating parts.

Lubrication

Apply Esso Clock Oil 8119 to the following points at least once during each month of use:

- (a) The oiling holes of the camera, indicated by arrows in Fig. 5.3. The two holes positioned centrally in the film path give access to the pivots of the link coupling the transport claw slide to the transport shaft; turn the mechanism until these pivots are visible through the holes before applying the oil.
- (b) The transport claws. Turn the mechanism to bring them to their lowest point of travel, and apply the oil through the slots 22, 23 (Fig. 2.1)



- to the bearings of the claws on the shaft supporting them.
- (c) The axial bores of the sprocket and spool spindles of the magazines. Remove the red-painted countersunk screws tapped into the left-hand ends of the spindles to obtain access to these bores.
- (d) All guide rollers in magazines. Remove them, and oil their spindles. Always use the minimum quantity of oil.

In addition to the foregoing regular lubrication, apply clock oil to the following parts occasionally, when they show signs of stiffness:

- (e) The sliding surfaces of the groups of rollers 33, 34 and 59, 70 (Fig. 2.4) in magazines. Remove these groups of rollers for the

purpose (operation 4.13) and check that the sliding bases on which the groups of rollers are mounted are flat.

- (f) The spindles carrying the two light seals of the pressure pad plates of magazines. Check the necessity for lubricating these by threading a length of film through the slits at the ends of a pressure pad plate, as when loading the magazine normally, and pulling it backwards and forwards; the light seals should ride freely on the film. If they do not,

which might score the plate and cause the film to be scratched. This treatment tends to prevent the accumulation of a deposit of emulsion on the aperture plate. If such a deposit does appear, remove it with a matchstick.

Remove dirt and particles of film from the transport claws by means of a small brush applied to the slots through which the claws work.

Clean the mirror shutter only when essential. Remove dust with a camel-hair brush and then wipe the mirrored surface lightly with a clean Selvyt

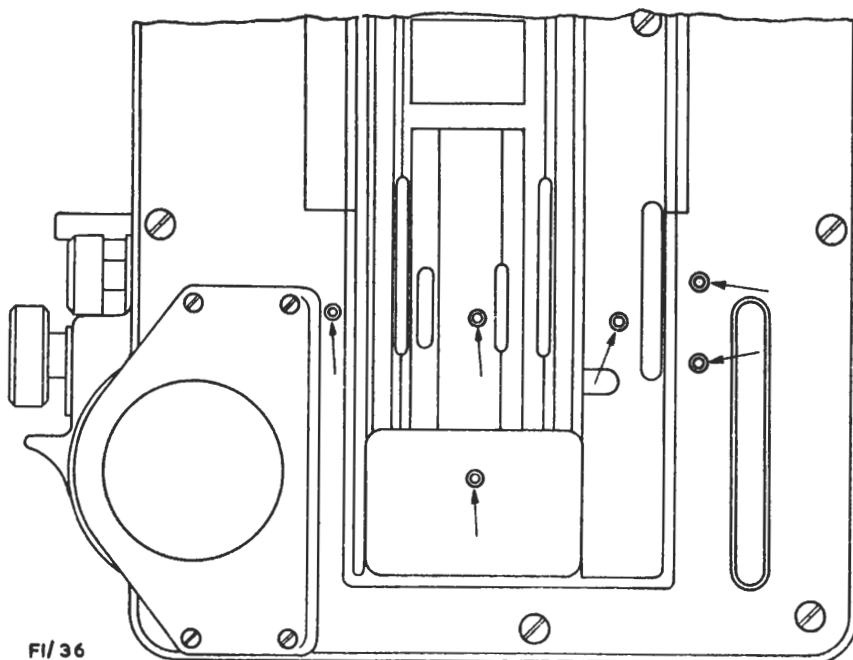


Fig. 5.3. Lower portion of camera, viewed from rear, showing oiling points

remove and oil the spindles on which they are mounted, taking care not to lose any of the washers on the spindles.

The motor does not normally require lubrication, but when it is dismantled for any other purpose the opportunity can be taken to smear the gears 120, 126 (Fig. 2.8) lightly with melted tallow.

Cleaning

Clean the aperture plate of the camera each time the magazine is changed by rubbing the plate with a piece of rag (preferably washed linen) which should be kept very lightly oiled for the purpose and stored in an airtight tin. The rag should be renewed frequently to minimise the risk of its gathering grit

cloth. No other material must be used.

To clean the lower surface of the ground glass, remove the lens from the receptacle in the taking position of the lens turret and turn the mechanism until the ground glass is accessible through the receptacle. Wipe the surface lightly with dry cotton wool. To clean the upper surface, remove the screw plug 7 (Fig. 1.1) and insert a camel-hair brush through the resulting aperture, observing the cleaning process through the viewfinder eyepiece.

Clean the mating surfaces of the lens mounts and the lens mount receptacles of the lens turret. Before re-fitting the lenses, check that the turret slides and rotates freely on the lens turret post, clean the

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contiguous surfaces of the rear of the turret and the camera housing, and ensure that no foreign matter is trapped between them.

Clean the interiors of magazines occasionally, removing the pressure pad plates for the purpose by lifting the locking catches (35-mm magazines only) and turning them through 90 degrees, then unscrewing the tapped bushes 162 (Fig. 4.1).

Avoiding Internal Scatter

The Cameflex camera is especially prone to internal scatter when used with 16-mm film, because the 16-mm aperture is formed by masking the 35-mm aperture, and light from the lens which would form the outer areas of a 35-mm frame falls on the front surface of the 16-mm gate. Unless the matt black finish of this surface, the lens mount and all nearby parts of the camera interior is carefully preserved, scatter will occur and picture contrast will be degraded. These surfaces should not be made shiny by being rubbed, or allowed to become oily. If the matt surface does become blemished, it should be re-touched with Berlin black.

Routine Checking

Where applicable, the following checks and tests should be carried out using both 16-mm and 35-mm film.

Run a length of film through the camera and inspect it carefully to ensure that no scratching is taking place due to excessive deposits of emulsion or wear of surfaces with which the film is in contact. Spin the magazine spool spindles manually to check that there is slight friction in the feed spool spindles and that the take-up spindles run freely. Disengage the sprocket-spindle locking lever 52 (Fig. 4.1) by hand when checking take-up spindles. After carrying out any work on the camera, check the accuracy of focus by the following rough method:

- (i) Lace the camera with ground stock.
- (ii) Using the viewfinder, focus a lens (with its aperture set at maximum) on an object at a distance of at least two hundred feet.
- (iii) Open the shutter and re-focus the lens on the object to obtain a sharp image on the ground stock.

The images obtained in operations (ii) and (iii) should be of equally good definition, and each should be obtained with a lens focus setting of infinity.

- (iv) Repeat the process, using an object at a distance of about ten feet, and checking

that the optimum focus is obtained at the correct lens focus setting.

NOTE:—This method is *not* adequate after any work involving the removal of the assembly plate from the camera housing.

Performance Checks

Steadiness Test

Unsteadiness in either the vertical or the horizontal direction should not exceed 0.1 per cent of the relevant picture dimension, as measured with the aid of the Branson Steadiness Test Object.

This test object is a chart showing two main scales, one vertical and the other horizontal, each with twenty divisions of two per cent of the chart dimensions. Alongside each main scale is a vernier scale of nineteen divisions so that the chart can easily be read to 0.105 per cent of its height or width.

Means are provided for blanking off either the main or the vernier scales. Film is exposed to one set of scales and then rewound in the camera without disturbing the lacing.* The film is then run a second time through the camera, when it is exposed to the other set of scales.

When the double-exposed film is developed and projected, unsteadiness is shown as relative movement between the two scales and can be read directly as a percentage.

Unsteadiness in the projector affects both scales equally and is eliminated.

Lens Scaling

The accuracy of the lens scaling depends on the correctness of the distance of the lens from the plane of the camera gate; when the lens scaling indication is infinity, a distant object should be brought into sharp focus on the film. This should be checked by means of an auto-collimator (see Appendix B, Instruction F.1) and by practical tests at measured distances after any work involving the removal of the assembly plate from the camera housing or the disturbance of the lens mounting arrangements.

If it is thought that the lens scaling of a mount is incorrect, no attempt should be made to adjust it;

*Where this is not possible, the film should be marked before removal from the camera so that it can be relaced with an identical relationship to the moving parts of the transport mechanism. This is of special importance in tests with 35-mm film, where there are several perforations per frame.

the lens mount should be returned to the Camera Maintenance Section of Television Film Studios, Ealing, London.

Photographic Resolving Power

The resolution of each lens should be not worse than 40 lines/mm at any part of the frame area, assessed by microscopic examination of negative images obtained under the following test conditions:

Test object: 35-mm or 16-mm BBC Resolution Chart for use with transmitted light. (When the image of this is correctly framed in the camera gate, direct resolution readings in lines/mm are obtained.)

Stock: Ilford FP3.

Lens aperture: $f/2$.

Shutter exposure angle: 180 degrees.

Illumination: Transmitted light adjusted to give a relative brightness reading of 2 on a Weston Master II exposure meter.

Processing: Develop to gamma = 0.6.

Under these conditions a negative density of 0.7 should be obtained, but to allow for slight variations of stock or processing additional exposures should be made with the illumination slightly greater and slightly less than the theoretically optimum value prescribed above.

D.E.H. 5/60

APPENDIX A

PARTS LIST

NOTE:—The nomenclature of this Parts List is that adopted for use in the present Instruction, and is not necessarily recognised outside the BBC. Spare and replacement parts should always be ordered by number to avoid confusion.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 1	1	Assembly plate		
CAM 1-E	1	Assembly plate, assembled		With aperture plate, etc., fitted.
CA 2	3	Fibre washer		In limbs of camera mechanism housing CA 5-25; inserts receive screws by which housing is mounted.
CA 3	3	Fibre insert		
CA 5-25	1	Camera mechanism housing	{ 134 150 173	
CA 5-25-E	1	Camera mechanism housing, assembled		Complete camera mechanism, less mirror shutter CA 6-B, shutter extension CA 7-B and mounting plate CA 11.
CA 6-B	1	Mirror shutter	132	
CA 6-BE	1	Mirror shutter, assembled		With counterbalance weight CA 20-B and protective shield CA 21-B fitted.
CA 7-B	1	Shutter extension	131	Thin steel shell behind shutter, marked with degree scale showing exposure angle.
CA 7-BE	1	Shutter extension, assembled		With counterbalance weight CA 22-B fitted.
CA 8	1	Bevel gear for mounting plate CA 11		
CAM 9	1	Aperture plate	17	

Instruction F.6
Appendix A

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 9-Ter	1	Light trap strip		Screwed to CAM 9, near bottom edge, to form part of the inner side of a rectangular groove mating with a corresponding ridge on the magazine.
CA 10	1	Shutter shaft		With disk to carry mirror shutter.
CA 10-E	1	Shutter shaft, assembled		With two ballraces.
CA 11	1	Mounting plate for 7-B		Annular plate, carrying CA 7-B and CA 8.
CA 12	1	Retainer for CA 11		Screwed to CA 10, has flange to retain CA 7-B and CA 11, and two radial cuts forming tongue to lock CA 11.
CA 12-Bis	1	Special screw for CA 12	130	Tapped into tongue of CA 12, tightens it against disk on CA 10 to lock CA 11.
CA 15	3	Ballraces, 12-mm		At both ends of shutter shaft CA 10 and rear end of transport shaft CA 35.
CA 16	3	Spacers		On shutter shaft CA 10, inside transport mechanism housing.
CA 17	1	Fibre helical gear		On shutter shaft CA 10, inside transport mechanism housing.
CA 19	1	Ballrace retainer for shutter shaft		Tapped into opening in camera mechanism housing, locked by grubscrew CA 19-V.
CA 19-V	1	Grubscrew for CA 19		
CA 20-B	1	Counterbalance weight for shutter CA 6-B	129	
CA 21-B	1	Protective shield for shutter CA 6-B		Of thin steel; screwed to rear of mirror shutter.
CA 22-B	1	Annular brass plate		Cut as required to form counterbalance weight of shutter extension CA 7-B.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 24	12	Flat-headed screws		Secure CA 6-B to CA 10 and CA 7-B to CA 11.
CA 26	1	Drive shaft	175	With integral steel gear 178 to mesh with fibre gear wheel CA 50.
CA 26-E	1	Drive shaft, assembled		With all gears and ballraces fitted.
CA 27	2	Insulating bushes for CA 28		Perspex bushes supporting ballraces for CA 26 in camera mechanism housing.
CA 28	1	Ballrace for CA 26		Right-hand side.
CA 29	1	Helical gear		On CA 26, inside camera mechanism housing. Drives gears on shutter and transport shafts.
CA 30	1	Flanged sleeve for helical gear CA 32 and crown wheel CA 36	167	Pinned to CA 26.
CA 32	1	Helical gear	166	Drives tachometer.
CA 34	1	Female member of motor clutch	179	Screwed to end of CA 26.
CA 35	1	Transport shaft	169	With integral disk 174 for link to drive claw slide CAM 350-E.
CAM 35-E	1	Transport shaft, assembled		With ballraces CA 15 and CA 41.
CA 36	1	Crown wheel	168	Mounted on CA 30, engaged by locking tooth CA 99 to lock drive shaft when required.
CA 37	1	Ballrace for CA 26		Left-hand side.
CA 38-39	1	Fibre gear with collar	180	Pinned to drive shaft CA 26, meshes with compound gear CA 46, CA 49.
CA 41	1	Ballrace, 11-mm		On transport shaft, forward end.

Instruction F.6
Appendix A

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 43	1	Flywheel	170	Pinned to transport shaft CA 35, at forward end. In earlier examples of camera, formed a braking surface.
CA 44	1	Bush wheel for CA 46 and CA 49	177	Screwed and pinned to assembly plate, carries CA 46 to CA 50, CA 53 and CA 54.
CA 45	1	Fibre block		
CA 45-P	2	Pins for CA 45	20	Left-hand member of compound gearwheel CA 46-E. Has obliquely-tipped teeth.
CA 46	1	Gearwheel		
CA 46-E	1	Compound gearwheel		Comprises CA 44, CA 46 and CA 49.
CA 47	1	Shaft for CA 50		Push-fit in hole in CA 45.
CA 47-Bis	1	Bearing for CA 47		
CA 48	1	Spacer		On shaft CA 53, between bearing CA 54 and CA 46-E.
CA 49	1	Gearwheel		Right-hand member of compound gearwheel CA 46-E. Has flat-tipped teeth.
CA 50	1	Fibre gearwheel		Pinned to CA 47, meshes with integral gear of drive shaft CA 26.
CA 52	1	Anti-reflection mask	151	Screwed to upper limbs of camera mechanism housing, immediately below aperture.
CA 53	1	Shaft for CA 46-E	151	Push-fit in hole in CA 45.
CA 54	1	Bearing for CA 53		
CAM 62	1	Link for claw slide CAM 350		Couples film transport claw slide CAM 350 to integral disk of transport shaft CA 35.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 63	2	Bushes }		Secure CAM 62 to CA 35 and to film transport claw slide CAM 350.
CA 64	2	Rivets }		
CA 65	2	Claw slide guide strips, rear	171	Nearest to aperture plate; with extra hole for lubrication.
CA 66	2	Claw slide guide strips, middle	171	Narrower than CA 65, CA 67, or CA 68.
CA 67	1	Claw slide guide strip, l.h. front	171	With tapped holes to receive tips of screws.
CA 68	1	Claw slide guide strip, r.h. front	171	With countersunk hole to accommodate head of top screw.
CA 70	1	Retaining plate for gelatine-filter-holder CA 71-E	29	Screwed to front surface of assembly and aperture plates.
CA 71	1	Gelatine-filter-holder slide	108	
CA 71-E	1	Gelatine-filter-holder, assembled		Comprises CA 71, CA 73 and two of CA 75.
CA 73	1	Tab for CA 71	31	
CA 74	1	Retainer for CA 71	133	Complements CA 70 in region of aperture. Has shaped edges to fit closely against shutter.
CA 75	2	Rivets		Secure CA 73 to CA 71.
CA 76	1	Spring clip for gelatine-filter-holder	28	Screwed to CA 70, engages with notch in CA 73.
CA 77	1	Locking clip for gelatine-filter-holder		Retained by plug CA 156, holds gelatine-filter-holder in position.
CA 78-A	1	Manufacturers' label (English)		Riveted to assembly plate.
CA 88	1	Protective cover for tachometer		
CA 89	1	Special screw		Tapped into bearing CA 90 to prevent rotation of sleeve CA98.

Instruction F.6
Appendix A

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 90	1	Bearing for CA 91		Secured in hole in camera mechanism housing by grub-screw CA 90-V.
CA 90-V	1	Grubscrew		
CA 91	1	Shutter adjustment shaft		Shaft by means of which exposure angle of shutter is adjusted. Carries bevel gear CA 93, male member of shutter adjustment clutch CA 94, is spring-biased by CA 92.
CA 92	1	Compression spring		Surrounds CA 91, acts between one end of CA 90 and step in internal diameter of sleeve CA 98.
CA 93	1	Bevel gear for CA 91		Pinned to CA 91; meshes optionally with bevel gear on CA 11.
CA 94	1	Shutter adjustment clutch (male member)	165	Pinned to CA 91.
CA 95	1	Stub shaft of shutter adjustment knob CA 96-A		With integral female member of shutter adjustment clutch.
CA 96-A	1	Shutter adjustment knob (English)	6	
CA 97	1	Bush for CA 96-A		Screwed to camera housing.
CA 98	1	Sleeve for CA 91		Carries crown - wheel - locking tooth CA 99. Prevented from rotating by screw CA 89. Spring-loaded by CA 92.
CA 99	1	Crown-wheel-locking tooth		Screwed to CA 98. Engages (optionally) with crown wheel CA 36 to lock drive shaft.
CA 100	1	Bracket for ground glass	27	
CA 100-E	1	Bracket for ground glass, assembled		With friction spring CA 103 attached by rivet CA 104.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 100-Bis	1	Clip		Secured over right-hand end of CA 100 by two screws tapped into aperture plate. Not present in all examples of the camera.
CA 100-P	2	Pins for CA 100		
CA 103	1	Friction spring		Secured to CA 100 by rivet CA 104. Introduces friction between CA 100 and aperture plate when screws securing former are slackened, in order to facilitate accurate setting-up of ground glass.
CA 104	1	Rivet for CA 103		
CA 105	1	Idle lens shield, l.h.	136	Screwed to upper forward surface of assembly plate.
CA 106	1	Idle lens shield, r.h.	136	With cut-out to accommodate magazine locking post CA 144.
CA 107	1	Prism	137	First prism in viewfinder optical system.
CA 108	1	Holder for CA 107		Screwed to objective bracket CA 110.
CA 109	1	Prism clamping strip		Secures CA 107 in CA 108.
CA 110	1	Objective bracket	141	Screwed to right-hand section of barrel and to assembly plate.
CA 110-P	2	Pins for CA 110		Locate CA 110 on assembly plate.
CA 110-E	1	Objective bracket, assembled		Comprises objective bracket CA 110 and sheet metal cover CA 113.
CA 111	1	Prism	138	Second prism in viewfinder optical system.

Instruction F.6
Appendix A

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 113	1	Cover for CA 110	79	Sheet metal cover for objective bracket CA 110.
CA 116-D	2	Objective lenses		Mounted on prism holder CA 512; one directly, the other on support tube CA 515-Bis.
CA 117	1	Magazine locating bracket	78	Screwed to right-hand section CA 516 of barrel.
CA 119	1	Barrel, left-hand section		Screwed to centre section CA 516-Bis. Carries eyepiece bracket CA 523.
CA 120	1	Plunger housing	4	Tapped into CA 119, contains plunger CA 121 and spring CA 122.
CA 121	1	Plunger		Engages in indentations in eyepiece - bracket - retaining ring CA 124 to latch eyepiece CA 130 in alternative working positions.
CA 122	1	Compression spring for CA 121		
CA 124	1	Eyepiece-bracket-retaining-ring		Screwed to eyepiece bracket CA 523. Has stepped outer surface engaging with correspondingly shaped inner surface of CA 119.
CA 125	1	Prism	148	Third prism in viewfinder optical system.
CA 127	2	Clips for CA 125	}	Secure CA 125 to prism holder CA 526.
CA 128	1	Prism clamping strip		
CA 130	1	Eyepiece, complete		
CA 131	1	Spacing ring		On threaded section of CA 130 between it and eyepiece bracket CA 523.
CA 132	1	Tapped insert	106	Screwed to assembly plate to receive retaining screw of 16-mm-gate housing CAM 390-E.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 133	1	Cover for CA 132	176	Prevents light from entering interior of camera through CA 132.
CA 135	1	Stowage bracket for 16-mm-gate housing		Screwed to rear surface of assembly plate
CA 135-E	1	Stowage bracket for 16-mm-gate housing, assembled	82	Comprises CA 135 and threaded pin CA 136.
CA 136	1	Threaded pin for CA 135		
CA 140	1	Sliding cover		Closes slit in assembly plate (see page 2·4 of text).
CA 140-E	1	Sliding cover, assembled	107	Comprises CA 140 and knob CA 141.
CA 141	1	Knob for CA 140		
CA 142	1	Upper retaining spring for CA 140		Screwed to forward surface of assembly plate.
CA 143	1	Lower retaining spring for CA 140		Screwed to forward surface of assembly plate.
CA 144	1	Upper magazine fixing post	81	
CA 145	1	Lower magazine fixing post	161	
CA 146	1	} Magazine light-trap actuating lugs	15	Screwed into recesses in aperture plate.
CA 147	1		21	
CA 148	1	Magazine brake releasing pin	16	Swaged into aperture plate.
CA 149	1	Shutter-adjustment-knob guard pin		Tapped into camera housing close to shutter adjustment knob CA 96-A.
CA 150	1	Camera housing		
CA 151	1	Tapped insert for motor locking screw	93	
CA 152	1	Bayonet receptacle for motor		

Instruction F.6
Appendix A

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 152-E	1	Bayonet receptacle for motor, assembled	94	Comprising CA 152 and two studs CA 153.
CA 153	2	Studs for CA 152		
CA 154	1	Dust-excluding plug for CA 152		Fills bayonet receptacle for motor when motor is not fitted.
CA 155	1	Tapped insert for tripod screw		
CA 156	1	Plug	7	In aperture through wall of camera housing; permits cleaning of ground glass.
CA 158	2	Pillars		Support aperture plate in vicinity of aperture. Screwed on to threaded studs in camera housing.
CA 159	2	Washers		At forward ends of CA 158.
CA 160	1	Lens turret post		Screwed and pinned to front of camera housing.
CA 160-P	1	Pin for CA 160		
CA 161	1	Key for CA 160		Screwed into keyway in CA 160, engages with any of three keyways in central brass insert CA 306 of turret.
CA 162	1	Dovetailed base	153	
CA 163	1	Latch plate	154	Secured to dovetailed base CA 162 by two screws and perforated strip CA 163-Bis.
CA 163-Bis	1	Perforated strip		With CA 163, grips edges of slot in CA 162.
CA 164	1	Special screw		Fills inserting screw hole of camera housing when this is not in use, to exclude dust.
CA 165	1	Inching knob stub shaft		Inside ratchet drum CA 170.
CA 166	1	Ratchet wheel		Inside ratchet drum CA 170.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 167	6	Rollers	5	Inside ratchet drum CA 170.
CA 168	1	Set-screw		Tip engages with slot in CA 165 to retain CA 166.
CA 169	1	Washer		Retains rollers in ratchet drum CA 170. Held in place by head of CA 168.
CA 170	1	Ratchet drum		Screwed to camera housing. Forms bearing for CA 165, contains CA 166, six CA 167, CA 171 and CA 173. CA 165 can turn anti-clockwise; clockwise rotation jams CA 167 against interior surface of drum.
CA 170-E	1	Ratchet drum, assembled		Comprises CA 165 to CA 173.
CA 171	1	Compression spring		Inside CA 170. Biases CA 165 out of engagement with drive shaft of camera mechanism.
CA 172-A	1	Inching knob		
CA 172-V	1	Grubscrew for CA 172-A		
CA 173	1	Wire spring CA 166		In groove in CA 166, presses CA 167 against interior surface of CA 170.
CAM 174-F	1	Manufacturers' label		Riveted to left-hand side of camera housing.
CA 260	1	Sprocket spindle locking lever	52	Has one end shaped to engage with toothed brake disk on sprocket spindle; other end receives thrust of magazine-brake releasing pin CA 148 when magazine is fitted to camera.
CA 261	1	Retaining bush for CA 260		
CA 262	1	Screw for CA 260 and CA 261		

Instruction F.6
Appendix A

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 263	1	Spring for CA 260	84	Biases CA 260 into contact with brake disk.
CA 265	2	Washers		Under retaining bushes CA 269.
CA 266	1	Knob for magazine release slide CA 267		
CA 267	1	Magazine release slide		Spring-loaded, engages with slots in magazine locking posts CA 144 and CA 145.
CA 268	1	Spring for CA 267	91	
CA 269	2	Retaining bushes for CA 267		
CA 270	2	Anchoring screws for spring CA 268		
CA 272	1	Cover for magazine pressure pads		
CA 272-E	1	Cover for magazine pressure pads, assembled	43	Comprises CA 272 and two of CA 273.
CA 273	2	Studs for CA 272		Gripped by CA 267.
CA 277	1	Ivory tablet		Writing surface riveted to magazine.
CA 278	1	Magazine footage-indicator lever		Carries pin CA 280 to ride on feed spool, and toothed segment to actuate indicator dial.
CA 279	1	Retaining bush for CA 280	43	
CA 280	1	Pin for CA 278		Swaged into CA 279.
CA 283	1	Spring for CA 278		
CA 284	1	Screw for CA 278		
CA 289	1	Retaining spring clip for magazine cover locking handle CA 292	43	
CA 291	1	Magazine cover locking handle plate		Flanged circular plate, retained in circular hole in magazine cover, to which handle CA 292 and locking cam are secured.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 292	1	Magazine cover locking handle		Retained by spring clip CA 289
CA 299	1	Retaining bush for CA 289		Forms resilient mounting for one side of CA 289 on CA 291.
CA 300	1	Lens turret		
CA 300-E	1	Lens turret, assembled		Comprises CA 300, lens mount receptacles and grubscrews CA 301, 301-V, central brass insert and pins CA 305, 305-P, locking knob CA 308 and set-screw CA 310.
CA 301	3	Lens mount receptacles		Brass; screwed into CA 300 and secured by grubscrews CA 301-V.
CA 301-V	9	Grubscrews for CA 301		
CA 305	1	Central insert for lens turret		Brass; with three key-ways to give alternative working positions of turret. Screwed and pinned to CA 300.
CA 305-P	2	Pins for CA 305		
CA 306	1	Washer for turret clamp screw CA 307		
CA 307	1	Turret clamp screw		With three-limbed flat head. Tapped into end of CA 160 through CA 306. Engages with internal projections of turret locking knob CA 308 to lock turret in chosen working position.
CA 308	1	Turret locking knob	10	Screwed on to central projection of lens turret. (N.B.: left-hand thread.) Rotation limited by set-screw CA 310 through slot in skirt of knob.
CA 309-A	1	Front cover for CA 308		
CA 310	1	Set-screw		Tapped into central projection turret.

Instruction F.6
Appendix A

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 315	3	Dust covers		Fill lens mount receptacles in turret when no lenses are fitted.
CA 315-E	3	Dust covers, assembled		Comprise CA 315 and front plates CA 316.
CA 316	3	Front plates for CA 315		Screwed to CA 315.
CA 319	2	Brackets for carrying handle CA 320-E		
CA 320	1	Leather carrying handle		
CA 320-E	1	Leather carrying handle, assembled		Comprises CA 320, clips CA 321, springs CA 322 and rivets CA 323.
CA 321	2	Handle clips		
CA 322	2	Springs for shoulder strap clips CA 327		Spring-load clips CA 327 to retain shoulder strap CA 326.
CA 323	2	Rivets		Attach CA 321 and CA 322 to CA 320.
CA 324	2	Latch bars for CA 319		Carried by CA 319 to retain CA 320-E.
CA 326	1	Shoulder strap		
CA 327	2	Shoulder strap clips		Pivoted on CA 324, spring-loaded by CA 322 to engage with clips on CA 326, attaching it to the camera in addition to the carrying handle.
CA 328	2	Large-headed screws		Tapped into CA 319, retain CA 324 in position.
CAM 330	1	Aperture plate cover		Protects aperture plate when magazine is not fitted.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CAM 330-E	1	Aperture plate cover, assembled	172	Comprises CAM 330, locking bar CA 331, spring anchoring pin CA 332, tension spring CA 333, spring anchoring screw CA 334, retaining bushes CA 335, grip CA 336 and guard CA 337.
CA 331	1	Aperture plate cover locking bar		
CA 332	1	Spring anchoring pin for CA 333		Swaged into CA 331.
CA 333	1	Tension spring		Acts between CA 332 and spring anchoring screw CA 334.
CA 334	1	Spring anchoring screw for CA 333		Tapped into CAM 330, retains CA 331.
CA 335	2	Retaining bushes for CA 331		Screwed to CAM 330 through slots in CA 331.
CA 336	1	Grip for CAM 330		Screwed to CAM 330; with raised lug on CA 331, is grasped between finger and thumb to remove cover.
CA 337	1	Guard for gear CA 46		Screwed to CAM 330.
CAM 350	1	Transport claw slide		
CAM 350-E	1	Transport claw slide, assembled		Comprises CAM 350, claw shaft support CAM 351, shaft CAM 352, clamps CAM 353, 354, transport claws CAM 355, 356, spacers 358, springs CAM 359 and screws CAM 360.
CAM 351	1	Transport claw shaft support		Light-alloy casting, screwed to CAM 350, carrying shaft CAM 352.
CAM 352	1	Shaft for transport claws		
CAM 353	3	Small clamps for CAM 352		Screwed to CAM 351 (2 screws each).

Instruction F.6
Appendix A

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CAM 354	1	Large clamp for CAM 352		Screwed to CAM 351 (3 screws).
CAM 355	2	Transport claws, 35-mm	23	
CAM 356	1	Transport claw, 16-mm	22	
CAM 358	6	Spacers		On CAM 352.
CAM 359	3	Leaf springs for transport claws		Screwed to CAM 351.
CAM 360	6	Screws for CAM 359		
CAM 380	1	16-mm gate	25	
CAM 381	4	Screws for CAM 380		
CAM 382	1	Film guide for CAM 380	32	In CAM 380, spring-loaded by CAM 383.
CAM 383	1	Compression spring for CAM 382		
CAM 385-E	1	Holder for CAM 380	30	Inserted in place of gelatine-filter-holder CA 71-E, locks CAM 380 in position.
CAM 390-E	1	Housing for CAM 380 and CAM 385-E	104	
CA 434	1	Brass helical gear		On transport shaft CA 35, inside camera mechanism housing CA 5-25.
CA 456	1	Slating lamp bush	14	Swaged into aperture plate. (Not used by BBC, and blocked.)
CA 510-E	1	Viewfinder, assembled		Complete viewfinder optical system, not including ground glass and bracket for ground glass.
CA 512	1	Holder for prism CA 111	139	Screwed to objective bracket CA 110.
CA 512-Bis	2	Packing pieces		Between faces of CA 111 and CA 512.

<i>Makers' Part No.</i>	<i>Quantity</i>	<i>Instruction Nomenclature</i>	<i>Ref. in Figs.</i>	<i>Notes</i>
CA 514	2	Angle brackets	140	Side pieces for CA 512.
CA 515-Bis	1	Support tube		Screwed into CA 512, carries one of objective lenses CA 116-D.
CA 516	1	Barrel, right-hand section		Secured to objective bracket CA 110 and to centre section CA 516-Bis.
CA 516-Bis	1	Barrel, centre section		Screwed to left-hand section CA 119 and to right-hand section CA 516.
CA 523	1	Eyepiece bracket	147	Retained in CA 119 by retaining ring CA 124. Carries eyepiece CA 130, screwed in.
CA 523-E	1	Eyepiece bracket, assembled		Comprises CA 523 and cover CA 529.
CA 526	1	Holder for prism CA 125		Screwed to CA 523.
CA 529	1	Cover for CA 523	149	Sheet metal cover for eyepiece bracket CA 523.
CA 535	1	Rubber eye piece	144	
CA 536	1	Locking catch for eye piece plate		
CA 536-E	1	Locking catch for eye piece plate, assembled	145	Comprises CA 536 and knob CA 537.
CA 537	1	Knob for CA 536		Swaged into CA 536.
CA 538	1	Bush for screw securing CA 536		
CA 539	1	Washer for screw securing CA 536		
CA 1000	1	400-ft magazine body casting		
CA 1002	1	Cover plate		Closes circular aperture in CA 1000.
CA 1073	1	Sprocket spindle bearing	57	
CA 1078	1	Rear stripper	58	

Instruction F.6
Appendix A

Makers' Part No.	Quantity	Instruction Nomenclature	Ref. in Figs.	Notes
CA 1100	5	Guide roller retaining pins	35	Carry rollers 34, 35, 59 (Fig. 2.4).
CA 1102	1	Guide roller		
CA 1105	2	Spool spindle bearings		
CA 1106	4	Spacing washers for spool spindles		
CA 1107	1	Take-up spool spindle	36 44	In grooves in sides of spool holders; bowed to grip interior surfaces of spool centres.
CA 1108	2	Spool holders		
CA 1109	1	Pulley for CA 1107	163	
CA 1110	2	Grubscrews for CA 1108		
CA 1111	4	Leaf springs for CA 1108		
CA 1116	1	Knurled knob for feed spool spindle		
CA 1117	1	Feed spool spindle	53	
CA 1118	1	Friction spring for feed spool holder		
CA 1119	2	Fibre washers for feed spool holder		
CA 1135	1	Spring cord belt		
CA 1140	1	Magazine mechanism cover	83	Screwed over circular aperture in CA 1145, supports footage indicator dial CA 1152-A.
CA 1145	1	Magazine cover casting	45	
CA 1150	1	Footage indicator plate		
CA 1151	1	Stub shaft for footage indicator dial	3	
CA 1152-A	1	Footage indicator dial		
CA 1153	2	Large-headed screws		Secure CA 1152-A to CA 1151.

ERRATA

To Editor,

Technical Instructions,

305, St. Hilda's, Maida Vale.

The following errors have been noted in **Instruction**

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