MOVIE CAMERA «KINOR-35N»

Technical specification and operating instruction
in two parts

Part 1

MKBI.202124.003 TO

http://RafCamera.com

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1. INTRODUCTION

The technical specification and operating instruction is intended to teach the operation and maintence of the movie cameras "KINOR-35N" model 9KSN and model 9KSN-M. It contains information necessary for full use of the technical aspects of the systems and correct operation of the camera.
Information and operation instructions of the rear retaining rings and matte box are described in the corresponding document.
Information and operating instructions on the follow focus control 5KSN-KEP17, the disconnecting device 1UO-12, charger UZ, discharger UR, and battery BA-3-16 are described in their respective carrying cases.
There are some variations allowed between the camera and this specification due to periodical updates in the camera system.

ATTENTION!
LENSES WITH OST 19-144-83 MOUNTS ONLY (DISTANCE FROM THE FOCAL PLANE TO THE SHUTTER IS 19MM),are permitted to be used on this camera.

2. PURPOSE

Movie cameras "KINOR-35N" model 9KSN and model 9KSN-M can be used for shooting from the shoulder, fluid head, geared head, and Steady Cam. It allows shooting of usual and wide-screen movies on black and white or color 35mm film according to GOST 4896-80.
The cameras can be used on sound stages and in various outdoor climates, with synchronous sound recording on the external sound recorder.

3. TECHNICAL SPECIFICATION

3.1. Movie Camera

Film used, mm	35, b/w or color with dimensions according to GOST 4896-80
Size and position of the exposed frame field on the film	According to GOST 24229-80 и RTM 19-184-86
Position and movement of the film in the camera	One plane, forward direction
Start-up time during operation on the crystal sync 24 fps speed and continuously adjustable speeds up to 24fps in the normal climatic conditions, sec	from 0,5 to 1
Shooting speeds, fps - continuously adjustable - fixed	 от 8 до 32 24, 25
Average speed deviation, % - continuously adjustable - fixed	 ±4 ±0,02
Diaphragm scales of the lenses	According to optical efficiency of the lenses
Lens mount	According to OST 19-144-83 for 35mm film
Mags	External, common chamber, 150m and 300m
Noise level of the camera loaded with film LN-7, NK-2 or NK-3 (with shrinkage level of 0 to +0.1%)? With 150m mag, 75mm lens MKBI.202333.018, without compendium, during work in steady state at 24 fps, dBA, no more than	32 according to OST 19-139-83
Viewfinder magnification factor:	
- short	6
- short desqueezer, horizontal direction	7.2
- long	5 and 10
- long desqueezer, horizontal direction	6 and 12
Image instability, mm, no more than	0,015
Shutter	Mirror, single blade, fixed 180° angle
Monitors and indicators	Footage counter of the unexposed film; sound and light indicators of the non-synchronous run; battery low indicator; digital shooting frequency indicator
Power supply, V:	
- battery	16^{+5}_{-2}
- single-phase AC network	220^{+22}_{-11}, 50±0.1Hz
Operating conditions:	
- lower air temperature, °C	Minus 30

- higher air temperature, °C	Plus 40
- maximum relative humidity, %	98 at 25°C
Transporting temperature range, °C	From minus 50 to plus 50
Dimensions of the camera with the 150m mag and 75mm lens, mm, no more than:	
- length - width - height	555 300 370
Weight of the camera with 150m mag (loaded with film), normal viewfinder and 75mm lens, kg, no more than	13
Consumption current at 24 fps, A, no more than: - at the normal climatic conditions:	
With 150m mag With 300m mag	3.5 4.5
- at the lower allowable temperature of minus 30°C:	
With 150m mag With 300m mag	3.7 4.2

3.2. Light Metering Device

Light bleed system	Through the lens (TTL)
Work modes	Rehearsal and shooting
Indication	Pointer
Pointer bias range, steps	±2
Basic relative error in the rehearsal mode, steps	±0.5
Temperature deviation factor upon the temperature change from 20±5°C, steps, no more than	±0.165 for each 10°C
Monitors and indicators	Two light indicators of the electrical zero set, pointer indicator in the viewfinder field
Shooting speed marks, fps	8, 12, 16, 24, 32
Film sensitivity ,arks, GOST	16, 22, 32, 45, 65, 90, 130, 180, 250, 350
Indicator reaction time, sec, no more than:	
- un the rehearsal mode - in the shooting mode	3 4
Power supply, V $^{+5}_{-}$	16
Dimensions, mm, no more than	
- length - width - height	85 89 120
Weight, kg, no more than	0.48

3.3. Shooting Speeds Unit

Digital indication of the set shooting frequency, fps	8-32
Power supply (stabilized), V	9
Dimensions, mm, no more than	
- length - width - height	78 37 58
Weight, kg, no more than	0.34

3.4. Shooting Mode Indication Unit

Power supply, V	9; 16
Consumption current, mA, (in 16V circuit) no more than	25
Frequency of the lamp flashing, times per second	fps/10
Dimensions, mm, no more than	
- length - width - height	109.5 88.5 183
Weight, kg, no more than	0.30

3.5. Video Signal Conversion Unit (BPV)

Input signal	Video signal according to GOST 7845-79
Amplitude of the input impulses, V	9
Amplitude of the output impulses	Vertical-repetition frequency according to GOST 7845-79
Power supply (stabilized), V	12

Dimensions, mm, no more than	
- length - width - height	75 35 25
Weight, kg, no more than	0.082

3.6. Voltage Conversion Unit (BPN)

Power, V	
- of the input signal	220^{+22}_{-11} , 50±0.1Hz
- of the output signal, no more than	0.5
Frequency of the output signal, Hz	50±0.1
Consumption current, A, no more than	0.01
Monitors and indicators	Light indicator of the input signal presence
Dimensions, mm, no more than	
- length - diameter	72 35
Weight, kg, no more than	0.06

3.7. Synchronization Unit

Power of the input signal, V	0.5…9
Frequency of the input signal, Hz	50±0.5
Power of the output signal, V	9
Frequency of the output signal, Hz	160±0.64
Power supply (stabilized), V	9
Dimensions, mm, no more than	
- length - width - height	108 40 79
Weight, kg, no more than	0.45

3.8. Network Power Supply Unit

Power supply, V	220^{+22}_{-11} , 50±0.1Hz
Output power ranges, V:	
- for the camera - for the video assist - for the heater	$16^{+1.6}_{-2}$ $17^{+1.7}_{-0.85}$ $24^{+2.4}_{-4}$
Output current, A:	
- for the camera - for the video assist - for the heater	4 1.5 6
Monitors and indicators	Light indicators of the operation mode (camera, VA, heater); pointer indicator of the power and consumption current values of the camera and the heater
Dimensions, mm, no more than	
- length - width - height	310 190 132
Weight, kg, no more than	7.0

3.9. Thermoregulator

Power supply, V	from 20 to 30
Output current, A, no more than	6.0
Pulsations power, V, no more than	1.0
Monitors and indicators	Light indicators of the input power presence and heating of the camera and the mag
Dimensions, mm, no more than	
- length - width - height	125 40 42
Weight, kg, no more than	0.22

4. CONFIGURATION

4.1. Configuration meets to the Table 1.

Table 1

Name, index of the item	Document number	Quantity, pieces		Note
		Normal version	Wide-screen version	
Camera gear with the controlling device UR	MKBI.203211.002 MKBI.421212.005	1 1	1 1	It contains: gear; electrical drive; film gate and ground glass for the normal frame; caps for the mags, lens mount and viewfinder.
150m mag	MKBI.301331.003	2	2	With the cap
300m mag	MKBI.301331.001-03	2	2	With the cap
Normal viewfinder	MKBI.201145.005	1	1	With the cap
Desqueezer	MKBI.201145.006	-	1	With the cap
Viewfinder extender	MKBI.201145.007	1	1	For shooting from a support
Tubule (for the model 9KSN-M only)	MKBI.203123.005	1	1	For the left eye viewfinder
Lens F=75мм in the focusing mount	MKBI.202333.018	1	1	Fast lens ОКС14-75-1М
Anamorphic lens 35BAS22-2, F=50mm	TU 3-3.1664-78	-	1	In the focusing mount U-45.59.514 with revision MKBI.202124.003
Lens focusing device	MKBI.203321.002	1	1	For the manual controlling of the lenses. It should be used with along with bridge plate MKBI.301714.002
Bridge Plate	MKBI.301714.002	1	1	For the mounting of the follow focus and 5KSN-KEP17/U1.1 device.
Start-up device	MKBI. 423142.003	1	1	
Set of the elements of the uniform backing device KUSU (matte box)	KUSU.00.000	1	1	For the 18-100mm lenses and anamorphic units. Used with the bracket MKBI.301567.003. Has its own packing.
Bracket	MKBI.301567.003	1	1	For mounting the matte box.
Set of the brackets for the anamorphic lenses	MKBI.805812.018	-	1	
Set of the balancing plate	MKBI.305812.018	1	1	For the mounting the camera onto support with ability to mount a heavy lenses, compendium, electric focusing drive onto the plate's rods.
Set of the units for the wide-screen shooting	MKBI.305812.011	-	1	Contains the wide-screen film gate and two ground glasses.
Network Power Supply Unit (BPS)	MKBI.435117.002	1	1	For powering the camera from the AC 220V 50Hz network
Battery BA-8-16 (BA)	TU19-419-83	2	2	16V, 8A·h
Disconnector 1UO-12 (UO)	TU19-420-83	1	1	For the battery
Thermoregulator with two cables	MKBI.421211.002	1	1	For the electric heating of the camera. Used along with thermoregulator adapter MKBI.434463.001
Thermoregulator adapter	MKBI.434463.001	1	1	Used with thermoregulator only
Cable	MKBI.434454.036	1	1	Connects the BPS to the AC 220V 50Hz network
Cable	MKBI.434454.030-01	1	1	Connects the camera to the BPS
Cable	MKBI.434454.031	2	2	Connects the BA and UO to the camera
Clamp	MKBI.301536.007	1	1	Fixes the start-up device on the support handle
Cable	MKBI.434419.002	1	1	For operation the camera on the support
Protective case	MKBI.322461.005	1	1	
Case with the tools	ИП 000-01	1	1	
Spare parts set (ZIP)	MKBI.305813.004	1	1	
Cable	MKBI.434454.030	1	1	Used instead of the cable MKBI.434454.031 at low temperature
Case (#1)	MKBI.323369.086	1	1	Following items are placed into the cases: Camera (with the caps for mag, lens, and viewfinder) with UR and the balancing plate; focusing device (single-sided); 75mm lens; viewfinder extender; normal viewfinder and desqueezer; rods; start-up device; clamp; case

				with tools; ZIP set; compendium bracket (for the rods); tubule; two brackets for zoom and anamorphic lenses.
Case (#2)	MKBI.323369.095	1	1	Network Power Supply Unit; camera to BPS cable; BPS to network cable.
Case (#3)	MKBI.323369.088	1	1	50mm anamorphic lens; compendium; set of the brackets for the anamorphic lenses; two rods out of the MKBI.305824.002 set; compendium bracket (for the camera); slots for the 35mm and 75mm anamorphic lenses.
Case (#4)	MKBI.323369.070	1	1	Battery (2 pcs); thermoregulator with two cables; thermoregulator adapter; cable (for the operation on the support); disconnector; cables (2 pcs) connecting BA and UO to the camera.
Case (#5)	MKBI.323369.094	1	1	150m mags (2 pcs)
Case (#6)	MKBI.323369.031	2	2	300m mag. Protective case (in the one of the cases). Documentation (in the one of the cases).
Case	MKBI.323369.083	-	1	Set of the wide-screen devices, desqueezer, slot for the wide-screen 1.85:1 film gate (Super-35) and masked format 1.66:1.

4.2. Additionally to the items specified in the Table 1, the camera may be supplied with additional items at extra charge. Available items are listed in the Table 2.

Таблица 2

Name, index of the item	Document number	Note	
Lens F=18mm in the focusing mount 35OP1-18	MKBI.202333.016	OKS5-18-1	
Lens F=22mm in the focusing mount 35OP1-22	MKBI.202333.010	OKS3-22-1	
Lens F=28mm in the focusing mount 35OP1-28	MKBI.202333.014	OKS7-28-1	
Lens F=35mm in the focusing mount 35OP1-35	MKBI.202333.015	OKS11-35-1	
Lens F=50mm in the focusing mount 35OP1-50	MKBI.202333.007	OKS1-50-6	
Lens F=75mm in the focusing mount 35OP1-75	MKBI.202333.011	OKS6-75-1	
Lens F=100mm in the focusing mount 35OP1-100	MKBI.202333.012	OKS2-100-2	
Lens F=150mm in the focusing mount 35OP1-150	MKBI.202333.006	OKS1-150-1	
Lens F=200mm in the focusing mount 35OP1-200	MKBI.202333.009	OKS1-200-1	
Lens F=300mm in the focusing mount 35OP1-300	MKBI.202333.013	OKS1-300-1	
Lens F=28 mm in the focusing mount	MKBI.202333.019	OKS10-28-1M	Fast lenses
Lens F=35 mm in the focusing mount	MKBI.202333.008	OKS12-35-1M	
Lens F=50 mm in the focusing mount	MKBI.202333.017	OKS11-50-1M	
Zoom lens 35OPF18-1AS with anamorphic attachment and tele attachments 1.5x и 2x	TU3-3.1984-86	35OPF18-1AS with revision MKBI.202124.003	
Anamorphic lens 35BAS25-1, F=100mm	TU3-3.1664-78	In the focusing mount U-45.59.507 with revision MKBI.202124.003. Has its own packing.	
Anamorphic lens 35BAS27-1, F=35mm	TU3-3.1664-78	In the focusing mount U-73.35.783 with revision MKBI.202124.003. Has its own packing.	
Anamorphic lens 35BAS23-2, F=75mm	TU3-3.1664-78	In the focusing mount U-42.59.507 with revision MKBI.202124.003. Has its own packing.	
Follow Focus device*	MKBI.203321.004	For the manual lens controlling (two-sided)	
Mag tilt*	MKBI.301134.017	Adapter that allows the mag to be situated at the bottom camera level	
Claw mechanism	MKBI.304534.001-01	For the B&H Negative film	
Lining	MKBI.723376.001	Used with claw mechanism MKBI.304534.001-01	
Anamorphic lens 35BAS2-2, F=150mm	TU3-3.1664-78	In the focusing mount U-45.59.381 with revision MKBI.202124.003. Has its own packing.	
Lens hoods set for the spherical lenses	MKBI.305812.008	For the 18-300mm lenses	
Lens hoods set for the fast lenses	MKBI.305812.009	For the 28-75mm lenses	
Brackets set for the heavy lenses	MKBI.305812.010	For the 200mm, 300mm lenses	
Plate	MKBI.203323.001	Used together with the beam splitter MKBI.203571.001	
Beam splitter	MKBI.203571.001	Used during operation of the camera with	

		light meter or video assist
Video Assist set	MKBI.468949.001	It contains: optical adapter, bracket, handle KTU25.000-01. Used together with the beam splitter MKBI.203571.001
Electrical focusing device 5KSN-KEP17/U1.1	TU19-533-84	Used together with the bridge plate MKBI.301714.002
Charger UZ	TU19-421-83	Used for charging the batteries. Comes with the cable.
Discharger UR	TU19-422-83	Comes with the cable. Used for the preventive discharge of the batteries.
Synchronization Unit	MKBI.426432.003	Provides synchronization of the electric drive from the external signals. Used together with the cable MKBI.434454.034, with the Video Signal Conversion Unit MKBI.426451.001 or with the Power Conversion Unit MKBI.426452.001
Synchrosignal Cable	MKBI.434454.034	Used for connecting the video signal to the BPV and BPN to the synchronization unit.
Video Signal Conversion Unit (BPV)	MKBI.426451.001	Used for synchronization of the camera from the video signal. Used together with synchronization unit MKBI.426432.003
Power Conversion Unit (BPN)	MKBI.426452.001	Used for synchronization of the camera from the AC 220V 50Hz network. Used together with synchronization unit MKBI.426432.003
Shooting speeds unit	MKBI.421254.001	For the camera operation at the 8-32 fps
Cable	MKBI.434454.041	For sending of the start marker signal to the sound recorder
Cable	MKBI.434454.028	For operation of the camera together with the drive KEP-17
Indication unit («Lighthouse» lamp)	MKBI.426439.005	For the external indication of the shooting mode
Battery BA-3-16 (BA)	MKBI.563521.007	16V, 3.5A·h
Film gate	MKBI.304126.002-02	For the wide-screen shooting 1.85:1 (Super-35). Used together with the ground glass MKBI.203543.001-02 or MKBI.203543.001-05.
Film gate	MKBI.304126.002-03	For the masked shooting 1.66:1. Used together with the ground glass MKBI.203543.001-02 or MKBI.203543.001-05.
Ground glass	MKBI.203543.001-02	For the wide-screen format 1.85:1 (Super-35) and masked format 1.66:1
Ground glass	MKBI.203543.001-05	Same, but without extra field outside of the frame
Ground glass	MKBI.203543.001-03	For the normal frame without extra field outside of the frame
Case (#7)	MKBI.3233369.087	Following items are placed into the cases: Normal spherical lenses F=18, 22, 28, 35, 50, 75, 100mm; lens hoods set for the spherical lenses; slots for the soft backing, tubules, straps, rotating filter holder.
Case (#8)	MKBI.3233369.091	Tele lenses F=150, 200, 300mm; set of the brackets for the heavy lenses (bracket and holder); lens hoods for the 150, 200, 300mm lenses.
Case (#9)	MKBI.3233369.036	Fast lenses F=28, 35, 50, 75mm; set of the lens hood for the fast lenses.
Case (#10)	MKBI.3233369.069	Anamorphic lenses F=100, 150mm.
Case (#11)	MKBI.3233369.093	Video assist set: optical adapter; bracket; KTU25.000-01; beam splitter; light meter.
Case (#12)	MKBI.3233369.092	Electrical device for controlling the lenses 5KSN-KEP-17; bridge plate; plate; two-sided follow focus; wide-screen film gate (Super-35); masked film gate 1.66:1; three ground glasses; cable MKBI.434454.028
Case (#13)	MKBI.3233369.033	Charger with the cables; discharger with

		the cables; battery 3.5A·h; indication unit («Lighthouse» lamp).
Case (#14)	MKBI.3233369.090	Synchronization unit; synchronization cable; video signal conversion unit; power conversion unit; shooting speeds unit (for 8-32fps); cable for the sending of the start marker signal to the sound recorder; mag tilt; claw mechanism MKBI.304534.001-01; lining MKBI.723376.001.
Case (#15)	MKBI.3233369.089	Zoom lens (zoom lens compendium has its own packing).

*For the model 9KSN-M only.

5. CONSTRUCTION AND OPERATION OF THE CAMERA

The camera is designed for maximum convenience of the operator and for shortest possible time of the preparation for shooting.
General information on the camera operation is stated in the descriptions of the kinematical diagram, optical diagram (see Appendix), and electrical diagrams (see Part 2).
General view of the camera is shown on the Picture 1 (see Appendix).
Picture 2 shows the camera (1) with the 150m mag (2), viewfinder (3), compendium (4), start-up device (5), video assist (8), controlling device (9).
Picture 2a shows the camera with the 300m mag (10) (of the «Kinor-35C II» model 5KSN-2M camera), 300mm lens (11), stand (12), 2-sided follow focus (13), bridge plate (14), plate, and long viewfinder (14a).
Picture 2b shows the camera with the 150m mag and mag tilt (14b). The camera can be set onto the flat surface in such setup.

5.1. The kinematics of the "KINOR-35N" camera.

The kinematics is shown on the Picture 3.
To move the camera mechanism, the electric drive (16) is used. There are claw couplings (15) and (17) on the shaft (I) of the drive. One end of the shaft (I) is connected to the shaft (II) with the shutter (29) via the claw coupling (15). Other end of the shaft (I) is connected to the shaft (III) with the pulley (18) via the claw coupling (17).
The grommet belt (19) encloses the pulley (18) and the pulley (20) (situated on the main shaft (IV)). This belt and the claw coupling (24) transfers rotation to the shaft (V) of the claw mechanism (28).
The grommet belt (22) encloses the shafts (21), (23), (25). It transfers rotation from the main shaft (IV) to the shafts (VI) and (VII) with the pulling sprocket (26) and the holdback sprocket (27) of the film track.
Movement of the feeding core (39) and the take-up core (34) in the 15m and 300m mags is accomplished by stand-alone winding units built up on the direct-current motors (32), (37) with the smooth pulleys (33), (38).
Cinematic link if the motors with the cores is accomplished by the belts (31) and (36) through the pulleys (30), (35) situated on the shafts (IX) and (X).

5.2. The optical schematics of the "KINOR-35N" camera.

The optical schematics of the camera provides the following features: generating the image of the objects by the lens on the film at the frame window; parallax-less observing of the objects through the viewfinder and focusing on the ground glass; desqueezing of the image during shooting of the wide-screen movies with the anamorphic lenses; generating the image of the objects on the TV diode target array; taking of the light energy to the integral light meter; observing of the light meter indicator and other service information in the viewfinder field of view.
Picture 4 shows the optical schematics of the camera.
The image of the shooting objects is produced by the lens (41) on the film in the frame window (42). While the film is pulled by the claw mechanism, the frame window is closed by the shutter (29) (see Picture 3). Mirror surface of the shutter directs the light onto the matted surface of the interchangeable ground glass (43) or (44) or (44a). Resulting image is identical to the image in the frame window. The interchangeable ground glasses have a finder marks and frames designating the normal, wide-screen, Super-35 and masked frame fields.
The image produced on the ground glass by the lens is observed by the operator through the optical system consisting of the: mirror (61), prism (47), lens (46), mirror (45) and interchangeable viewfinders (51) and (53).
The viewfinder (51) is used during shooting of the normal movies. It has 6x magnification. The viewfinder (51) consists of the prism VR-0° (48), lens (49), prism AR-90° (50), two mirrors (60) and eyepiece (52) with dioptric adjustment of ±5 dptr.
Deanamorphic viewfinder (53) is used during shooting of the wide-screen movies. It desqueezes the image and it has 7.2x magnification in vertical direction.
The desqueezer consists of the prism VR-0° (54), cylindrical lenses (55) and (57), mirror (56), two mirrors (59) and eyepiece (58) with dioptric adjustment of ±5 dptr.
For the convenience of the operator, the eyepiece slides BCD of the viewfinders (51) and (53) can be rotated on 180° around the transversal slide AB. Resulting rotation of the image is compensated by the rotation of the prism (54) automatically.
The eyepieces of the viewfinders (51) and (53) are removable. It is possible to replace them with the long viewfinder (79) consisting of the ground glass (80), lens (81) and eyepiece (82) with dioptric adjustment of ±5 dptr.

The lens (81) has two positions D and E determining the two magnification factors of the viewfinder. The magnification of the assembly of the long viewfinder (79) with the viewfinder (51) will be 5x and 10x. The magnification of the assembly of the long viewfinder (79) with the desqueezer will be 6x and 12x in the horizontal direction, and 3x and 6x in the vertical direction.
The mirror (61) can be replaced by the beam splitter (62) allowing 15% of the light to the mirror-lens block (75) consisting of the prism AR-90° (63), mirror (76) and lens (77) purposed for the producing the image of the shooting objects on the TV diode target array (78).
The mirror-lens block (75) can be replaced with the mirror-lens block (74) containing the light receiver (69) of the light meter, four-element photodiode FD-20 KP, light meter indicator (72) null indicator M4770.
The image of the pointer of the null indicator (72) and the scale (73) is transmitted into the viewfinder field of view by means of the mirrors (71), lens (70), mirror (65), ground glass (66), prism (67) and mirror (68). There is the compensating filter (64) placed in front of the photodetector (71).

6. CONSTRUCTION AND PRINCIPLE OF WORK OF THE MAIN PARTS

6.1. The camera

The camera consists of the body (89) and the mechanism (101) (see Picture 5).
The mechanism is isolated from the body by the special shock absorbers to lower a noise level.
Using of the low-noise claw mechanism, grommet belts and special sound absorbing material allow to reduce a noise level without using of the protecting glass in front of the lenses.
The body has the door (100) with the film track behind it. The door is locked by the noggin lock (99). To open the door, lift the lock button on 90 degrees. To close the door, lower the button back. Inner side of the door has a mechanical interlocking gear. External side of the door has the handle (93) (Picture 2a) of the manual turn of the camera mechanism. The handle has the half-coupling (94) (Picture 5).
The camera body has the slot "B" for the mounting of the viewfinder on the film track side. It is fixed by the bayonet ring (90). Fixing of the viewfinder in different positions is accomplished by the latch (91).

ATTENTION! The door (100) will not open if the viewfinder (3) (Picture 2) blocks it. Draw it aside.

The adapter plate (92) (Picture 6) contains the bushings (111) and (109) to mount a follow focus device. The adapter plate is secured on the camera body by screws.
Side wall (105) is secure by screws too.
The camera body has the cover (86) (Picture 5) with the slot for video assist or light meter beneath it.
External side of the wall has the coupling (106) (Picture 6) with a plug to mount the start-up handle (5) (Picture 2) to it.
The controller (9) is mounted to the side wall. It is secured by a lock, and electrically connected to the camera via the plug (113) (Picture 6).
The controller has a button to eliminate film slackness after the camera loading.
A compendium bracket is secured to the camera side by a captive screw.
There is a cover with a heater plug in the bottom part of the side wall. To work with the heater, it is necessary to replace the cover with the adapter (112).
Rear side of the camera has the bridge (114) (Picture 7) and the plug (119). The bridge has the alignment pin (116), the axle (120) and the lock (115).

ATTENTION! To open the lock (115) fully, it is necessary to push it along its axis.

The plug (119) is connected to the mag's plug to power up the pulling and holdback motors. The rectangular window "A" and the alignment pin (116) provide a precise mag positioning.
The handle (118) serves for the moving the camera form one place to another. It has a slot for mounting a video monitor.
There is bubble level (121) in the top part of the camera body.
Bottom part of the camera body features 3/8" tripod bushing and dovetail to mount a heavy lens support.
The camera movement (101) (Picture 5) is stand-alone unit including: the claw mechanism (28), the lens mounting (110) (Picture 6), the shutter (20) (Picture 3), the film track with the pulling sprocket (26) (Picture 5) and the holdback sprocket (27), blocker (98), the photo receiver, and the prism block.
There is start/stop switch on the controller.
The camera features crank claw mechanism with registration. The film is moved by the single-tooth one-side claw. Film registration in the film channel (formed by the front gate (84) or (84a) or (84b), and rear gate (104)) is accomplished by the single-tooth one-side registration pin, the side clamps (85) and pressure plate. The front and rear gates are easily removable for cleaning. They are secured by the locks (103) and (96). Manual turn of the mechanism is accomplished by the handle (102).
The lens mounting (110) (Picture 6) is installed onto the face of the camera. It allows to mount a single lens in the focusing mount. The lens is secured by the ring (108) of the bayonet lock. The viewfinder is secured in selected position by the friction ring (122).
The film movement is accomplished by two 12-teeth sprockets – pulling one (26) (Picture 5) and holdback one (27).
Constant engagement of the film perforation with the sprockets is provided by the clamping rollers (97).
In case of the end, break or 'salad' of the film, the mechanism is being stopped by the blocking (98).
There is the prism block at the top front of the camera. It contains an elements of the optical track.

The motor (107) (Picture 6) is installed on the other side of the camera. There are a fixed stop detector and a pulley (for transferring the movement form the motor (16) (Picture 3) to the claw mechanism (28) (Picture 5)) on the one end of the motor. Other end of the motor transfers the rotation to the single-blade shutter with 180° opening (29) (Picture 3) via claw coupling.
The shutter is stand-alone unit secured to the camera by a flange.

6.2. The mags

The mags are purposed for protecting the film from light, and for transporting the film in the film track.
The camera works with the external common chamber mags of 150m and 300m capacity.
The mags are supplied with the loading diagrams, the loading type switch (emulsion inward or outward), and the footage counter of the unexposed film.
The 150m mag is shown at the Picture 8.
Basic parts of the mag are: the body (131), the cover (127) and the mechanism (129).
The body (131) has the opening (134), the plug (133) for powering the motors, and the toggle switch (132) (loading type switch).
The opening (134) is stand-alone unit. It can be removed during partial mag disassembling for cleaning and lubricating.
The cover (127) is hold on the joint hinges, and secured by two locks (126). Light-proof is achieved due to the rubber cord (130).
The cover has the footage counter of the unexposed film on the feeding roll of the mag. The counter operates by the lever (125) fixed in the non-operational state by the spring. To set it into the operational position, turn the handle (201) (Picture 2a) clockwise.
The mechanism (129) (Picture 8) is assembled on the board with following parts: the feeding core (39), the take-up lug (135), the holdback sprocket (32) (Picture 3) and the pulling sprocket (37), the guiding roller and two belts (31) and (36). The take-up lug (135) has a burst lever that secures the film end during loading, bursting the lug. There is a friction under the lever. This friction allows adjusting the film winding density and providing reliable interaction with the blocking (98) (Picture 5).
The mechanism (129) (Picture 8) is isolated from the body (131) by special shock absorbers.
A standard lug is being mounted onto the core (39) and secured by turn of the core nut clockwise.
The camera has a compartment (128) with two motors (32) and (37) (Picture 3) in it. To reduce a noise level, the motors are placed onto shock absorbing rings.
The 300m mag is shown at the Picture 8a. The mag is taken from the 5KSN-2M camera. Its construction is similar to the 150m mag. Main difference is construction of the take-up lug friction. Adjusting of the friction is accomplished via the slots “D” and “E” by turn of the internal nut.
Mounting of the mag onto the camera is accomplished by the bracket (136). The loading type switch is placed under the cap (124).

6.3. The viewfinders

The viewfinders are purposed for observing of the magnified image of the shooting object on the ground glass.
The viewfinders are shown at the Picture 9.
Use the viewfinder (137) and the eyepiece (138) during shooting of the normal movies from the shoulder.
Use the viewfinder (137) and the long eyepiece (139) during shooting of the normal movies from the tripod.
Use the deanamorphic viewfinder (140) and the eyepiece (138) during shooting of the wide-screen movies from the shoulder.
Use the deanamorphic viewfinder (140) and the long eyepiece (139) during shooting of the wide-screen movies from the tripod.
For the convenience of the operator, it is possible to rotate the viewfinder on 360°. The resulting image rotation is being compensated automatically. Desired position of the viewfinder is secured by the friction ring (122) (Picture 6).
The eyepiece (138) (Picture 9) has the ring (141) to control a shield and the ring (142) of the dioptric adjustment.
The long eyepiece (139) has a slider (143) for the step change of the magnification.
The levers (144) and (145) change a color filter.

6.4. The lenses

The lenses are for producing of the image on the sensitive layer of the film with different scales.
The lens has a focusing mount with focusing ring and aperture ring.
The lens body has scales of the distance and aperture value. Aperture scale (red color) designates effective values of the aperture.
To protect the glass of the lens, cover it with a front and rear caps after shooting.

6.6. The start-up device

The start-up device (5) (Picture 2) is to start and stop the camera during shooting for the shoulder of from the tripod.
To start the camera, press the button (7).
The start-up device is mounted into the coupling (106) (Picture 6) on the side wall (105), and secured by the ring (6) (Picture 2).
To mount the start-up device onto the handle of the tripod, use the special clamp from the camera outfit.

6.7. The follow focus devices

The follow focus devices are for focusing of the fixed focal length lenses.
The camera supplied with the one-side and two-side follow focus.
The one-side follow focus is shown at the Picture 10.
The follow focus has the focusing knob (160), the latch (159), the screw (163), the cog-wheel (162) and the nut (161).
The follow focus is secured to the adapter plate (92) (Picture 6) by the latch (159) (Picture 10) and the captive screw (163).
The cog-wheel (162) is engaged with the geared ring of the lens and secured by the nut (161).
Focusing is accomplished by the knob (16).

The two-side follow focus is shown at the Picture 11. Its construction is similar to the one-side follow focus.
Main differences are the second focusing know (164) and mounting method (it is mounted onto the rods (154) (Picture 12a) of the bridge plate). It is secured by the screw (165) (Picture 11).
Engaging with the lens is accomplished by moving of the top part (166) along the bottom part (167). It is secured by the handle (168).

6.8. The brackets

6.8.1. The set of the brackets for anamorphic lenses

The set consists of the support (short 'tongue') and two adapter brackets.
The set is purposed for mounting of the anamorphic lenses.
The support is secured to the camera by the dovetail guiders. The adapter brackets are mounted onto it by a screw. They are used for mounting corresponding anamorphic lenses.

6.8.2. The set of the brackets for heavy lenses

The set consists of the stand with rollers and the support (long 'tongue').
The set is for mounting of the 200mm and 300mm fixed focal length lenses.

6.8.3. The matte box bracket

The matte box bracket is shown at the Picture 12.
It is secured to the camera body by the captive screw (169). The bracket rods (172) may be turned on 90° pushing the button (170).
The handle (171) secures the rods after their drawing out.

6.9. The network power supply

The network power supply (BPS) is purposed to power up the camera and the video assist or the heater.
The power supply is stand-alone unit.
Its front panel contains following controls and indicators:

1) The network power trigger switch (OFF/NETWORK).
2) The mode trigger switch (HEATER/TV).
3) The light indicators of the mode (HEATER/TV).
4) The pointer indicators of the network voltage, and of the camera consumption current at 30V.
5) The light indicator of the power presence.
6) The power jack "CAMERA".
7) The '+' and '–' clips "HEATER".
8) Two power jacks for the video assist outfit.

Rear panel has following parts:

1) The network power cord with the plug (AC 220V 50Hz).
2) Output power jack (AC 220V 50Hz).
3) Five fuses 8A, 5A, 3A, 2A, 2A.
4) The ground clip.

6.10. The light metering device

The light meter is purposed for determination of the nominal exposure and its deviations.
It is stand-alone unit with the controls and indicators on its rear end. It contains a condenser for transmitting the image onto the photo receiver. It is secure to the camera by means of the guiding rod and two captive screws.
The controls and indicators on the panel:

1) The power switch ON/OFF.
2) The switch of the null-indicator scale backlight brightness.
3) The calculator of the fps to S_{GOST}.
4) The knob of the "0 set".
5) Two indicators of the "0 set".

The controls and indicators are closed by a cover.

6.11. The video assist set

The video assist allows to view the image of the shooting object on the TV monitor and through viewfinder simultaneously. It is shown at the Picture 13.
The set consists of: the plate (175), the optical adapter (178), the pickup camera TVK (180), the video monitor VKU (181), and the bracket (182).
The plate can be mounted onto the tripod together with the camera by means of the screw.
The TVK is installed into the plate slot and secure by two screws through the bracket.
The optical adapter is installed into the slot "V" and secured by the bayonet lock. It has the screw (177) for fixing it to the camera.

The bracket (182) serves for mounting of the VKU. The bracket has a movable part to rotate the VKU in the vertical plane. To do this, loose the screw (183), set the VKU into desired position, and tight the screw again.

6.12. The controller

The controller (9) (Picture 2) is for the controlling of the motors of the camera and the mags.
It has following controls and indicators:

1) The indicator lamp of the power presence and shooting mode.
2) LED of the non-sync run and blocking mode.
3) The shooting speed switch "24", "25".
4) The 'wind' button for manual engaging of the winding and holdback motors.
5) The jack at the top part for connecting of the fps unit, the sync unit, or the shooting mode indication unit.
6) The power jack for connecting the controller to the network power supply or battery.
7) The TV jack for powering the video assist set.

The controller is stand-alone unit. Front panel elements are listed above. Rear end has a jack for the electrical connection with the camera.
There are five printed circuit boards in the controller. They are docked to the sixth board. There are also two power transistors inside.
The body if the controller consists of two parts – the base and the cover connected to each other by screws.
Cooperative operation of the controller and the camera results in functioning of the synchronous digital servo drive with two channels – frequency one and phase one.
The frequency channel is for the achievement of the minimal start-up time of the motor. The phase channel is purposed for the achievement of the necessary accuracy of the motor rotation speed.

6.13. The video signal conversion unit

The video signal conversion unit is for extracting the vertical-repetition frequency from the video signal.
It is stand-alone unit. Its rear side has the SH1 VIDEO jack for connecting the video signal cable to it. Opposite side has a cable with the SH2 plug for connecting this unit to the synchronization unit.
There is the printed circuit board U1 of the video signal conversion inside.

6.14. The voltage conversion unit

The voltage conversion unit is purposed for producing of the half-wave signal of AC 220V 50Hz with galvanic isolation from the network for safe operation.
The unit is made in the form of cylinder with AC 220V 50Hz plug on the one end, and output jack "SYNC" for connecting it with the sync signal cable to the synchronization unit. There is input power presence indicator near the output jack.
There is a printed circuit board inside the cylinder.

6.15. The shooting frequency unit

The shooting frequency unit is for generating of the variable master frequency that will allow getting continuously adjustable shooting frequencies from 8 to 32fps.
It is stand-alone unit. Its front panel has the digital indicator allowing setting necessary frequency by means of the regulator knob, and the backlight switch.
Bottom part of the unit has a socket to dock it to the controller.
There is a printed circuit board inside the unit.

6.16. The shooting mode indication unit

The shooting mode indication unit is for the producing of the light signal of the shooting mode and for transmitting the light marker to the sound recorder.
It is stand-alone unit. Its front panel has the SH2 START jack for connecting it to the sound recorder, and the switch B1 for the shooting mode indication.
Top panel has the extending rod with the lamp L1 to indicate the shooting mode of the camera.
Bottom part of the unit has a socket to dock it to the controller.

6.17. The synchronization unit

The synchronization unit is for the converting of the sync frequency (the vertical-repetition frequency or the network frequency) into the master frequency to achieve a shooting frequency synchronous to the previously mentioned frequencies. It is stand-alone unit that is installed onto the controller.
Its front panel has SYNC jack for connecting the sync signal cable or video signal conversion unit, and the START jack for connecting the start marker cable to the sound recorder. There situated also:

1) The external/internal synchronization switch.
2) The shooting frequency switch for external synchronization at 24-25fps.
3) The phasing knob used during shooting of the TV screen.

There are two printed circuit boards inside the unit.

6.18. The thermo regulator

The thermo regulator is for the providing of the necessary temperature condition inside the camera and the mag upon lowering the air temperature below +5°C.
It is standalone unit.
It has following controls and indicators:

1) The indicator of the power presence.
2) The indicator of the camera heating.
3) The indicator of the mag heating.
4) The heater OFF switch.
5) The CAMERA jack for connecting the thermo regulator to the camera.
6) "–24V" plug for connecting the thermo regulator to the network power supply unit.

There are two printed circuit boards and two fuses (5A and 3A) inside the unit.

6.19. The bridge plate set

The bridge plate set is shown at the Picture 12a. It consists of: the sliding plate (148), the base plate (149), three brackets and the plate (150). The plates are for balancing the camera mounted onto the plate (150) relatively to the tripod head pivot pin.
The plate (150) is fastened to the bottom part of the camera by the screw (151). The sliding plate (148) is fastened to the plate (150) by the screw (152). It can slide along the axis, and stops by the lever (153).
The sliding plate (148) has two rods (154) for mounting a brackets. The rods can be extended and secured by the screws (155).
The base plate (149) is mounted onto tripod and secured by the screw. It has a screw and the button (156) that limit movement range of the sliding plate (148) to prevent its falling of the base plate.
The base plate is connected with the sliding plate by means of the dovetail connection. To do this, press the button (156) and slide the sliding plate (148) onto the dovetail of the base plate (149). Stop its position by the lever (153). To disassemble the plates, loose the lever (153), and slide the sliding plate (148) from the base plate (149) over the pressed button (156).
To use the matte box during operation on the tripod, use the bracket (157) mounted onto the rods (154) and secured by two screws.
Two brackets (158) are purposed for mounting of the anamorphic lenses and the zoom lens with the matte box.

7. MARKING AND SEALING

Marking of the camera and its components supplied by the separate orders contains:

a. trade mark of the manufacturer;
b. symbolic notation and (or) name of the camera;
c. serial number of the camera in accordance with the numeration system of the manufacturer with the year of production included into this number.

The components of the camera outfit affecting its operation (such as film gates, mags, viewfinders etc.) has the marking containing the symbolic notation and (or) name of the camera, and serial number of the camera.
The marking of the cases contains:

d. symbolic notation and (or) name of the camera;
e. serial number of the camera in accordance with the numeration system of the manufacturer with the year of production included into this number;
f. sequence number of the case (if there are more than one case).

The cases should have main and additional signs meaning: "Fragile", "Top; don't turn over", "Protect from moisture".
The cases should be locked and sealed.

8. PACKAGE

The camera outfit should be packed into the cases for the transporting of storing.
The cases has a special slots for each camera component with a shock absorbing materials. Internal parts of the lids have a tools for fixing the components.
The cases are locked by two lock.
There are special lugs provided for sealing.

9. THE OPERATION GUIDELINES

Always keep in mind the following things:

1) Observe all requirements of this manual.
2) Use a film with perforation step from 4.755mm to 4.7405mm. This means a film with shrinkage level of -0.1% to +0.2%.
3) Load the mags in accordance with the diagram at the Picture 14.
4) Do not close the side door of the camera with the guiding rollers moved to non-operational position.
5) Do not strike the camera components.
6) Do not mount lenses in the focusing mounts other than OCT 19-144-83 (19mm distance form the focal plane to the shutter).
7) Do not expose the camera and its components to aggressive environment (acids, high humidity etc.)

ATTENTION!

1. **Do not use a tele lenses without bracket.**
2. **Do not bend the film end during loading of the mag.**

10. THE SAFETY GUIDELINES

Observe the following things for safe operation of the camera.

1) Do not do anything (repairing, testing, adjusting, fuse replacing etc.) with power on and during parts movement.
2) Do not change any connection or units replacement during shooting.
3) Do not use non-standard fuses or fuses with higher operate current.
4) Make any connections and reconnections with power OFF only.
5) Repair the electrical units is the repair labs.
6) Observe rules of the electrical safety during work with the voltage conversion unit.

11. PREPARATION FOR WORK

Do following things before put the camera into operation:

1) Check the camera completeness according to the logbook.
2) Do the appearance test.

If the camera was in the preservation longer that one year, lubricate it in accordance with the subsection 14.4.

During the appearance test check the following things:

1) Absence of the damages on the prominent parts and components of the camera.
2) Absence of the cracks and chips on the plastic parts.
3) Cleanness and absence of the foreign pieces in the camera and mags.
4) Cleanness of the optical elements.

Assemble the camera in the following order (accordingly to shooting in the normal, wide-screen, Super-35 or masked format):

1) Install the interchangeable ground glass (43), (44) or (44a) (Picture 6) through the lens mounting (110) onto two alignment pins until stop, and secure it by the screw (200).
2) Install the interchangeable front gate (84) (Picture 5) or (84a) or (84b) matching to the ground glass onto two alignment pins until stop, and secure it by two locks (103).
3) Install a lens into the lens mounting (110) (Picture 6). See subsection 11.4.
4) Install the viewfinder and secure it by the bayonet ring (90) (Picture 5).
5) Install a loaded mag onto the camera (see subsection 11.2).
6) Load the camera with the film (see subsection 11.3).
7) Close the camera door.
8) Turn the camera mechanism by the handle (93) (Picture 2a).

ATTENTION! For manual turn, fold the handle (93), then push and turn it.

11.1. Preparation of the controller

1) Connect the disconnecting device to the battery. Connect the controller (EP jack) to the disconnector or network power supply unit by means of the corresponding cable.
2) Press the START button of the disconnector to check that its LED is going on.

ATTENTION! If the LED is flashing, charge the battery or replace it with charged one.

3) Set the shooting frequency switch to desired position – 24 or 25 fps.
4) During work with the shooting frequency unit, set the shooting frequency by the digital indicator.

During work with the video assist, power it from the TV jack of the controller.

11.2. The mag loading

Load the mag in accordance with the Picture 14 in the following order:

1) Open the locks (126) (Picture 8) and open the mag cover (127).
2) Set the trigger switch (132) into the position corresponding to the film loading (emulsion inward or outward).
3) Move the footage counter lever (125) to the top fixed position.
4) Mount a roll of the unexposed film onto the feeding core (39), winded emulsion inward or outward onto standard lug.

Push a free end of the film through the channel outside, and them back into the mag chamber. Secure the film end in the slot of the burst lug (135) turning its lever counterclockwise.

ATTENTION! To remove a film roll from the core, turn the lever clockwise until stop.

5) Close the mage cover (127) and lock the locks (126).

11.3. Loading the camera

1) Open the camera door (100) (Picture 5).
2) Shift the clamping rollers (97).
3) Shift the lever (88) of the side clamps in the film channel.
4) Press the handle (102) and turn it to set the reg pin fork into leftmost position.
5) Shift the reg pin out of the film channel pulling the lever (87) to the right.
6) Pull a small film loop out of the loaded mag.
7) Put the mag onto the camera bridge (114) (Picture 7). To do this:
   - pass the film loop through the window "A";
   - put the mag by its bottom clip onto the axis (120);
   - turn the mag around the axis (120) to set it onto the alignment pin (116);
   - turn the lock handle (115) until stop.
8) Load the camera film track in accordance with the Picture 14.
9) Fix the film on the assistance teeth at the bottom part of the front gate (84) or (84a) or (84b) (Picture 5). Set the side clamps lever (88) into working position. Push the handle (102) and turn it counterclockwise slightly to insert the reg pin into the film perforation.
10) Set all the elements into operation position.
11) Turn the sprockets (26) and (27) to adjust a loops size so that they don't touch the camera body, and not be stretched.
12) Pull the rest of the film pressing the button "WIND" on the controller.
13) Push the handle (102) and turn it to check operation of the film track. Wind the rest of the film (paragraph 12).

ATTENTION! Check the operation position of the clamping rollers, the side clamps and the locks of the front and rear film gates before closing the camera door.

11.3a. Installing and removing of the front and rear film gate.

1) Shift the lever (88) of the side clamps in the film channel.
2) Press the handle (102) and turn it to set the reg pin fork into leftmost position.
3) Shift the reg pin out of the film channel pulling the lever (87) to the right.
4) Open two locks (103) and remove the front film gate.
5) Open the locks (96), turn the rear film gate around the top lock, and remove it.
6) Clean the front and rear film gate.
7) Install the front and rear film gate in the reversal order.

11.4. Mounting a lens

1) Turn the ring (108) (Picture 6) counterclockwise until stop.
2) Remove the lens mounting cap (110).
3) Remove rear lens cap from the lens.
4) Insert the lens into the lens mounting aligning the alignment pin in the mounting with the lens mount groove.
5) Secure the lens turning the ring (108) clockwise.

11.4a. Installation of the viewfinder

Normal or deanamorphic viewfinder is installed into the slot "B" (Picture 5) and secured by the bayonet nut (90).
During using the eyepiece (138) (Picture 9), install the viewfinder (137) or (140) into the slot "B" (Picture 5) so that red mark of the slot "B" match the red mark of the viewfinder.
During using the long eyepiece (139) (Picture 9), install the viewfinder (137) or (140) into the slot "B" (Picture 5) so that red mark of the slot "B" match the red mark of the viewfinder.
The slot "B" can be turned for convenience in the following way:

1) Turn the friction ring (122) (Picture 6) counterclockwise.
2) Turn the slot "B".
3) Secure the clot "B" by the friction ring (122).

11.5. Mounting the one-side follow focus

1) Mount the plate (92) (Picture 6) to the camera body and secure it by screws.
2) Install the pin (159) of the follow focus into the plate bushing (109) (Picture 6) and secure it by the screw (163) (Picture 10) into the bushing (111) (Picture 6).

11.6. Mounting the matte box.

Mount the necessary components of the matte box(see the manual KUSU.00.000RE) in front of the shooting lens onto the rods (172) and secure them by the locks.
Install filters into the filter holders. Install a mask into the mask slot of the hood or bellow.
Mount the matte box so that the surface of the last filter is 2-3cm in front of the lens. To set the compendium in front of the anamorphic lens, pull the rods (172) (Picture 12) and secure them by the handle (171).

11.7. Mounting the video assist set

1) Open the camera door (100) (Picture 5).
2) Replace the mirror with the beam splitter.
3) Insert the camera (180) (Picture 13) into the window of the plate (175) and secure it by two screws through the bracket.
4) Mount the optical adapter (178) into the slot "V" of the plate (175) and secure it by the bayonet lock.
5) Remove the camera lid (86) (Picture 5).
6) Install the assembly into the camera slot and secure it by the captive screw (177) (Picture 13).
7) Secure the plate to the camera by the screw.
8) Set the monitor onto the bracket (182) and secure it by the screw (185).
9) Insert the cylindrical shank (184) of the bracket into the hole in the carrying handle of the camera, and secure it by the screw.

11.8. Mounting the light metering device and preparation it for work

1) Open the camera door (100) (Picture 5).
2) Replace the mirror with the beam splitter.
3) Remove the lid (86).
4) Install the light meter and secure it by two captive screws.
5) Set the shooting parameters on the calculator: film sensitivity S_{GOST} against the shooting frequency FPS.
6) Set the switch ON into bottom position and check illumination of the on of the '0 SET' indicators.
7) Close the lens with the cap; close the viewfinder with the built-in shield. Check illumination of both '0 SET' indicators. Turn the knob '0 SET' slowly to achieve this if necessary.
8) Remove the lens cap and open the viewfinder shield.
9) Set desirable brightness of the scale backlight in the viewfinder field of view by the switch ○-◐. Change the object illumination or the lens aperture to set the viewfinder indicator into the middle position.
10) After shooting, set the switch ON into the top position.

11.9. Preparation of the batteries

Charge the battery. To do this, connect is as shown at the Picture 15.
Plug the charger plug to the network of AC 220V 50Hz.
Lighting of the LED indicates that charging is in progress.
Later during the charging, the LED will switch to the flash mode (boosting charge mode). This means that the battery is 70-80% charged, and will be charged fully within next 2-4 hours. Charge time is 4^{+2} hours.
The battery may be in the boosting charge mode for a long time (up to 24 hours).
At low temperature, internal resistance of the batteries is increased significantly that leads to the decreasing of the battery capacity. That is why it is recommended to not allow the battery to be cooled to the air temperature at cold.
It is necessary to carry out a deep supercharge of the elements at least once in 3 months, or upon significant lowering of the battery capacity, or before long storage (more than a month).
To do this, connect the battery as shows at the Picture 16.
Discharge all even cells down to 0.15 volt or less. The voltage can be checked on the built-in indicator. Sequence number of the cell is set by the switch (red cell numbers).
Connect the plug to the ODD jack, and discharge the odd cells in the same way (black cell number).

11.10. Operating the network power supply unit

Connect one end of the power cable to the BPS, and its other end to the network AC 220V 50Hz. Set the trigger switch NETWORK/OFF into NETWORK position.
Connect one end of the CAMERA-BPS cable to the CAMERA jack, and its other end to the plug BP of the camera. So you'll power up the camera.
Set the trigger switch HEATER/TV into the TV position for work with the video assist, or into HEATER position in the heating mode.

11.11. Operating the camera from the external sync signals and sending the start marker signal

During operating the camera from the external sync signal, set the sync unit on the controller and secure it. Set the sync switch into ◄○ position. Set the "24-25" switch into desirable position.
In the mode of synchronization from the video signal, connect the video signal conversion unit to the sync unit (SYNC plug) by its cable.
Connect the source of the video signal to the video signal conversion unit (VIDEO plug) by the sync signal cable.
In the mode of synchronization from the AC 200V 50Hz network, connect the voltage conversion unit (SYNC plug) to the sync unit (SYNC plug) by the sync signal cable. Connect the voltage conversion unit plug to the AC 220V 50Hz network.
To send the start marker to the external sound recorder at the fixed 24 or 25 fps, connect the start mark cable between the external sync unit (START plug) and the sound recorder.

11.12. Heating

The heater is used when the air temperature drops below plus 5°C.

1) Unscrew the screws of the bottom cover of the side wall (105) (Picture 6), and remove the cover. There is the jack under it. Install the adapter (112) instead of the cover, and secure it by the screws.
2) Connect the output heater jack KSA to the CAMERA jack of the thermo regulator by the KSA-THERMOREG cable.
3) Connect the jack "–24V" to the HEATER clips of the network power supply unit by the cable.
4) Set the thermo regulator switch into HEATING position. After this, the LEDs CAMERA, MAG, and POWER should light up.
5) Some time later the CAMERA and MAGS LEDs should go off, and go on again later (may be not at the same time).

Note. At the minus 30°C, the MAG LED may not go off that doesn't mean any malfunction.
After 2-3 cycles of going the CAMERA and MAG LEDs off and on, the camera is in the working temperature mode. You may start shooting.

12. CONTROLLING THE CAMERA

12.1. Start and stop the camera.

Before running the camera, make sure that it is loaded correctly. Turn the camera mechanism manually in the pointer direction by pressing and turning the handle (102) (Picture 5). The shooting mode power LED should light on the controller.
Start the camera by the button (7) (Picture 2) on the start-up device, or by setting the controller trigger switch into the right position.
Stop the camera pressing the button again or returning the trigger switch into original position.
Note. When using the 300m mag at the 32fps, and more than 250m of the film has been exposed, it is necessary to dense the film by the "WIND" controller button before next start.
During short time of start-up, the red non-sync indicators should light in the viewfinder field of view and on the controller, and sound signal should be heard. During normal run of the camera the power indicator should flash.
After camera stop, the shutter should be in the sight position. If the camera door is open, the film is loose or broken, the camera should not run after the button (7) pressing. The red non-sync indicators should light in the viewfinder field of view and on the controller, and sound signal should be heard.

ATTENTION! During operating the camera in the mode of synchronization from the network or video signal, delay of not less than 30 seconds is required after powering the camera or before next start. In this mode, bit longer start-up time is allowed than in the fixed fps mode.

If the camera stopped as a result of the response of some blocking device, it is necessary to switch the power off before next start. Next start is allowed only after learning and eliminating the reason of the blocking device operation.
Switch the power off by the disconnector button after shooting.

12.2. Operating the lenses

Focus the lenses by their focusing rings or by the focusing knob (120) (Picture 10) of the follow focus device.

ATTENTION! During focusing the lens with checking it through viewfinder, do not forget to set the eyepiece dioptric adjustment for your eye.

Set the aperture by the aperture ring.

13. TROUBLESHOOTING

It is forbidden to do following things during the troubleshooting:

1) To change the factory circuit and assembling/
2) To use an acids instead of colophony during soldering.

If the problem can't be solved without a special tools and qualified tech, the camera should be sent to a specialized repair lab. Such problems include:

1) Mechanical damage of the film channel surfaces.
2) Failure of the claw mechanism and film track.

Possible problems and methods of their elimination are listed in the Table 3.

Table 3

Problem	Possible cause	Method of elimination	Note
The film unwinds from the feeding roll after the camera stop	Holdback belt became loose	Tight the belt by the roller or replace the belt	The belt is included into the ZIP set
Winder doesn't work, the camera stops as due to film break	The belt became loose, or friction moment is weak	Adjust the belt stretch (subsection 14.5) or increase the friction moment (subsection 14.6) or replace	–//–

		the belt	
Scratches or friction lines on the film	Scale on the working surfaces of the film channel. Dirt at the film track elements	Remove the scale and clean the film track elements	
'Salad' in the camera	Incorrect loading of the camera	Reload the camera (subsection 11.2 and 11.3)	
The disconnector LED is flashing after switching it ON	The battery is discharged	Charge the battery or replace it with charged one	
The camera doesn't run after pressing the START button	1) A blocking operates	1) Check the correctness of the film loading	
	2) The start-up device cable is broken	2) Check the cable and repair it if necessary	
	3) The fuse of the connector is burnt	3) Replace the fuse	The fuse is included into the ZIP set
The LED isn't going ON after plugging the charger to the network	1) The fuse is burnt	1) Replace the fuse	–//–
	2) The charger cable is broken	2) Check the cable and repair it if necessary	
No indications on the discharger	The discharger cable is broken	Check the cable and repair it if necessary	

14. MAINTENANCE

The maintenance includes the following procedures: cleaning of the camera, mags and optics, and lubricating of the camera mechanism.
- Make a 3 minutes pause and clean the film channel after 300m of exposed film.
- Clean the camera and lubricate the mechanism after 3000m of exposed film.

14.1. Cleaning the camera

Clean the external surfaces of the camera components with the cotton napkin before and after operation.
Keep the film track clean carefully. Clean the sprockets, the clamping rollers, the mag opening, and guiding rollers with the brush and by blowing.
Check a condition of the front and rear film gates before shooting and remove a scale if necessary.
The procedure of removing and installing of the film gates is described in the subsection 11.3a.
The scale should be removed with the flannel napkin wetted in the spirit.

ATTENTION! Do not remove the scale by hard tools including wooden ones.

Check condition of the jacks, plugs and sockets. Wash them with spirit of necessary.

14.2. Cleaning the optics

Clean the optical elements of the lenses and viewfinders carefully to not damage the coating layer. Remove the dust and dirt by the soft brush or by blowing.
Oil spots and fingerprints should be removed with the cotton wool wetted in the spirit or ether.
Clean the mirrors with external aluminizing with the cotton wool wetted in the pure gasoline or ether. Do not press the wool.

14.3. Cleaning the shutter

Don't touch the mirror surface of the shutter, and protect if from the moisture.
Blow out the dust from the mirror surface. Use the cotton wool wetted in the pure gasoline or ether in the exclusive cases only (such as oil spots or fingerprints).

14.4. Lubricating

Full lubricating is accomplished during overhaul only.
In the normal climatic conditions, use the oil VNIINP-6 TU 38-001-168-79 to lubricate the parts of the claw mechanism and the shutter shaft after each 3000m of exposed film. Dose two oil drops to the guiding forks of the registration mechanism, the registration mechanism supports and the shutter shaft. Remove the registration mechanism cover to access it.
Lubricate the shutter shaft through the lens mounting. On the shutter, unscrew the black painted crew.
During operation at high temperature, lubricate the camera every day. After lubricating, test the camera at 24fps during 15-20 seconds.
Lubricate the registration mechanism shaft through the hole under the screw of the crank cog-wheel. Unscrew the screw.
To lubricate a drive shaft you should remove rear side of the camera.
Extra oil drops should be wiped with soft cloth.
Check the camera operation after lubrication. Run it at 24fps for 15-20 seconds.

14.5. Adjusting belts tension in mags.

There is a slit in the plate of the mag mechanism to adjust tension of the take-up spool. In the 150m mag, this slit is covered with a cover secured with a single screw.
To adjust tension:
1) loosen the screw in the slit;
2) move the plate with a roller to adjust tension;
3) measure currents consumed by the mag motors. Max current should be not higher that values given in the Table 6.

Position of the switch on the connector MKBI.434454.063	Current consumed by the mag motor at 12(±0.3)V, A		Notes
	150m mag	300m mag	
TOPM	0.3-0.4	0.3-0.5	Without film
IIODMOTKA	0.3-0.4	0.3-0.5	Without film
TOPM	1.0-1.2	1.1-1.3	Blocked feeding spool
IIODMOTKA	1.2-1.3	1.4-1.5	Blocked take-up spool

Control is accomplished by the power connector MKBI.434454.063 plugged into 12V power source with an amperemeter connected to (+) and (-) jacks of the connector.
ATTENTION: SET THE CONNECTOR SWITCH INTO WORKING POSITION DURING CONTROL
If measured current doesn't match given values, adjust belts tension (paragraph 14.5) and friction tension (p.14.6).
If these adjustments don't provide necessary values of the consumed current, it is necessary to replace belts in the mag (paragraphs 14.7 and 14.8).

14.6. Adjusting of the friction tension in mags

14.6.1. 150m mag

Adjusting of the take-up spool (135) (Picture 8) is done in following way:
1) unscrew the nut (210) (Picture 17) for a few turns, but don't remove it;
2) lift the stop washer (211) - pull its bent part from the nut slit (212);
3) turn the nut (212) clockwise or counter-clockwise.

ATTENTION! Turning the nut clockwise increases the friction moment, and vice versa.

4) Place the tightening washer (211) back.
5) Secure it by the nut (210).

14.6.2. The 300m mag

Adjusting of the 300m mag take-up lug friction is accomplished by turning the nut clockwise or counterclockwise through the slots “D” (Picture 8a) and “E” of the disk.

ATTENTION! Turning the nut clockwise increases the friction moment, and vice versa.

14a. PRESERVING

The camera preserving should be done in the special rooms with temperature not lower than 15°C and relative humidity not higher than 70%. There are allowed day-to-day temperature variations that don’t cause a moisture condensation.
The camera should be preserved in fully operational state.
Metal parts should not have any corrosion or mechanical damages.

14a.1. Preparation for preserving

1) Check the camera completeness.
2) Clean any oil or mechanical dirt from the surfaces:
   - clean the optical elements with the cotton wool wetted in the 10-15% solution of spirit in ether.
   - clean the metal parts with the cotton napkins wetted in gasoline GOST 443-76.
   ATTENTION! Do not clean a friction parts, cog-wheel etc. with gasoline or solvent! There should remain an oil after the camera assembling.
3) Wrap the lenses and viewfinder into the cigarette paper GOST 3479-85.
4) Put all the outfit into the cases.

14a.2. Preserving

The preserving is accomplished accordingly to the protection variant VZ-10 GOST 9.014-78.
14a.2.1. This method means isolation the camera from the environment by means of the packing materials with subsequent drying the air in the isolated space with a moisture absorber (silica gel).
14a.2.2. Use a polyethylene bags of type M and S accordingly to GOST 10354-82, 1st grade, with 0.15-0.30mm thickness.

14a.2.3. Wrap the case into the paper before placing them into the bags. Use any of the following papers:
- paraffined paper GOST 9569-79;
- paraffined capacitor paper GOST 1908-82;
- two-ply packing paper GOST 8828-75;
- brown paper GOST 8273-75 sodden with temporary corrosion preventing agent.

14a.2.4. Use the fine technical silica gel GOST 3956-76 do dry the air in the isolated space. Drying of the silica gel and its storage is in accordance with GOST 3956-76.

14a.2.5. Rate of the silica gel for one year storage is shows in the Table 4.

Table 4

Storage place	Surface density of the silica gel, kg/m^2 of the film of the following thickness (mm)		
	0.15	0.20	0.30
Heated room	0.30	0.20	0.15

14a.2.6. Prepack the silica gel into the small bags before placing it into the polyethylene bag. Do not place more than 1kg of the silica gel into each of the small bags.

14a.2.7. Remove the extra air from the bag by pressing it up to weak adjacency it to the case, and lute the bag.

14b. DEPRESERVATION AND RE-PRESERVATION

14b.1. Depreservation procedure:
- depressurize the cases;
- remove the bags, silica gel, and packing material.

14b.2. Re-preservation should be accomplished if any defects were found in the corrosion preventing protection, or after 1 year of storing.

14b.3. The re-preservation is accomplished by partial unpacking, silica gel replacing, and subsequent lute of the bags.

15. STORAGE RULES

The camera is optical and mechanical device. It is forbidden to drop and strike it, or leave it under rain or snow.

The camera outfit should be stored in the cases at temperature of 5-40°C in the heated ventilated rooms. Average monthly relative humidity should not exceed 65% during warm wet season.

Note. It is allowed a short-term humidity increasing up to 80%.

The cases should be stored accordingly to their labels “Top; don’t turn over”.

Do not keep the camera near the heaters or acids and alkali.

Presence of the active gases and vapors in the storage room is forbidden.

Preserve the cases (section 14a) to prevent corrosion during transporting and storage.

16. TRANSPORTING

The transporting of the packed camera is accomplished in accordance with current rules of the transporting by any covered vehicles, or by open vehicles (the cases should be covered by asphalt-laminated paper GOST 626-77 or roofing glassine GOST 2697-83.

During air transporting, the camera should be in the pressurized heated module.

Transporting of the camera during operation period should be accomplished in the cases in accordance with the rules described before.

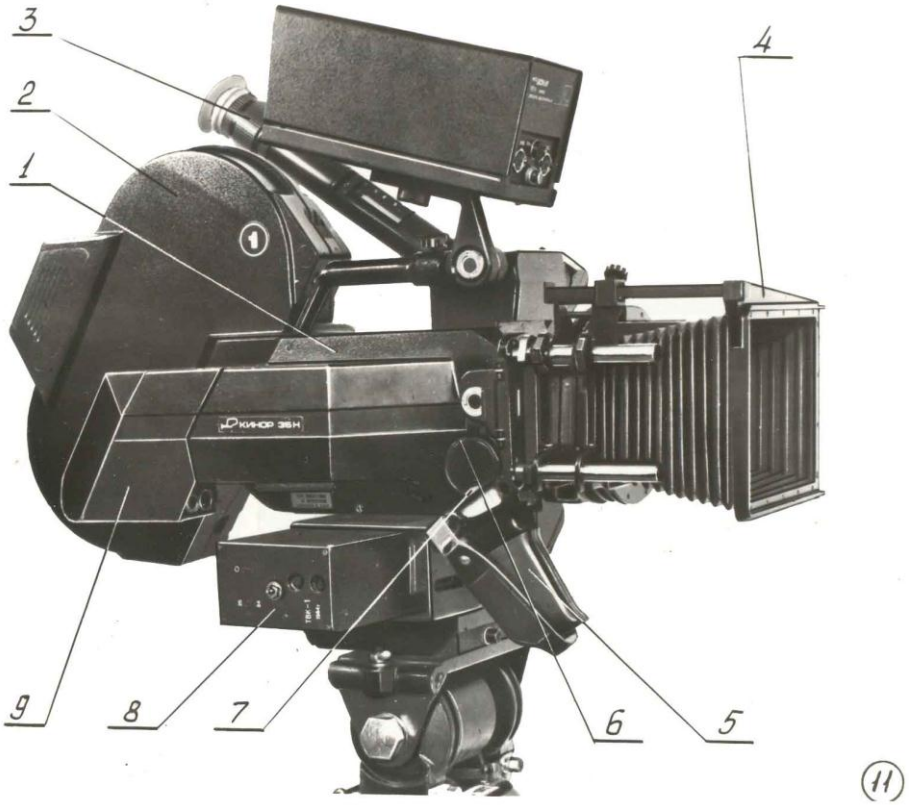
APPENDIX

LIST OF THE PICTURES

The camera Kinor-35H. General view.

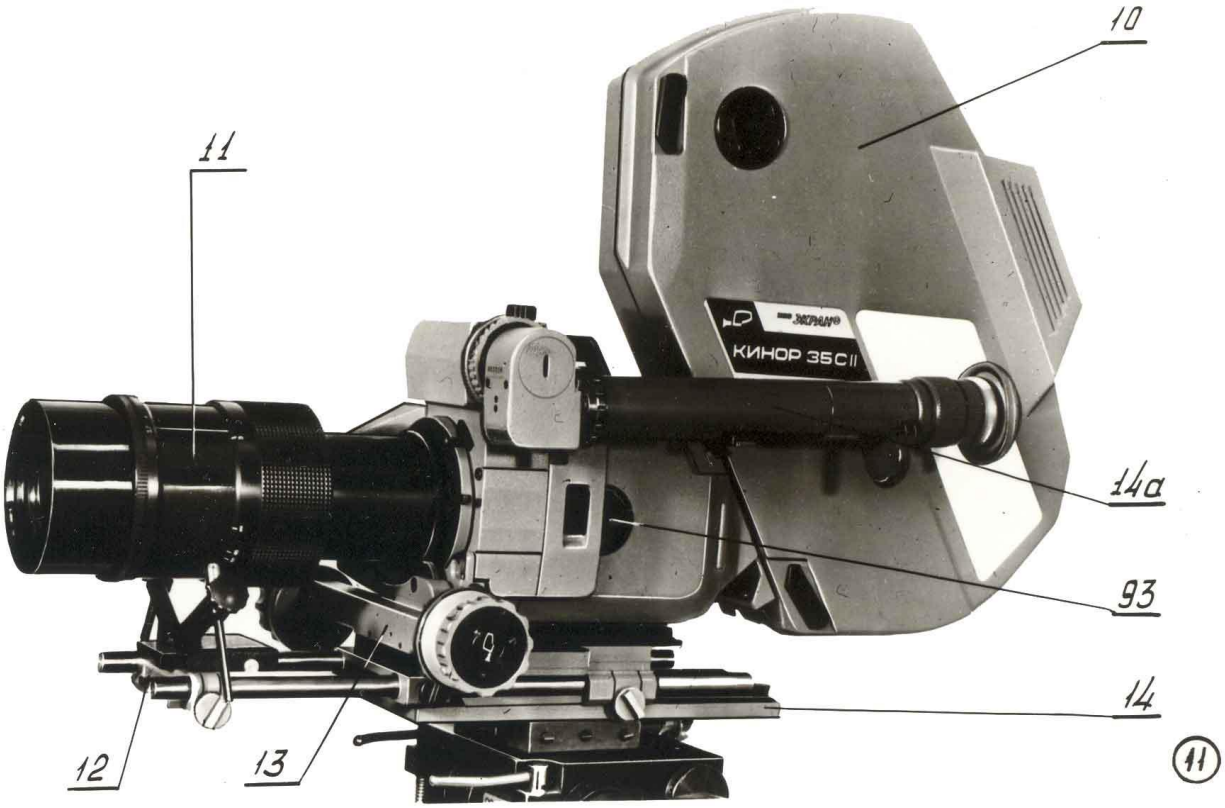
Picture 1

The camera Kinor-35H. Right view.



Picture 2

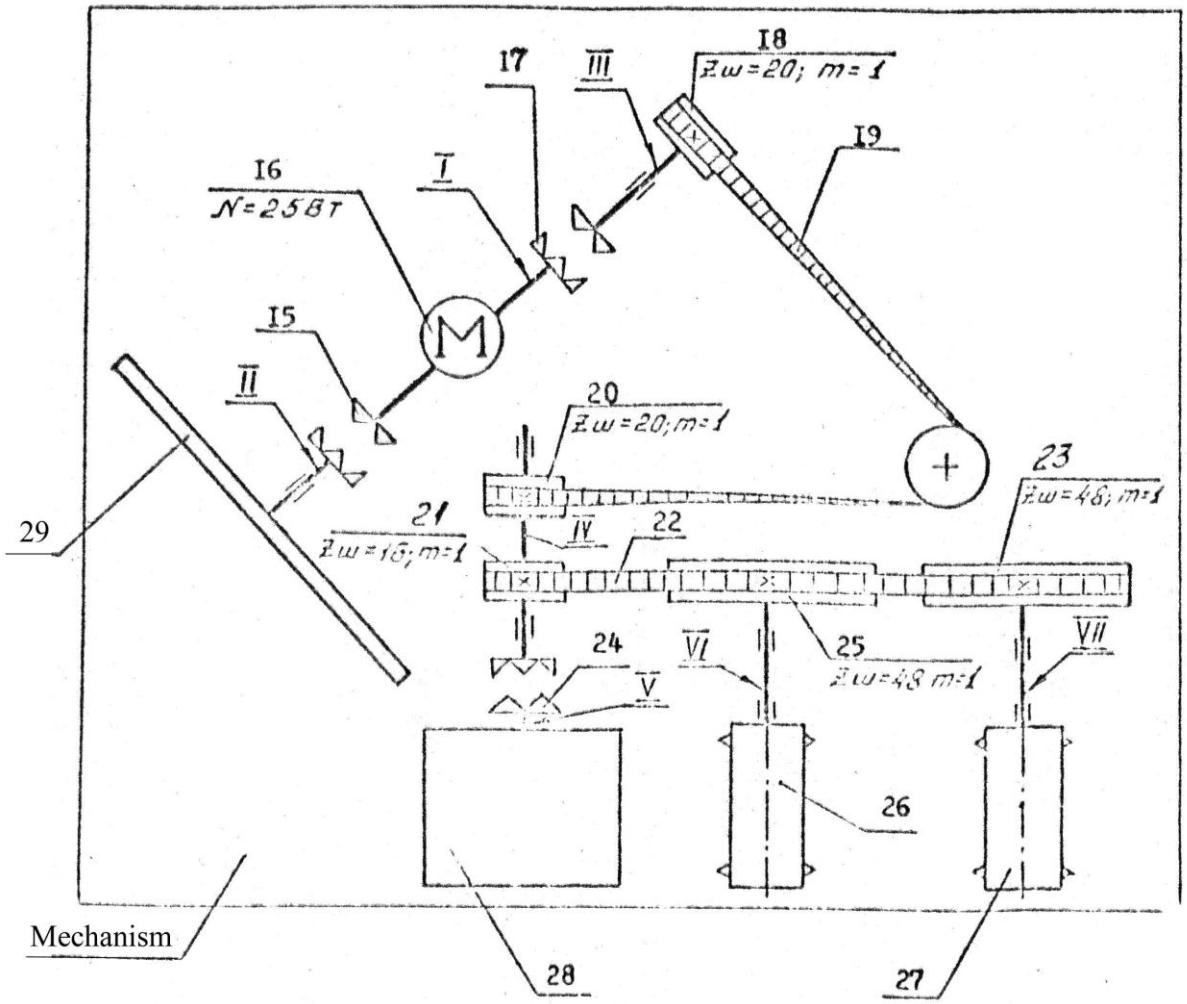
The camera Kinor-35H with the 300m mag.

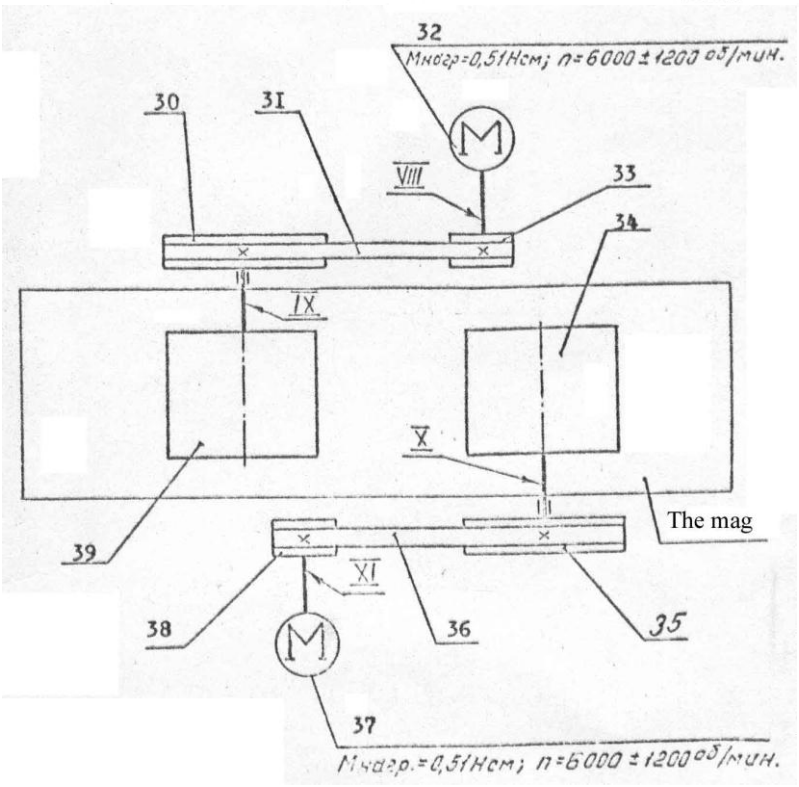


Picture 2a

The camera Kinor-35H with the 150m mag and the mag tilt.
Picture is missing. Sorry.
Picture 2b

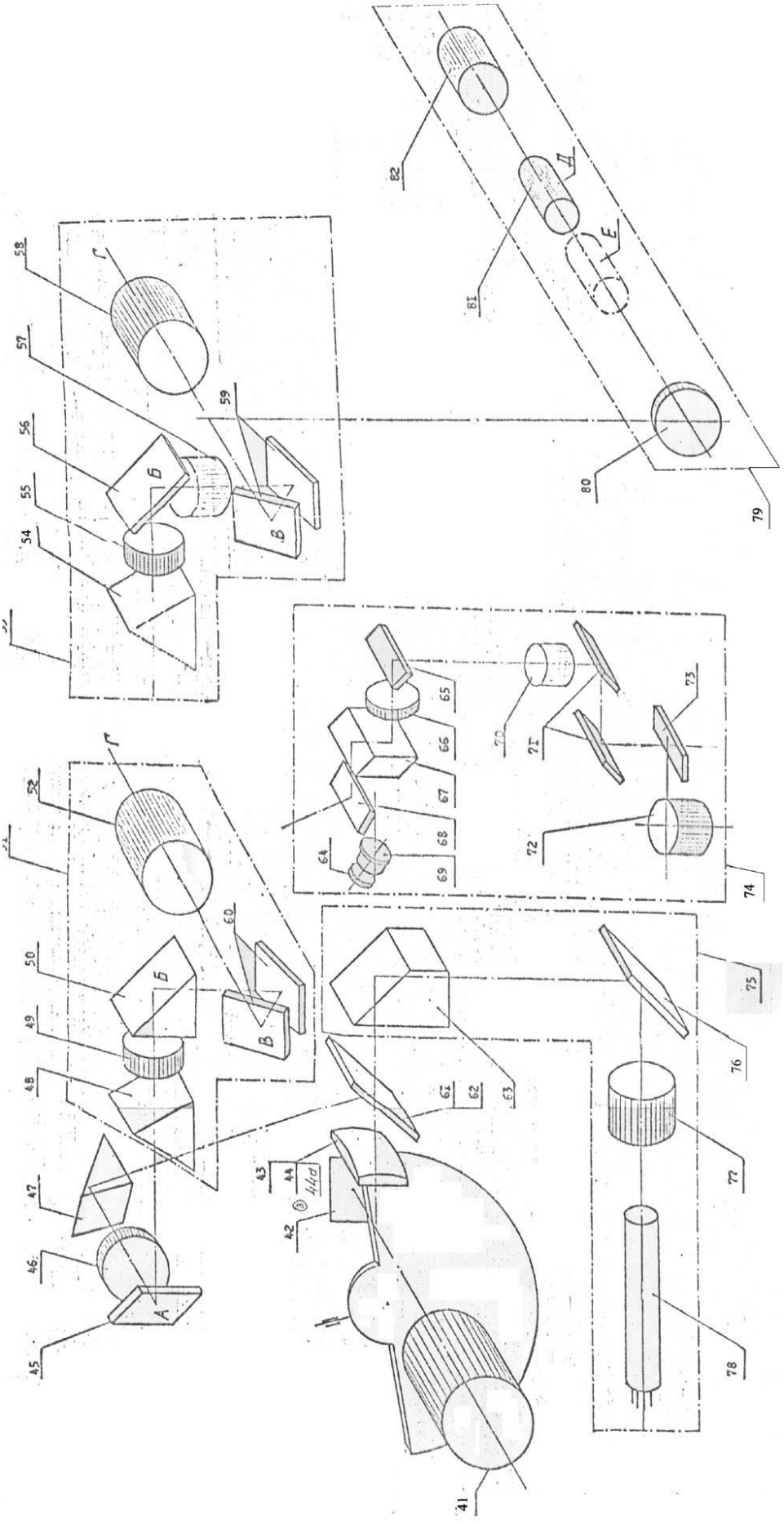
The camera Kinor-35H. Kinematics.





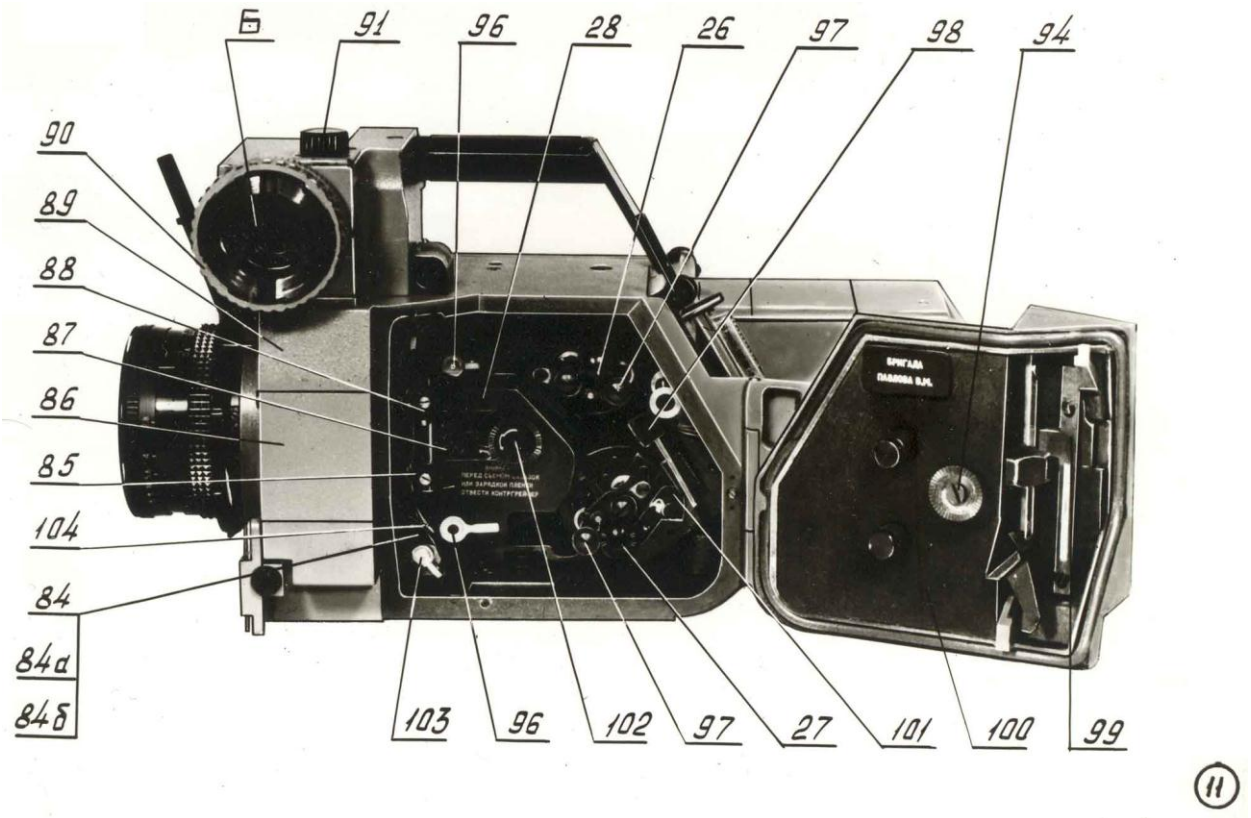
Picture 3

The camera Kinor-35H. Optical schematics.



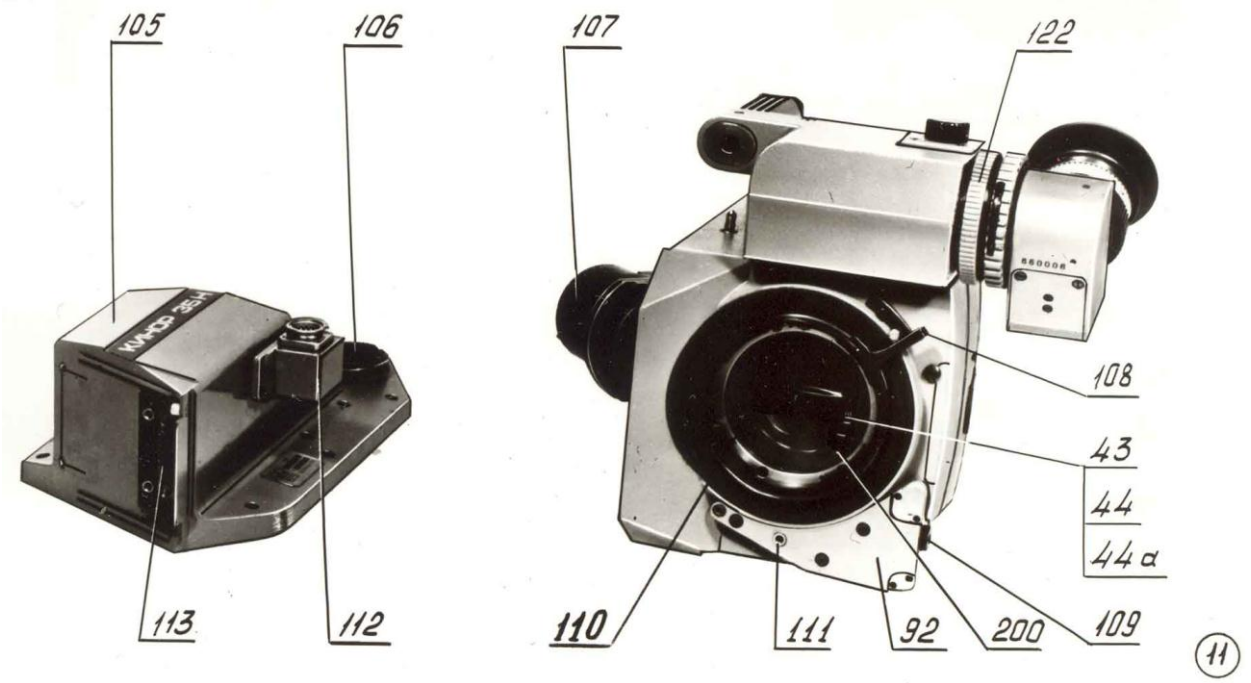
Picture 4

The camera. Film track side view.



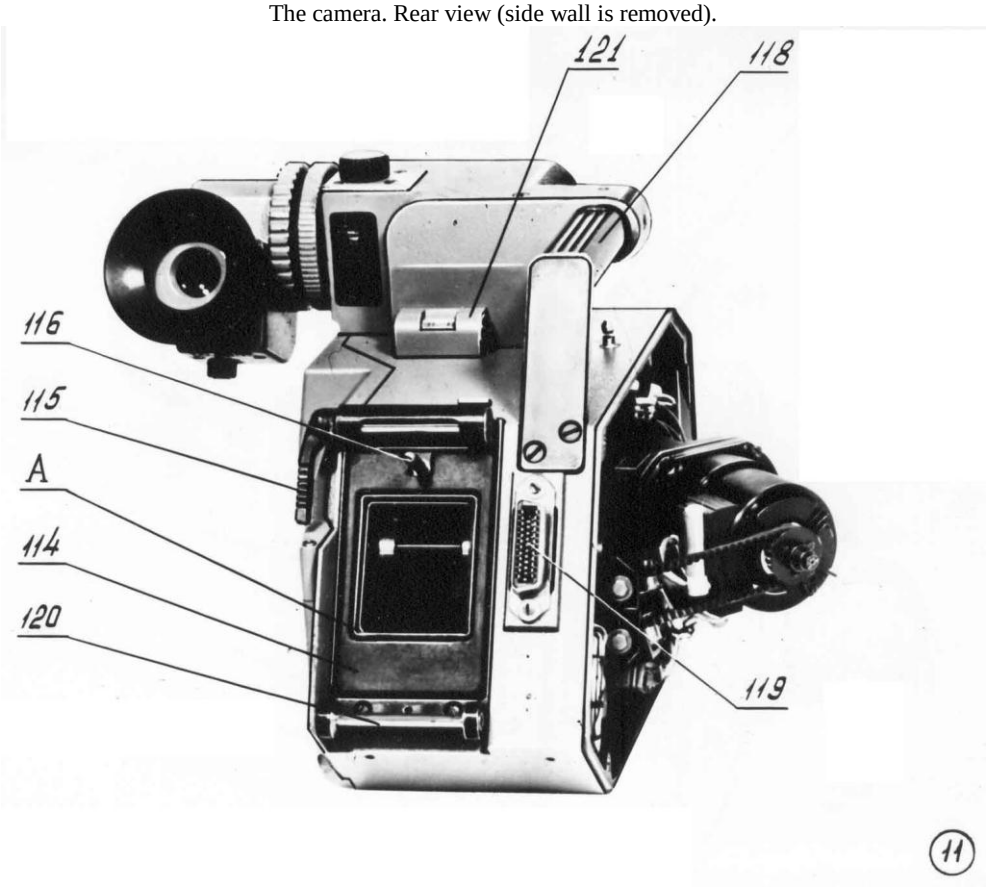
Picture 5

The camera. Front view (side wall is removed).



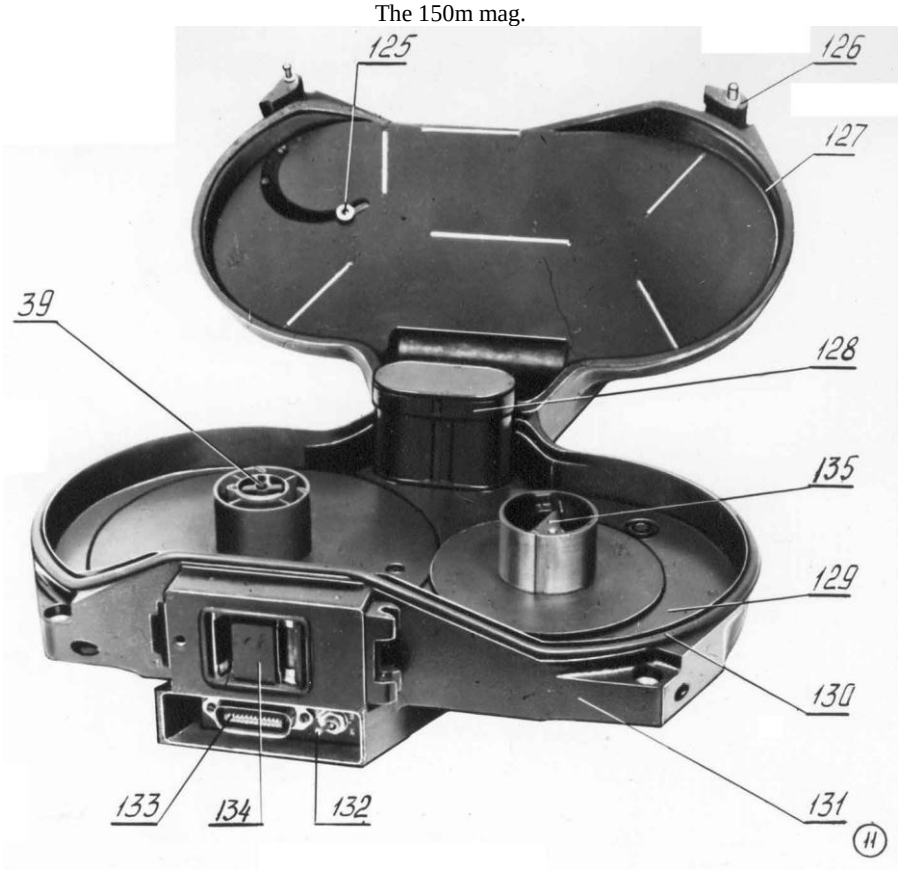
Picture 6

The camera. Rear view (side wall is removed).



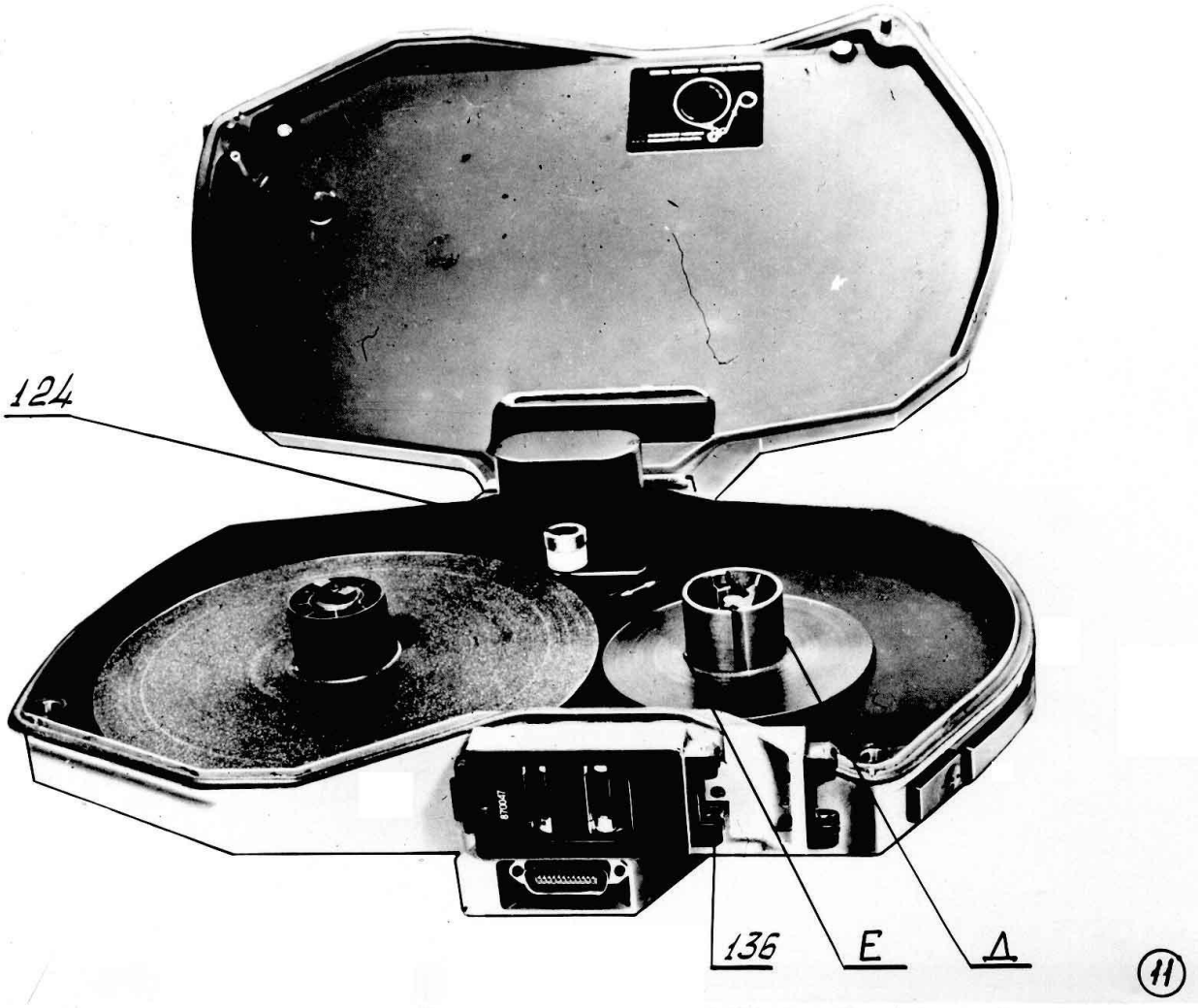
Picture 7

The 150m mag.



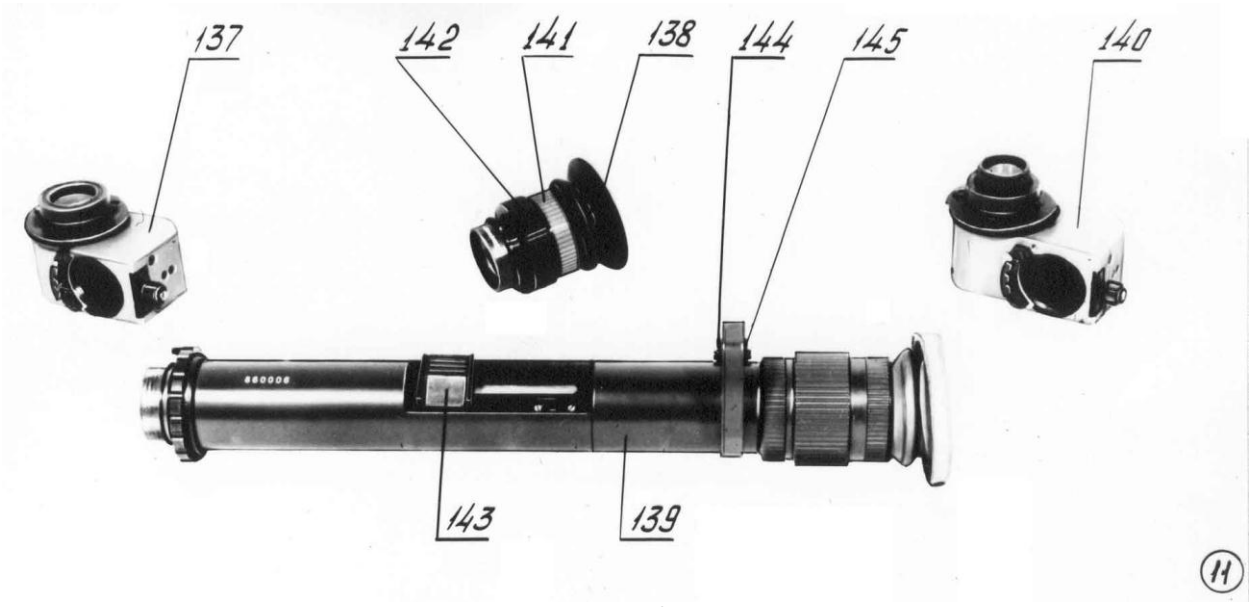
Picture 8

The 300m mag.



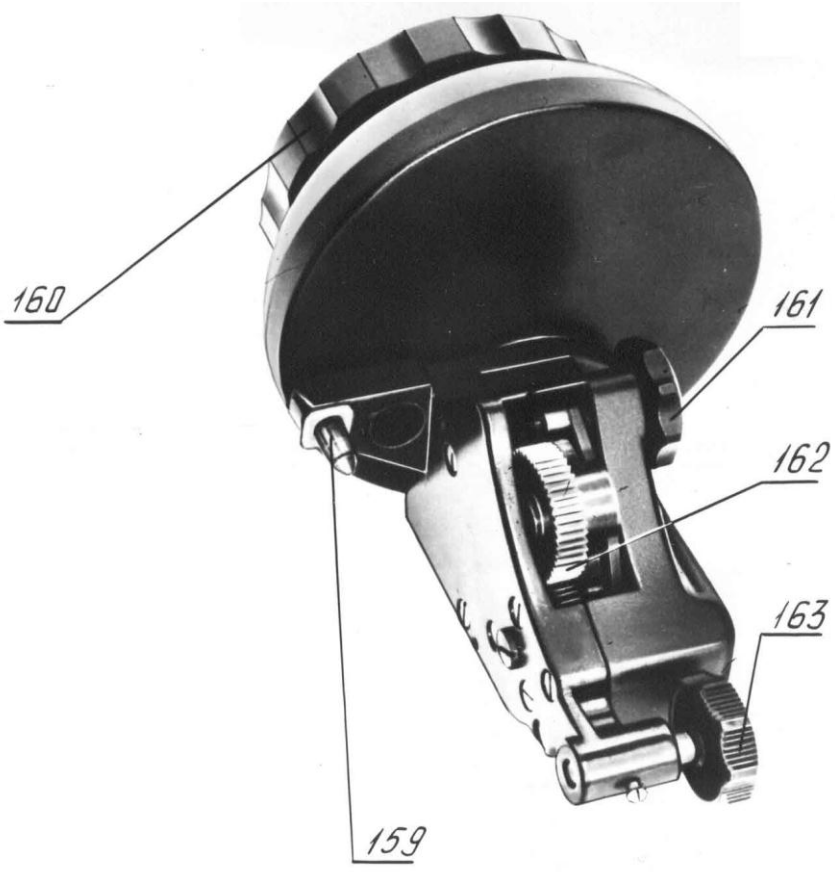
Picture 8a

The viewfinders.



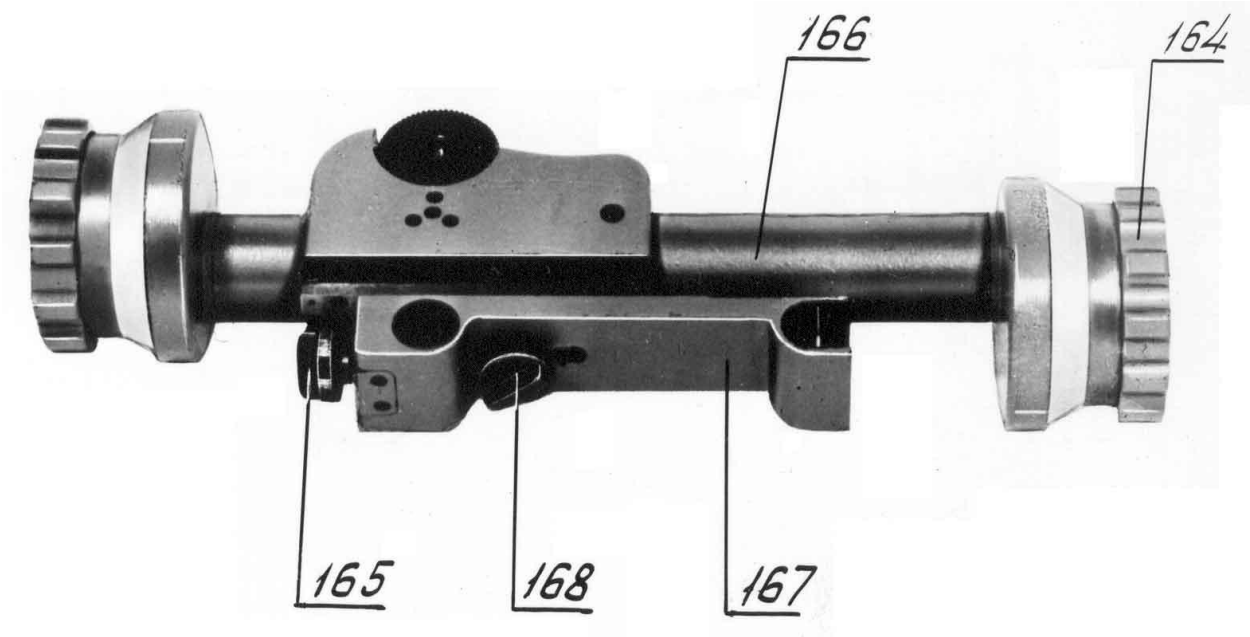
Picture 9

The one-side follow focus device.



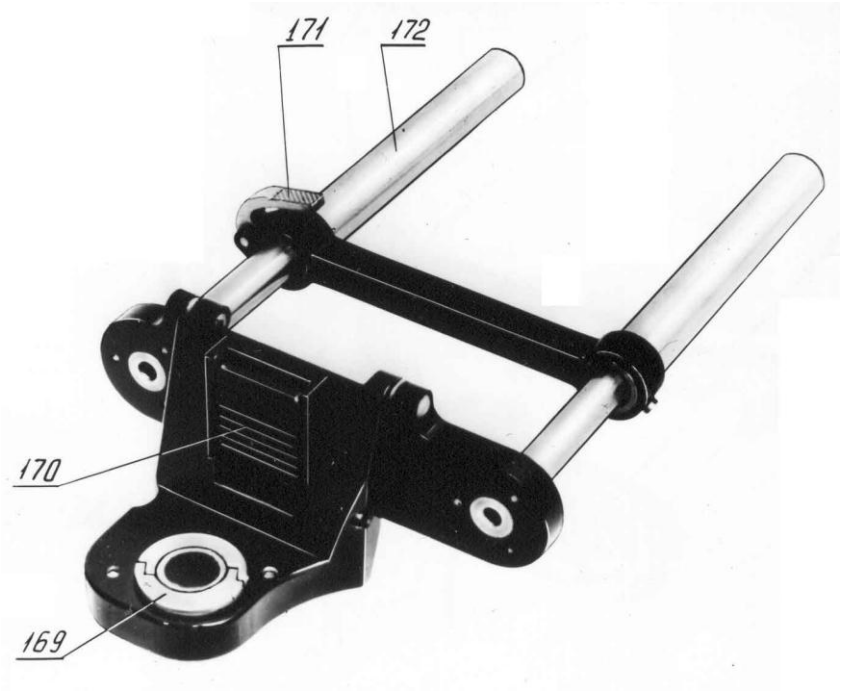
Picture 10

The two-side follow focus device.



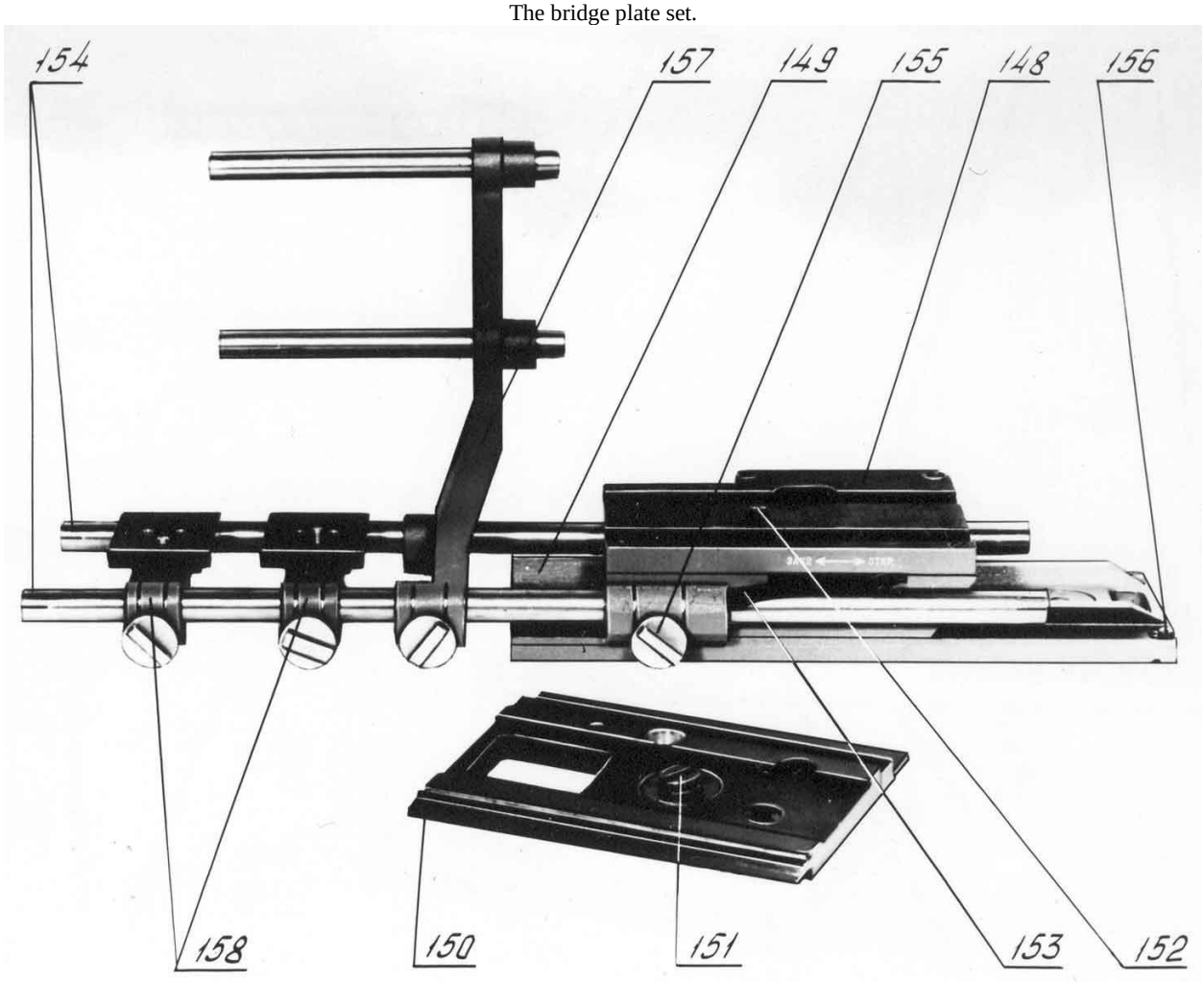
Picture 11

The matte box bracket.



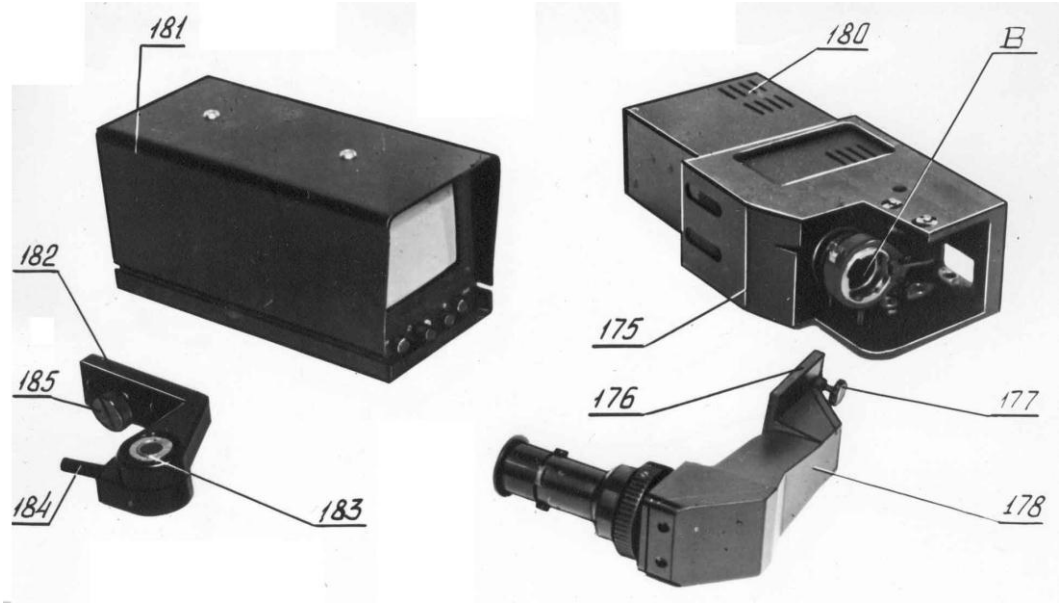
Picture 12

The bridge plate set.



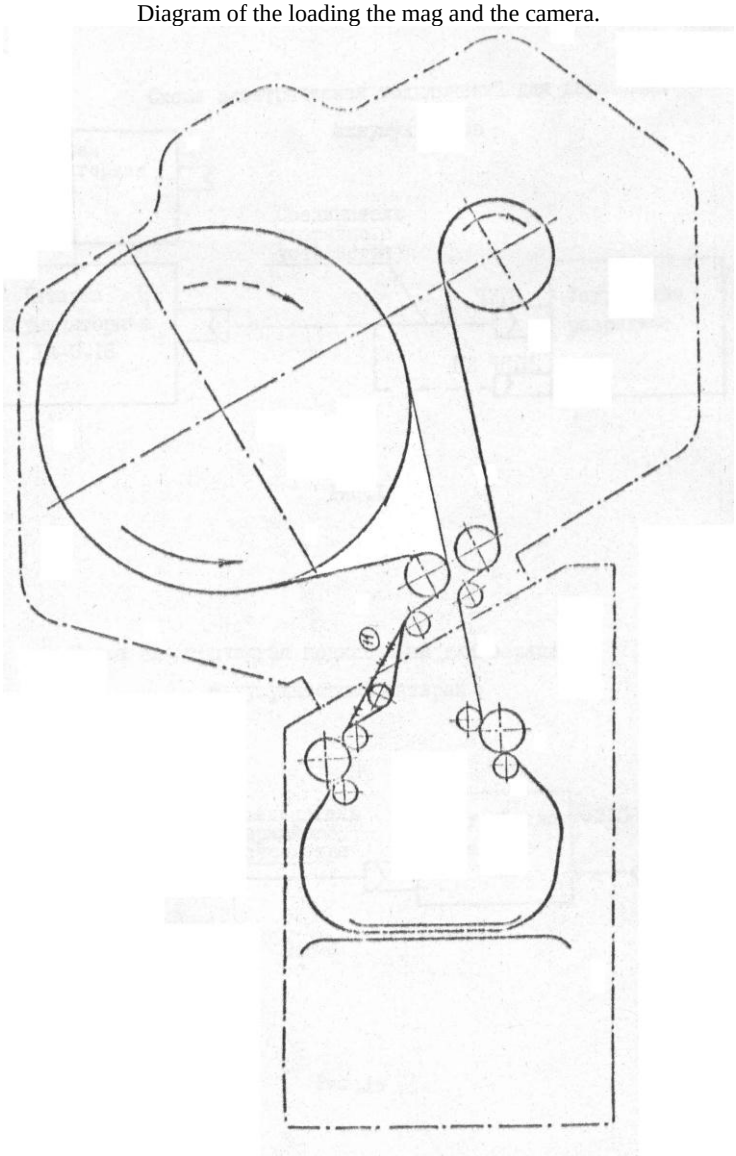
Picture 12a

The video assist set.



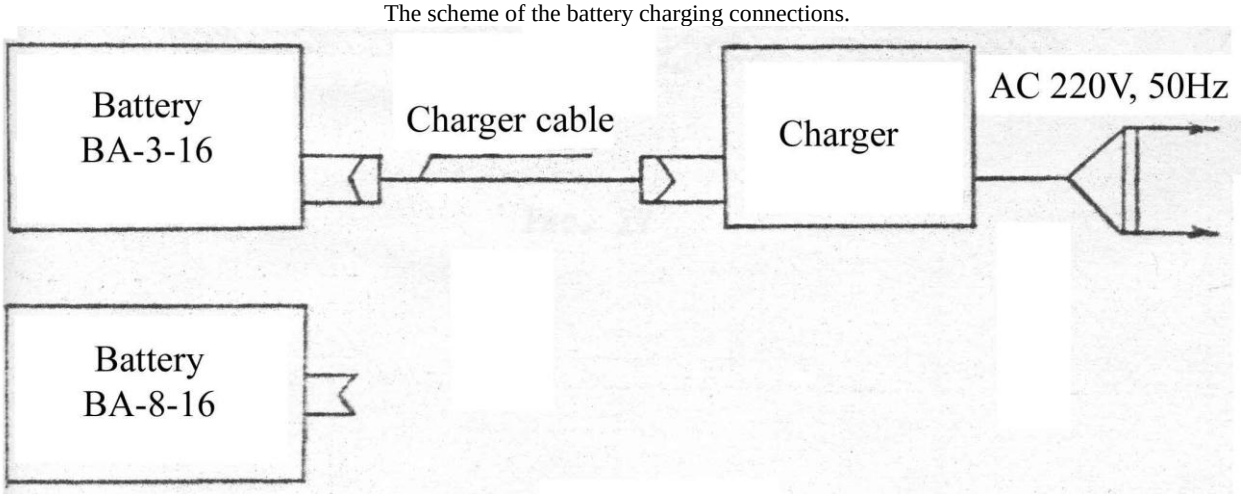
Picture 13

Diagram of the loading the mag and the camera.



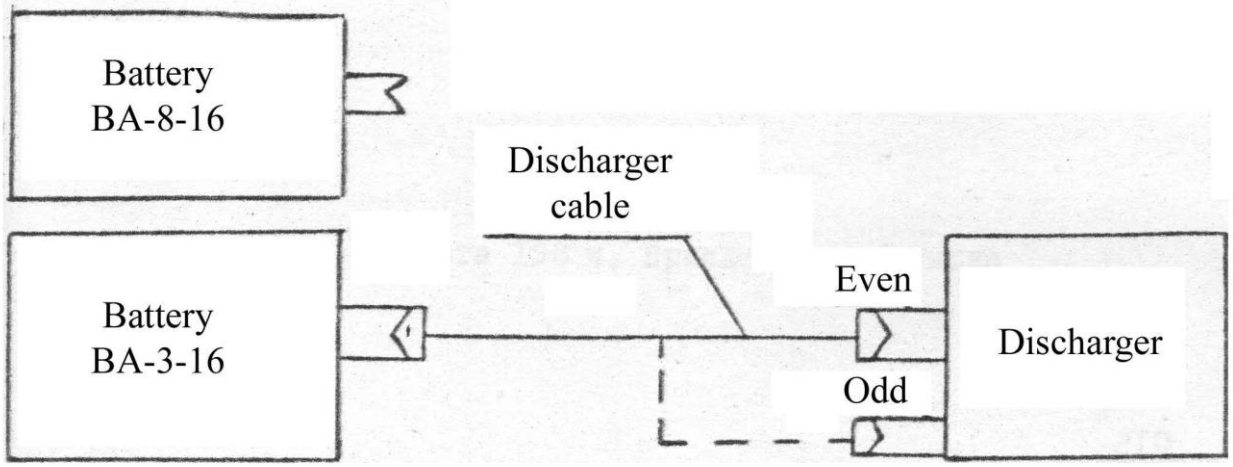
Picture 14

The scheme of the battery charging connections.



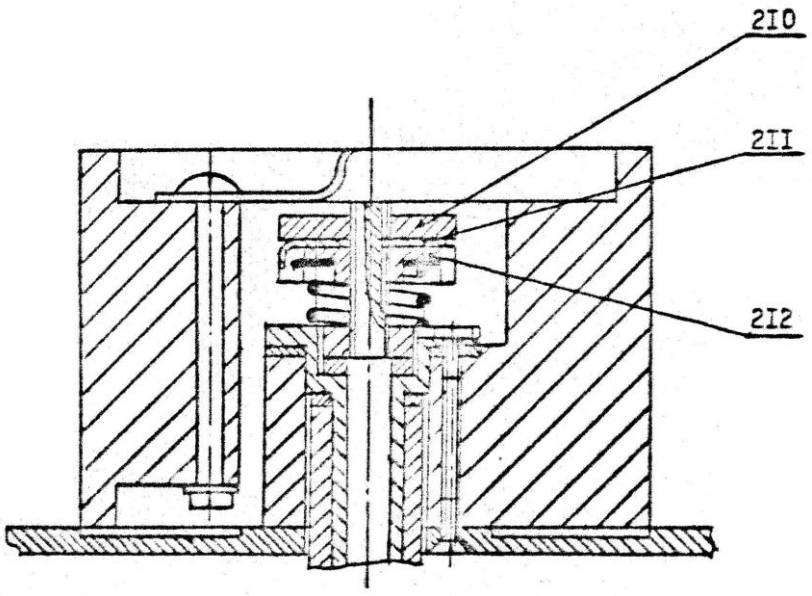
Picture 15

The scheme of the battery deep charging connections.



Picture 16

The scheme of the battery charging connections.



Picture 17