Film-Tech

The information contained in this Adobe Acrobat pdf file is provided at your own risk and good judgment.

These manuals are designed to facilitate the exchange of information related to cinema projection and film handling, with no warranties nor obligations from the authors, for qualified field service engineers.

If you are not a qualified technician, please make no adjuatments to anything you may read about in these Adobe manual downloads

www.film-tech.com

Cinema projectors of the MEO 5 XB1 and MEO 5 XB3 line

Description of the machine

MEO 5 XB1 (**Fig.1**) and MEO 5 XB3 (**Fig.2**) are professional stationary projectors designed for projecting 35_mm films with optical sound record. The projectors enable projecting all currently used formats: 1:1.37; 1:1.66; 1:1.85 and 1:2.35. The turret holder of auxiliary lenses (hand or motor driven) enables an arbitrary combination of three formats.

The electrical interconnection of projector and lamp is carried out by introducing the lamp plug into the machine connector, the mechanical connection is carried out by means of four bolts and nuts. The machine and the xenon lamp have been set up together and marked with the same production number at the manufacturer's. Thus the installation at the user is substantially facilitated.

For film winding-up and winding-off with the projectors MEO 5 XB1 are used spools with capacity of 600 m or 1800 m, with projectors of the MEO 5 XB3 line also spools with 2400 m capacity. The winding-up and winding-off units have the driving shaft diameter 9 mm, with removable reducing adapter diameter 12.7 mm enabling use of all spools mentioned. Both units are designed as independent, transmissions are accomplished with indented belts with minimal maintenance and long service life, the hysteretic motors enable their use also for rewinding out of the film gate of the projector by means of rewinding rollers.

The driving force distribution from the main motor (**Fig.3 - pos.11**), that is single-phase with the projector MEO 5 XB1 and three-phase with the projector MEO 5 XB3, is achieved by means of two polyurethane indented belts of equal length (**Fig.3 - pos.4**). Besides the feed and take-up sprockets, the motor drives also the Maltese cross mechanism. The Maltese cross chamber (**Fig.3 - pos.3**) is designed as independent system with inner geared transmission and drive for double-wing rotary shutter. The Maltese cross chamber is oil-filled.

The film guide is suitably curved and provided with guide bars from both sides coming in contact with the film strip. A part of the film guide is movable which allows film threading. With the projector MEO 5 XB1 film format changing is carried out manually by exchanging the format mask on the fixed part of the film guide. With the projector MEO 5 XB3 the film format changing is carried out automatically by pressing down the respective format push button on the control panel. The format push buttons are electrically led out on the connectors of the main terminal board of the projector which enables to connect a remote controller or another control system. The movable film guide

part, called also variable film guide (**Fig.2 - pos.14**), is provided with a mechanism for automatic changing the mask format when turning the turret with auxiliary lenses.

Additional focusing of the image being projected with the projector MEO 5 XB1 as well as the height correction of the projected image compared with the picture aperture is accomplished by means of a turning knob. With the projector MEO 5 XB3, besides hand made corrections also remote motor operated corrections using a control box, optionally delivered as extra accessories, are possible.

For stabilizing the film strip in front of the optical sound head, there is provided a braking sprocket (**Fig.10 - pos.16**) with adjustable braking torque. The optical sound record is read by a double-channel macro optical sound head (**Fig.12 - Pos.1 and 7**) with rotary sound gate (**Fig.12 - pos.6**), driven by the film strip. The lap dissolve flap, placed inside the case, is controlled electro magnetically. After film run-out, break or cut the projector terminal switch (**Fig.12 - pos.10**) closes the lap dissolve flap, stops the projector, switches off the xenon lamp, stops the winding-off and winding-on unit and switches on the lamp inside the projector casing.

Control of all projector functions is concentrated on the control panel of the projector (**Fig.1 - pos.3**). The particular push buttons are designated with symbols of the functions. With the projector MEO 5 XB3 also push buttons for format selection are available. A turning knob for hand turning of the projector is provided under the control panel.

The construction system ALMES with electronic units, necessary for the projector and xenon lamp operation, is located in the rear part of the projector casing. The individual electronic units are easy to exchange. The terminal board for connecting the projector and the lamp to the power network, for interconnection of a pair of projectors or for remote control connection (**Fig.5 and 6 - pos.3**) is located in the lower part of the projector casing. On the lower projector panel is provided a connector for introducing the contact less induction mark reader (**Fig.12 - pos.4**), necessary for automatic lap dissolving of projectors. On the lower rewinding arm is provided a switch for pull selection of 600/1800 or 2400 m according to spools used. On the side wall of the projector casing is provided a connector with outlet of the sound signal from the stereo sound head. On the electronic unit PL_02.1 (**Fig.3 - pos.13**) is located a switch enabling to put out of operation the winding-on and the winding-off unit when projected from tower or plates.

Further details on xenon lamps H1; H11 and H2 are part of separate instructions, and that is why they will be mentioned only marginally.

Technical data

Pictures frequency 25 frames . s-1

Effective light flux with lens Meopta Meostigmat 1.7/84 for sides relation 1 : 1.37; measured under ÈSN 19 0040

- for xenon lamp H1 with discharge lamp 1 600 W 5 500 lm

- for xenon lamp H11 with discharge lamp 1 600 W 6 000 lm

- for xenon lamp H2 with discharge lamp 4 000 W 13 500 lm

Image oscillation in horizontal and vertical direction max. 0.2 % frame height

Height setting of image with projector running ± 0.5 frame

Illumination evenness of sound head slot to 3 dB

Sound head output voltage in one channel min. 8 mV

Film speed variation in spot of optical sound record scanning max. ± 0.2 %

Cross talks between right and left channel min. 40 dB

Driving shafts for spools diameter 9 mm and diameter 12.7 mm

Rewinding duration: 600 m 4 min 1 800 m 7 min 2 400 m 14 min

Optical axis height in horizontal projector position 1 225 mm ± 25 mm

Tilt possibility of optical axis from horizontal position + 3° to - 8°

Power input of MEO 5 XB1 450 W

Power input of MEO 5 XB3 500 W

Supply voltage of MEO 5 XB1 230 V~; 50 Hz

Supply voltage of MEO 5 XB3 3 x 230 V/400 V~; 50 Hz

Outside dimensions - length 740 mm

- width 500 mm

- height of MEO 5 XB1 1 780 mm

- height of MEO 5 XB3 1 850 mm

- height of MEO 5 XB1 with spool 1 800 m 2 055 mm

- height of MEO 5 XB3 with spool 2 400 m 2 160 mm

Mass of projector MEO 5 XB1 170 kg Mass of projector MEO 5 XB3 175 kg

Mass of xenon lamp H1 50 kg

Mass of xenon lamp H11 50 kg

Mass of xenon lamp H2 78 kg

Values of electric motors used

Motor M1 with MEO 5 XB1 - for driving projector mechanisms Asynchronous single-phase motor 230 V; 120 W; 50 Hz; 1420 rev.min-1; IM 1082

Motor M1 with MEO 5 XB3 - for driving projector mechanisms Asynchronous three-phase motor 3´400/230 V; 50 Hz; 120 W; 1380 rev.min-1; IM 1082

Motor M2 - for driving the winding-off unit

Motor M3 - for driving the winding-on unit Asynchronous single-phase motor with permanently connected condenser and special hysteresis rotor 230 V; 50 Hz; 16 W; 1 300 rev . min-1

Motor M4 with MEO 5 XB3 - for remote lens focusing

Motor M6 with MEO 5 XB3 - for driving the turret holder of auxiliary lenses 2 W; 5000 rev . min-1

Motor M5 with MEO 5 XB3 - for remote picture framing 24 V; 0.5 A; 45 rev . min-1 on output shaft

Motor M7 - for cooling the projector casing space, fan 230 V; 50 Hz; 21 W; 2600 rev . min-1

Values of lamps used

Lamp E3 - exciter lamp of the optical sound head Halogen lamp H3 12 V, 55 W

Lamp E4 - illumination of projector casing and film guide Lamp KALA 230 V; 100 W

Lamp E2 - short-circuit signaling of source Z 02 Telephone lamp 6 V; 50 mA; T7

Lamp H6 - indication of film threading Telephone lamp 36 V; 0.05 A; T7

Lamp H5 with MEO 5 XB1 - start indication of motor M1 Telephone lamp 36 V; 0.05 A; T7

Values of fuses used

Source Z 01.1 - fuse link T 500 mA/250 V - fuse link F 2 A/250_V

Source Z 02 - fuse link T 800 mA/250 V

Switching unit MT 14.1 with MEO 5 XB3 - over current relay R 100 - fuse link T 200 mA/250 V

Main circuit breaker with MEO 5 XB1 - single-phase 230 V/400 V~; 50 Hz; M 3.5 A

Main circuit breaker with MEO 5 XB3 - three-phase 230 V/380 V~; 50 Hz; M 3.6 A

Projector assembly in the projection room

For transport the projector is fastened by means of three screws on the transport pallet and placed in a transport package. After dismantling the pallet from the projector base in the projection room the projector is located on the due place of the projection room floor. By means of the supplied slidable anchoring beam and anchoring screw M 20 x 200 form B the projector is to be fastened to the floor in the following way (**Fig.19**). The anchoring beam is inserted into the slot of the base angles in a distance of 295 mm from the front edge of the base. The position of the hole in the anchoring beam is to be marked on the projection room floor. The slidable anchoring screw and a washer are put on the anchoring screw, a nut is screwed on and firmly tightened.

In the case that the base cannot be fastened on the middle anchoring screw, it can be fastened by using three holes in the base angles. With this way of base fastening any additional projector movement is disabled.

The nuts on the side wall of the projector casing are screwed off from the bolts and the washers are taken off. The xenon lamp housing is put on these bolts and fastened to the projector by means of washers and nuts. The electric interconnection of the lamp cabling and of the projector cabling is carried out by introducing the plug VVK 670 of the lamp bunched cables into the corresponding connector of the projector. The protecting conductor of the projector is connected to the earthing screw of the lamphouse. Thus the mechanical and electric connection of the lamphouse and of the projector is carried out.

The closing devices of the rear door are slightly moved and opened. A further operation is to put on and to fasten the flywheel (**Fig.3 - pos.5**) on the rotary gate shaft. For the sake of transport reasons the flywheel has been taken off at the manufacturer’s before shipping. The screw on the shaft is loosened, the transport securing ring is taken off and the flywheel of the optical sound head is put on instead. The axial clearance of the shaft with flywheel is taken up to 0.05 mm and the screw is tightened. The rotary gate run must be smooth. The transport securing ring is to be placed into the cabinet with accessories.

Connecting the projector to electrical network, to rectifier and interconnecting two projectors

There are two holes, sheltered by a sheet cover, provided on the front wall for electric connection of the projector. When using the holes in the front wall of the projector casing for connection, the cover will be taken off after loosening two screws.

Armoured hoses will be slid into these holes and fastened by a fixed and free clamp (**Fig.5 and 6 - pos.4**) by means of three screws. Through one hole with armoured hose pass power conductors for feeding the xenon discharge lamp, an outer protective conductor, conductors for controlling the rectifier and conductors for feeding the projector. Through the other hole with armoured hose will pass conductors for short-circuiting the amplifier, conductors for interconnecting two cooperating projectors in the projecting room and conductors for regulating the discharge lamp current.

The outer protective conductor will be connected to the earthing strip (**Fig.5 - pos.2**), the power conductors to the lamphouse clamps. The other conductors will be connected to the terminal board X7 as shown on **Fig.7** with respective wire cross sections recommended. The output of the optical stereo sound head is led out to the connector on the front wall of the projector casing and its connection is shown on the projector wiring diagram.

Filling of the Maltese cross chamber with oil

CAUTION: The Maltese cross mechanism must never run without oil filling!

Before putting the projector into operation, for space reasons it is useful to dismantle rotary shutter cover (**Fig.3 - pos.10**) by loosening four screws. The plastic stopper is produced from the hole in the upper part of the Maltese cross chamber, a funnel is put into the hole and the chamber is slowly filled with oil OLN 4 supplied with the projector. When rightly filled, the oil level in the transparent hose (**Fig.16 and 17 - pos.3**) reaches to the mark OIL (**Fig.16 and 17 - pos.2**) on the chamber cover. After the oil has been poured, the plastic stopper is to be put back into the filling hole.

The protective cover of the rotary shutter is to be mounted back, otherwise imminence of injury danger!

The following properties of the oil are given for the possibility of equivalent substitute with further oil exchanges. The question is of a bearing, low-congealing, deeply deparafinned crude oil with polymer agent for freezing point depression. -

kinetic viscosity at 50 °C: 33 - 38 mm2 . s-1

- dynamic viscosity at - 18 °C: 6.5 Pa.s

- max. point of congelation: - 25 °C

- min. inflammation point 190 °C

In projection rooms where the temperature does not fall under 15 °C the use of the oil OLN 5 or its equivalent with the following properties is more advantageous:

- kinetic viscosity at 50 °C: 40 - 45 mm2 . s-1

- dynamic viscosity at -18 °C: 6.5 Pa.s

- min. inflammation point: 200 °C

Projector starting

Turn on the main projector switch (**Fig.1 - pos.22 and Fig.2 - pos.20)**; the lamp inside the projector casing will light up, thus making clear also the film guide which is of importance for rightly threading the film strip. After threading the film on the divided roller of the projector end switch, the pilot lamp on the control panel (**Fig.8 - pos.7 and Fig.9 - pos.1**) signaling the film threading will light up. The shaft of the upper winding-off unit will start turning in the counterclockwise direction and the shaft of the lower winding-on unit in the clockwise direction. The motion of both units can be stopped by switching over the switch on the electronic unit PL 02.1 from the ON-position to the OFF-position.

All projector functions can be controlled by means of push buttons on the control panel (**Fig.1 - and 2 - pos.3**). When checking the functions the film strip should not be threaded in the projector. In this case it is necessary to place a suitable object between the movable faces of the end switch whereby a state will be brought about as if film were threaded. The individual buttons of the control panel **(Fig.8 and 9**) have following functions:

Central start - Starting of projector, xenon lamp, after 7 seconds opening of the lap dissolve diaphragm flap, together with the flap opening will light up the exciter lamp and go out the lamp in the projector casing. The opening duration of the lap dissolve flap can be set by the potentiometer on the electronic unit RP 02 (**Fig.3 - pos.12)**.

Channel selector - switching-over of the mark reader function for 600 m or 1800 m

Lamp start - starting of xenon lamp

Lamp stop - putting out of xenon lamp

Projector start - starting of projector without xenon lamp starting and without lap dissolving

Projector stop - stopping of projector

Lap dissolve start - opening of lap dissolve flap

Lap dissolve stop - closing of lap dissolve flap

Rewinding start - film rewinding outside the film gate

Rewinding stop - film rewinding termination outside the film gate

Format 1 : 1.37 - motor-operated positioning of supplementary lenses of formats needed (relates only to projector MEO 5 XB3)

Format 1 : 1.66

Format 1 : 2.35

Projector tilt adjustment

The projector tilt adjustment is carried out by lifting or descending the rear part of the projector casing by means of the lower nuts (**Fig.5 - pos.8**) on the projector tilt regulation screws (**Fig.5 - pos.7**). In so doing it is necessary to loosen equally the upper nuts. The fulcrum of projector tilting are pivots situated on common axis with eccentric cylinders. By slightly moving round the eccentric cylinders the optical axis of the projector is being changed. Before turning the eccentric cylinders it is necessary firstly to loosen the securing screws on the yokes and after setting the height wanted to retighten them in order to prevent spontaneous movement of the projector. After reaching the projector tilt needed the nuts on the projector tilt regulation screws are to be duly retightened as well. The elasticity of the projector casing construction allows also a slight inclination in the plane perpendicular to the projector tilt. In this case the nut heights from the base will be different. In the case of fastening the projector by means of the anchoring screw the anchoring beam of the base can be loosened and, if necessary, the whole projector can be moved by ± 75 mm in longitudinal direction and by ± 40 mm in cross direction. In case that the projector base is fastened to the projection room floor by three screws in the angle holes, any further manipulation of the projector position is rendered impossible.

Setting of objective lens and turret with auxiliary lenses

The projectors of the MEO 5 XB1 and MEO 5 XB3 line use for image projection a combination of the basic lens and of a suitable a focal or anamorphic auxiliary lens. The basic lenses Meostigmat are supplied with focal lengths of 77 mm to 141 mm.

With lenses of focal length of 77 to 92 mm the bearing diameter is diameter 62.5 mm, with lenses of a focal length of 100 to 141 mm the bearing diameter is diameter 80 mm. For fastening the lenses with the bearing diameter 80 mm into the lens holder a reducing piece (adapter) diameter 90/80 is used. When using the lens with the bearing diameter 62.5 mm a further reducing piece diameter 80/62.5 is applied.

With the projection of various formats the basic lens is not changed, the change is made by means of corresponding auxiliary lenses that are fastened in a turret auxiliary lens

holder (**Fig.10 - pos.13**) with projectors MEO 5 XB1 line, or in a motor-controlled turret holder of auxiliary lenses (**Fig.11 - pos.14**) with projectors of MEO 5 XB3 line. The hand or motor controlled turret holder enables to hold three lenses simultaneously. Currently is used anamorphic lens Anagon 2x for the picture format 1 : 2.35. Furthermore there are used two a focal auxiliary lenses Hyper Meostigmat for formats 1 : 1.37 and 1 : 1.66 or 1 : 1.85, as the case may be. The auxiliary lenses are also placed in reducing pieces and in the holder, similarly as the basic lens, they are secured by means of a screw. With the projector MEO 5 XB3 where the motor-operated turret holder of auxiliary lenses is used, it is necessary to see to it that the anamorphic auxiliary lens is to be placed in aluminum reducing piece diameter 90/80 and the a focal lenses in steel reducing pieces diameter 91/80. This is for the reason of balancing different masses between individual auxiliary lenses.

Before adjusting the basic lens with the projector MEO 5 XB1, the turret lens holder is dismantled by loosening and taking off the nut and the washer. With the projector MEO 5 XB3 the turret lens holder is slightly turned by depressing the format button 1.66 into working position and after loosening two screws and taking out the reducing piece 1.66 the assembling hole for setting up the basic lens is obtained without greater dismantling. The adjustment of the basic lens Meostigmat is carried out in the following way. The reducing piece diameter 90/80 is inserted into the objective lens holder and pushed in to stop so that the reducing piece pin fits into the lens holder slot. If the basic lens diameter corresponds to the reducing piece hole, the basic lens will be introduced. In case of using the basic lens diameter 62.5 mm still the reducing piece diameter 80/62.5 mm will be used and only now the respective basic lens will be introduced. The way of fastening the basic lens differs in dependence on its focal length. When using the basic lens with focal length of 77 mm, the front face of the reducing piece diameter 80/62.5 must overlap by 10 mm the front face of the basic lens. When using a basic lens with a focal length of 84 and 92 mm, the front face of the reducing piece diameter 80/62.5 must be in the plane of the front face of the objective lens. When using objective lenses with a focal length of 100 mm and more, the reducing piece diameter 80/62.5 is not applied as the bearing diameter of these lenses is diameter 80 mm. The focusing turning knob is set up to the middle zero position and is not turned during adjustment of objectives and auxiliary lenses. The main lens is shifted in the reducing piece so as to receive a focused image of the test film on the projection screen. In this situation the objective lens position in the reducing piece is to be secured by means of a screw through the hole in the objective lens holder. After securing the reducing piece with lens will be taken out and the remaining screws that were not accessible in the lens holder will be retightened. Then the lens with the reducing piece will again be introduced into the lens holder and secured by means of a hand operated nut (**Fig.10 - pos.11 and Fig.11 - pos.12**) and check will be made whether the test film image on the projection screen remains focused. With the projector MEO 5 XB1, the turret holder of auxiliary lenses will be reassembled.

The setting-up of auxiliary lenses will be commenced by fastening the anamorphic lens Anagon 2x. With the projectors of MEO 5 XB1 line with hand-operated turret holder of auxiliary lenses will be selected any of the three holes. With the projectors of MEO 5 XB3 line one of the three holes in the turret has the diameter 90 mm. This hole is to

receive the anamorphotec lens Anagon 2x with the reducing piece 2.35. It is to be set in front of the lens by depressing the format press button 2.35. Verification of this step is useful. The way of fastening the anamorphote lens in the reducing piece is dependent on the basic lens used and holds for both projector types. With a focal length of the objective lens Meostigmat of 77 to 109 mm the rear face of the anamorphote must overlap the rear face of the reducing piece 2.35 by 30 mm. With a focal length of the Anastigmatic of 119 to 130 mm the anamorphote lens will be introduced so that the distance between the front face of the basic lens mount and the rear front of the anamorphote lens mount is about 8 mm. When using Meostigmat with focal length 141 mm, the anamorphote lens is to be introduced so that its rear face is in the plane of the reducing piece face. By turning the anamorphote lens round the optical axis the projection screen image will be set to horizontal position. The position of the anamorphote lens in the reducing piece will be secured by means of a screw which is accessible through the hole in the turret holder body. The anamorphote lens with the reducing piece will be taken out and secured by means of screws which were not accessible in the holder. After securing the auxiliary lens with the reducing piece will be put back into the turret holder and secured by means of two screws. By turning the focusing ring of the anamorphote lens the image on the projection screen will be focused and the focusing ring will be secured.

Setting the a focal auxiliary lenses for the formats 1.37; 1.66 or 1.85 for both projector types will be made in the following way. The a focal lens Hyper Meostigmat will be inserted into the reducing piece carrying equal format marking engraved. With the hand-operated turret any free hole can be selected, with the motor-operated turret holder will be selected that opening which comes into the optical axis after depressing the respective format press button on the control panel. In dependence on the focal length of the basic objective, two different reducing pieces are selected for the auxiliary lens 1.37. Focusing of this lens is carried out in other than working position. When using Meostigmat 77 to 109 mm, the longer reducing piece 1.37, and with Meostigmat 119 to 141 mm the shorter reducing piece 1.37 is selected for the auxiliary lens. The a focal auxiliary lens Hyper Meostigmat 1.37 will be introduced into the reducing piece 1.37 so that the front face of the lens overlaps the front face of the reducing piece by 10 mm. The lens will be secured by means of one screw through the hole in the turret holder body. The image on the projection screen will be focused by turning the front part of the a focal auxiliary lens. The screw will be loosened through the hole in the holder, the lens will be taken out from the reducing piece and the front part will be secured by means of three screws. Into the longer reducing piece 1.37 the lens will be introduced so that the rear face of the auxiliary lens is in common plane with the rear face of the reducing piece. In this position the auxiliary lens will be secured by means of four screws. In the shorter reducing piece 1.37, when using the basic lens Meostigmat with the focal length 119 and 130 mm, the auxiliary lens will be secured so that the rear face of the auxiliary lens overlaps the rear face of the reducing piece by 15 mm. When using the objective Meostigmat with the focal length 141 mm, the auxiliary lens will be secured so that the rear face of the auxiliary lens is in common plane with the rear face of the reducing piece. The reducing piece 1.37 with the auxiliary lens Hyper Meostigmat will be introduced in the same way as the anamorphote auxiliary lens into the hole in the turret holder and secured by means of two screws.

The a focal auxiliary lens Hyper Meostigmat 1.66 or 1.85 will be introduced into the reducing piece with corresponding format engraving, the reducing pieces being of one type only. The auxiliary lenses are fastened in the reducing piece again in dependence on the basic lens used. When using the objective Meostigmat with a focal length of 77 to 109 mm, the auxiliary lens will be introduced into the reducing piece so that the rear face of the auxiliary lens overlaps the rear face of the reducing piece by 30 mm. When using the basic objective Meostigmat with focal length of 119 and 130 mm, the auxiliary lenses are fastened in the reducing piece so that the distance between the front face of the basic objective and the rear face of the auxiliary lens is round 8 mm. When projecting with the basic objective Meostigmat of focal length 141 mm, the auxiliary lenses are fastened in the corresponding reducing pieces so that the rear face of the reducing piece is in common plane with the rear face of the auxiliary lens. With the auxiliary lenses 1.66 and 1.85 focusing is performed in the following working positions.

With the projector MEO 5 XB1 the change of the format projected will be performed by pulling the turret holder lever, thus loosening the turret holder from the arrested position, and by turning the turret holder in clockwise direction the auxiliary lens will be selected. The turret holder will be arrested in the function position. It must not be forgotten to exchange the format mask in the fixed film guide for a mask of value equal to that of the auxiliary lens pre inserted.

With the projector MEO 5 XB3 the exchange of the format projected is performed by depressing the format press button on the control panel, the exchange of auxiliary lens and setting of format in the variable film guide takes place automatically.

If non-standard conditions in the auditorium or other special projection methods do not allow to use the combination basic lens + auxiliary lens, it is possible to use for the projection only basic lenses with corresponding focal distances which will be fastened in the lens holder by means of reduction adapters. In such case another basic lens will be used for each format and its focusing will be accomplished in a similar way as described earlier. For this case the reduction adapters delivered are provided with the respective format engraving. Considering that the whole adapter holder must be dismantled, it is preferable to use the projector MEO 5 XB1 for such case of projection (**Fig.13**) as most of the refinements given with MEO 5 XB3 are hardly applicable.

Film guide

The film guide consists of two parts, a fixed one and a movable one. The fixed film guide (**Fig.10 - pos.4 and Fig.11 - pos.5**) is provided with delrin guide bars that are interchangeable. The turning knob (**Fig.10 - pos.5 and Fig.11 - pos.6**) on the fixed film guide is coupled with a cam that tensions the guide bars through a compression spring and thus brings about the necessary film thrust in the film guide. With the MEO 5 XB1, a holder with format mask is introduced in the spring-cushioned dovetail guide of the fixed part. When changing the projected picture format, it is necessary to change the holder for another. In the holders are fastened aperture lenses 14D which are delivered with the xenon lamp. The holders are put in the accessories box. With the MEO 5 XB3 projector,

there is only one holder with mask introduced in the dovetail guide. The aperture lens 14D is fastened in the holder.

The movable part of the film guide is different in dependence on the projector type. For the MEO 5 XB1 projector the movable part is provided with delrin guideway that is exchangeable, similarly as with he fixed part. With the MEO 5 XB3 projector the movable part of the film guide, called also variable film guide (**Fig.11 - pos.7**), is substantially more complicated. It is provided with steel polished guide bars and, in addition, with a mechanism for automatic exchange of the projected picture format. The variable film guide enables exchanging three formats which have been preset in the production establishment. Question is of three formats as a rule: 1 : 1.37; 1 : 1.66 and 1 : 2.35. The steel „stones" for the 1 : 1.85 format are part of accessories. If the format 1 : 1.85 is to be used, the „stones" will be exchanged for the format not used - see chapter ´Exchanging and adjusting of „stones" in the variable film guide´. The format exchange in the variable film guide is carried out automatically by pressing down the respective format button on the control panel of the projector. By means of carrier pins the rotating turret holder will actuate the mechanism on the film guide which will set up the picture format according to the set auxiliary lens. With both projector types the film guide is cooled by air stream from the fan (**Fig.16 - pos.8 and Fig.17 - pos.9**) which is in function every time if the main projector driving motor is running.

Film strip threading

Into the projector film guide is threaded a 35 mm strip with optical sound record. The threading scheme is given on the label (**Fig.10 - pos.10 and Fig.11 - pos.2**) on the upper image panel of the projector. In dependence on the projection spool size, the reduction adapter diameter 12.7 mm or diameter 9 mm will be put on the shaft of the winding-off as well as of the winding-on unit (**Fig. 14**). Both adapter types are to be put in such a way as to allow the lug of the adapter to fit in the cut on the shaft flange of the winding-off or winding-on units. By means of the hand-operated turning knob for controlling the picture position, the Maltese cross inner chamber will be adjusted so that the mark on the inner chamber is in the middle of the stop segment opposite to the index (**Fig.10 - pos.9 and Fig.11 - pos.10**). Thereby also the picture correction range within ± 0,5 film aperture against the format mask and thus also against the projection screen is guaranteed. By turning the knob for hand turning-over of the projector (in clockwise direction) the Maltese cross mechanism will be adjusted to the arrested position when the intermittent sprocket does not rotate.

The pressure rollers of the feed (**Fig.10 - pos.3 and Fig.11 - pos.4**), intermittent (**Fig.10 - pos.8 and Fig.11 - pos.9**), braking (**Fig.10 - pos.17 and Fig.11 - pos.18**) and take-up (**Fig.12 - pos.8**) sprockets will be swung away. Depressing the hand push button (**Fig.10 - pos.14 and Fig.11 - pos.15**) on the objective lens holder will move the film guide together with the lens holder to opened position. Thus will be created a sufficient room for safe threading the film into the film guide.

Before putting the spool with film onto the shaft of the unwinding unit, the film strip should be checked for correct orientation. When observing in the projection direction, the film image must be seen inverted in height and side. When putting the spool with film onto the unwinding unit, care should be taken that the pin on the flange of the reduction adapter diameter 12.7 mm or diameter 9 mm enters into some of the holes of the spool face. By tipping the lever the spool position will be secured. In the same way the spool will be put on the winding-on unit. When using the spools 2400 m, this concerning the MEO 5 XB3 projector, the spools will be secured by means of hand knurled-head screws **(Fig.14 - pos.1)** through the spool holes **(Fig.4 - pos.2)** into threaded holes in the winding-off and winding-on unit flanges. The securing screws are available in accessories box. Securing by means of screws is suitable also when using the spools 1800_m, which holds true for both projector types, especially if the film strip is to be rewound outside the film gate when spool motion speed is substantially higher than with current projection.

The threading proper of the film into the film gate of the projector will be carried out in the following way. By means of the knob for hand turning-over of the projector **(Fig.8 - pos.13 and Fig.9 - pos.15)** the intermittent sprocket of the Maltese cross will be set into rest (arrested) position. Round 2.5_m film will be wound off from winding-off spool. The film strip will be led across the guide roller **(Fig.10 and 11 - pos.1)** on the teeth of the feed sprocket **(Fig.10 - pos.2** and **Fig.11 - pos.3)** where it will be secured by means of a pressure roller. Before entry of the film strip into the film gate a film loop of suitable size must be created so that its top is in the level of the feed sprocket axis. The film strip will be put on the teeth of the intermittent sprocket **(Fig.10 - pos.7 and Fig.11 - pos.8)** so that the whole film image frame is in the illuminated film aperture of the film guide and the film strip will be secured on the intermittent sprocket by means of a pressure roller. By pressing down the hand press button of the objective lens holder **(Fig.10 - pos.14 and Fig.11 - pos.15)** the lock will be released and the variable film guide will be pushed towards the fixed film guide (**Fig.10 - pos.4 and Fig.11 - pos.5)**. The objective lens holder and the variable film guide will be unprompted arrested in the function position. For facilitating correct threading of the film strip into the film guide, there is a red index provided on the tension roller of delrin bars. With middle position of the image control range and in arrested position of the Maltese cross the index must coincide with the dividing line between film frames.

The film strip will be put on the braking sprocket teeth **(Fig.10 - pos.16 and Fig.11 - pos.17)** so as to create a loop between the intermittent and braking sprockets with top at level of the inner step of the intermittent sprocket. On the braking sprocket too the film strip will be secured by means of a pressure roller. Further the film strip will be led on the first guide sprocket, round the rotary gate of the sound head and on the second guide sprocket of the double-arm swinging lever **(Fig.12 - pos.5)**. From the sound head the film strip will be led across the guide roller (**Fig.12 - pos.3)** at the mark reader on the teeth of the take-up sprocket **(Fig.12 - pos.9)** and here too will be secured by means of a pressure roller.

From the take-up sprocket the film will be led on the divided double-roller of the side end switch of the projector **(Fig.12 - pos.10)**. Through its mechanical stiffness the film separates the double-roller faces whereby is set in function the electric circ uit watching whether the projector operation does not damage the film copy by longitudinal cutting. At the same time the end switch reacts to film-strip fracture or run-out by stopping the projector. From the end switch the film strip is led across the fixed guide sprocket **(Fig.1 2 - pos.11)** onto the spool of the lower winding-off unit. The remaining free film end will be wound on the spool core by turning it in the clockwise direction.

Make sure that the film strip is correctly threaded in the film gate by hand turning-over of the turn-knob under the control panel.

Before connecting the main switch the film strip will be tensioned between the spools and fixed guide rollers in order to avoid film fracture during projector starting.}

Film threading during rewinding

From the winding-on spool the film strip will be threaded onto the lower rewinding roller, further between the fixed rewinding roller and the roller on the rotary lever of the upper rewinding roller **(Fig. 4 - pos.1)**. The free film will be wound on the core of the upper winding-off spool.

After lifting the swinging lever with the rewinding roller the built-in end rewinding circuit breaker will switch in the hysteresis electromotors of the winding-off and winding-on units whereby the film between both spools becomes tensioned or moves slowly in the rewinding direction. Depressing the press button for rewinding start (**Fig.4 - pos.4)** on the projector control panel will put into operation the film rewinding. The rewinding can be stopped by depressing the press button rewinding stop **Fig.4 - pos.3**) on the control panel. For film rewinding it is useful to secure the spools by means of hand screws to the rewinding and winding-on units, as indicated in the foregoing chapter.

Projection

The xenon lamp being prepared according to the instructions and the projector according to the foregoing sections, the film projection can be proceeded to. Starting the projector, igniting the xenon lamp and opening the lap dissolve flap will be carried out according to the formerly given description, usually by depressing the press button \lquote central start\rquote **(Fig.8 and 9 - pos.2**).

Should it prove to be necessary to refocus the image during projection, the focusing turn-knob should be turned in one or other direction. The material of the film has not always the same thickness and rigidity. In the interest of the least possible film wear and best quality film presentation it is therefore necessary to adjust the most advantageous pressure of the pressure bars by turning the grooved turn-knob on the fixed film guide in one or other direction. The relative value of the film pressure can be read against mark on

the scale engraved on the turn-knob. By experience the least possible pressure value at which the flicker of the projection screen image disappears should be adjusted.

During projection the pull (braking torque) of the braking sprocket can be adjusted as well. The pull of the braking sprocket influences the film stability on the rotary gate. With correct adjustment the swinging double-arm lever must not lea n on the upper or lower stop. The securing knurled nut **(Fig.18 - pos.8)** on the braking sprocket shaft will be loosened and the braking pull of the sprocket will be changed by turning the second knurled nut **(Fig.18 - pos.3)**. By turning in clockwise direction the pull will be increased and the middle distance of the double-arm lever from the upper stop will be enlarged. After adjusting the securing knurled nut is to be tightened. The friction washers are not to be lubricated (**Fig.18 - pos.4 and 5)**.

Adjusting the winding-on and winding-off units

The film pulls on these units have been adjusted in the production plant. In case of important mains voltage deviations from the rated value it is necessary to adjust these pulls after installing the projector in the projection room. The pull changing is carried out by moving the cursors on the resistor (**Fig.15 - pos.3)** of the winding-on and winding-off units.

Setting-up the resistor cursors is to be carried out on principle with the projector disconnected from the power mains!

The pulls are adjusted for spools with the inner diameter 12.7 mm and with core diameter of 200 mm. These wire spools have a low mass of inertia. Using sheet spools is forbidden. These pulls are valid also for spools with inner diameter of 9 mm and core diameter of 127 mm.

The empty wire spool is fitted on the shaft of the winding-on unit in the known way. Round 3 meters 35 mm film are wound on the spool core and a catch for dynamometer is fixed on the free film end. The catch is suspended on the dynamometer hanger. The catch as well as the dynamometer are available in the accessories box. The end switch double-roller is opened and secured in this position by inserting a bit of film or another suitable object.

The resistor which is part of the winding-on unit has three sliding cursors serving for adjusting pulls.

The pull which is measured on the dynamometer with the main projector switch on is called basic and its value should be 3 +- N. If the pull is higher, then the movable cursor which is nearest to the unit base is shifted in direction to the right from the motor, if the pull is lower the same cursor is shifted to the left to the motor.

The projector will be started in the known way and the pull is measured. This pull is referred to as operation pull. Its value is to be 9 +- 1 N. With this measurement the switch

(**Fig.1 - pos.21 and Fig.2 - pos.19)** on the lower rewinding arm is set in position 600. The correct value of the operation pull will be set in the same way as the value of the basic pull with t he difference that now the middle movable cursor of the resistor will be slid.

The position of the 1800 - 2400 switch on the lower rewinding arm is designed for projecting from the spools 1800_m and 2400 m. With this switch position depressing the \lquote projector start\rquote press button will cause the winding-on spool to create a pull during round 2 seconds which is referred to as additional. Its value should be 21 +-1 1 N. After the said time interval this pull changes on it s own to the operation pull, i.e. 9 +- 1 N. The correct value of the additional pull will be adjusted by moving the third slidable cursor which is most distant from the unit base. If the pull is higher the movable cursor will be shifted to the right from the motor, if the pull is lower the cursor will be shifted to the left to the motor.

The wire spool with film and dynamometer will be put on the winding-off unit shaft. The winding-off unit has a resistor with only one movable ring and only one pull can be adjusted on it - with opened double-roller of the end switch. The pull is referred to as basic and its value should be 7 +- 1 N. In case that the pull is higher the cursor is to be shifted upwards, if it is lower the cursor is to be shifted downwards.

Thus all necessary pulls for a correct projector run have been checked and adjusted.

Depressing the start press button on the winding-off unit with rewinding terminal switch closed will cause formation of rewinding pull. This pull will not be adjusted, only its value will be checked. The rewinding pull is measured on full wire spool on the diameter of 600 mm and its value must not be less than 7.5 N.

By depressing the press button " rewinding stop" the rewinding will be arrested and basic pulls, values of which have been set already, will arise on the winding-off and winding-on spools.

All pulls that have been measured are static. With the projector running the value of these pulls is lower so that sparing of the film copy is guaranteed.

Adjusting rotary shutter

The rotary shutter (**Fig.16 - pos.5 and Fig.17 - pos.6)** has been adjusted at the manufacturer s. When replacing the Maltese chamber, the rotary shutter must be readjusted.

Three screws tightening the cover plate of the rotary shutter (**Fig.16 - pos.6 and Fig.17 - pos.7)** are to be loosened. The turn-knob for hand turning-over of the projector is slowly turned while closely watching the intermittent sprocket. With first movement of the intermittent sprocket the slow rotary movement is to be immediately stopped. For more

precise finding of the beginning of the pull-down it is convenient to fix a longer arm on the intermittent sprocket as indicator and to watch the movement at the end of the arm.

The rotary shutter is to be oriented on the hub so that the shutter edge is in the middle of the image aperture. The slight turning of the shutter on the hub must be carried out with care in order not to move the shutter shaft. After setting the correct position of the shutter three screws on the shutter plate are to be tightened. Correctness of the setting can be checked with the test film VUZORT KOF-1.

When adjusting the rotary shutter and when replacing the Maltese cross mechanism, it is necessary to work with great care as these operations are carried out with dismantled cover **(Fig.3 - pos.10)** which otherwise shelters against possible injury. The protective cover can be removed after loosening 4 screws.

Before putting the projector into operation the rotary shutter cover must be reinstalled. Caution - otherwise serious injury danger from the rotating shutter!

Description of function of particular electronic circuits of the projector

Control circuit of main projector motor

The main driving motor of the projector differs with individual types. With the MEO 5 XB1 projector is used a single-phase asynchronous motor with auxiliary condenser phase permanently attached. When starting the motor, it is necessary to increase temporarily the starting torque by connecting another condenser to the auxiliary phase. Connecting of further capacity is carried out by the circuit which controls the motor starting. The motor is started by means of a relay which is switched by a bistable flip-flop circuit.

With the MEO 5 XB3 projector is used a three-phase asynchronous motor that is started by means of a contactor in the switching unit. This contactor too is switched by a bistable flip-flop circuit.

With both projectors starting can be effected only in case that the film strip is duly threaded or the terminal switch is opened. The projector start proper can be carried out either by means of the press knob central start and projector stop on the control panel.

Control circuit of lap dissolve flap

The lap dissolve flap is controlled by an electromagnet with straight movement. In open position it is held by a low holding current of the magnet, for its opening, however, the current must be several times higher. The closing current switches the monostable flip-flop circuit with a trigger time of round 0.3 second. This current regulates at the same time the bistable flip-flop circuit which connects the holding voltage to the magnet and also the voltage to the exciter lamp of the optical sound head. Starting of the dissolve lap

equipment of the second projector during lap dissolving is performed by a relay situated at the output of the flip-flop circuit. With automatic lap dissolving or with automatic projector start the trigger pulses come from the starting circuit. In the control circuit of the lap dissolve equipment is inserted a delay monostable flip-flop circuit with a transfer time of about 5 to 10 seconds. The output of the delay circuit starts flip-flop circuits controlling the lap dissolve flap. The press button for controlling the lap dissolve flap (lap dissolve stop) is led out on the projector terminal board for controlling the second projector during lap dissolving. The lap dissolve equipment circuits are in function in case that the projector is running.

Control circuit of the rectifier for xenon lamp

The circuit forms a flip-flop circuit with relay in the output which closes the contactor circuit in the rectifier. Feeding of the flip-flop circuit is blocked in case of opening of the door in the lamphouse by door contacts. The flip-flop circuit can be controlled by means of push buttons (lamp start, stop) or by pulses from the starting circuit (with automatic starting or lap dissolve), namely only in case that the film has been correctly threaded in the projector and thus that the terminal switch is closed.

Motor control circuits of the winding-on and winding-off units

Motor torques of both units with hysteresis motors are to be duly regulated with various functions. The regulation is effected by series resistors.

Film threading closes the terminal switch and connects both motors of the units to the power network voltage through the series resistors. The motors begin to induce moments resulting in film tensioning and thus in absence of loose loops on input and output of the filmstrip into the projector.

With projector start the motor torque of the winding-off unit becomes lower (motor disconnected from the power network)and the motor torque of the winding-on unit increases to working value.

When rewinding (the projector terminal switch is in idle position and the rewinding terminal switch is closed) the motors are again connected through the series resistor. By depressing the press button rewinding start the motor torque of the winding-off unit increases and the motor torque of the winding-on unit becomes lower and the film begins to wind on the spool of the win ding-off unit (upper spool). The rewinding is terminated by switching-off of the rewinding switch (film run-out).

Starting circuit

The circuit is started manually by the press button automatic start or by the contact-less mark reader from the neighboring projector, if provided. The circuit forms pulses necessary for starting the projector, the circuits of the lap dissolve flap and the xenon lamp.

Feeding and connecting of the projector

The supply mains leads and other lead-in wires are introduced into projector through two openings on the front projector casing and in armoured hoses. The projector is connected by means of a terminal board **(Fig.5 and 6 - pos.3)**.

The projector has a built-in main electric power supply switch (**Fig.1 - pos.22 and Fig.2 - pos.20)** and circuit breaker for protecting of mains circuits and motors (**Fig.16 and 17 - pos.1)**. The low voltage circuits are protected by cut-out fuses. The control circuits are fed from the source Z 01.1. The exciter lamp of the sound head is fed from the separate source Z 02. The output signal from the stereophonic macro sound head is led out on a DIN connector positioned on the front face of the casing.

Description of particular electrical blocks of the projector (Fig.3)

Power source 24 V (Z01.1)

This source has two outputs:

a) stabilized d.c. voltage 24V, protected by transistor fuse with light signaling of overload (this voltage can be regulated in the range of 22.5 - 28.5 V).

b) non-stabilized voltage round 36V d.c. for feeding the electromagnet of the lap-dissolve flap and with the MEO 5 XB3 projector also for feeding the electromagnet of the turret with auxiliary lenses.

Power source of the exciter lamp (Z 02)

The source feeds the exciter lamp of the optical sound head. The regulated d.c. voltage of 7 to 10 V is stabilized, protected by transistor fuse with light signaling of overload. The ripple of the output voltage must not exceed the value of 150mV.

Control unit (RP 02)

The unit has a flip-flop circuit controlling the starting circuit of the main motor.

This flip-flop circuit allows also to block the function of the lap-dissolve flap (if the motor is not started-up, it is not possible to lift the lap-dissolve flap). The starting circuit controls the starting-up of the motor. Furthermore this unit contain s flip-flop circuits serving as delay member for controlling the lap-dissolve device and the exciter lamp (the delay can be regulated within the time interval of 5 to 10 seconds).

Control unit (PL 02.1)

The unit consists of 3 relays for controlling the motors of the winding-on and winding-off units. Rewinding too is controlled by means of these relays. Besides this unit is fitted

with circuits controlled by the mark reader. These are the deciding circuit, the switching-off circuit of the lap-dissolve device and circuits of both relays. This unit contains also a flip-flop circuit controlling a relay the output of which controls the rectifier contactor. Also the starting circuit of the projector is contained in this unit.

Control unit (D 02) - only with MEO 5 XB3

This unit serves for controlling the motor-operated turret with auxiliary lenses, for remote control of lens focusing and for the control of motor-operated picture framing. The unit contains 6 relays and the controlling electronic system. The unit enables remote focusing and picture framing, always under the condition of the lap-dissolve flap being lifted. When turning the turret with auxiliary lenses, the lap-dissolve flap will be automatically switched off and lifted again after stopping in selected position.

In case of failure the unit D 02 can be shifted out from the connectors whereat other projector functions remain active. The projection can be finished with manual control.

Switching unit (MT 14.1) - only with MEO 5 XB3

This unit serves for controlling the main three-phase motor of the projector. It contains one contactor protecting the over current relay and an auxiliary relay for controlling the motor starting. For decreasing the starting torque of the motor with projector starting, a series resistance is inserted in one phase. After start of the projector the series resistance will be put out by closing of the auxiliary relay. The command signals come from the control unit RP 02. The switching unit forms its power part for the three-phase motor.

Maintenance of the projector

Cleaning of the projector must be carried out daily before the projection. Impurities will be removed from guide sprockets, pressure rollers, toothed sprockets, rotary gate, fixed and movable film guides. The guide sprockets are fastened on the shaft by means of a ball catch and can be easily removed. When cleaning, care should be given to pressure rollers. The conical shaft end is to be moved round a slight amount and the shaft will be put out. The plastic rollers will fall out from the body of the pressure roller. The shaft as well as the rollers will be thoroughly cleaned. The rollers will be put back into the body, the shaft will be introduced and slightly moved round so as to enable the wire spring to fit into the slot. **The plastic rollers will not be lubricated!**

For thorough cleaning the fixed and the movable film guide must be dismantled. The fixed film guide will be taken off the pins of the upper panel after shifting the movable film guide and loosening the hand knurled screw. The movable film guide will be taken off the pins of the lens holder after its shifting aside and loosening two knurled hand screws. After performance of the cleaning operation the fixed film guide will be put back on the upper and lower pins and secured again by tightening the hand knurled screw. After cleaning, the movable film guide will be put back on the pins and secured by

tightening the two hand knurled screws. The film guide is to be cleaned always after the film strip passed through.

For assuring the projection quality it is necessary to clean also the objective lens and the auxiliary lenses. Only the outer surfaces of lenses are cleaned, best with hair brush which is part of accessories. Therefore **this brush should be used for no other purposes!** If the lens surface is more soiled, e.g. by finger prints, first the lens surface is to be cleared of dust with hair brush and then a soft linen cloth will be used. Care should be taken to avoid mechanical damage to layers applied on lens surfaces. The surface of optical elements of the sound head and the halogen lamp are cleared of dust in the same way. For the halogen lamp it is essential to adhere to the principle not to touch by hand the bulb glass as every touch is harmful to the bulb glass.

Beside everyday perfect cleaning of all parts which come into contact with the film, the whole projector is to be cleared of dust and impurities with duster as well. When cleaning all these parts, care should be taken not to soil them with grease which does damage to the film. Less accessible places are cleaned using a hard brush which is part of accessories too. Metallic objects should never be used for removing impurities, cleaning is effected with beveled wooden pen-holder end of a hard brush. Deposit ed dust should never be removed by mouth blowing.

Cleaning of the braking sprocket

In order to have a good film stabilization on the rotary gate it is necessary to clean to braking sprocket after every 300 hours of operation. The knurled nuts will be screwed out and the spring will be taken out. The thrust ring, the plastic washer, the braking sprocket and the second washer will be pulled down from the shaft. The shaft, the thrust ring, the washers and the body of the braking sprocket will be thoroughly c leaned on the surface as well as on the front friction faces. Further dismantling of the sprocket or its cleaning as a whole unit in petrol or in other liquid is not allowed, as its bearings have been smeared in the production plant. The friction surface s either the plastic washer are **not** to be **greased**. The cleaned sprocket will be set up again on the axis and the run wanted (braking torque) will be adjusted by tightening of hand-operated nuts, as described in the chapter **Projection**

Lubrication and oil replacement

Except for the Maltese cross all rotary parts of the projector are embedded in ball bearings (some in closed) filled with vaseline directly at the manufacturer s, the other have been smeared in the plant with oil OKB, Lukoil M_10 or with other non-drying oil. Maintenance of ball bearings comes into consideration in case of the lubricant dried-up or heavy impurities.

The manufacturer of electromotors which have been used in the projector recommends their dismantling, cleaning and greasing of be arings after 6000 hours of operation. The manufacturer draws attention to maximum care to be given at additional greasing, if need

be, of guide roller bearings where one oil drop is fully sufficient for one bearing. Reason of this caution is damage to the film copy by oil leaking from the guide roller.

On the whole projector only the Maltese cross chamber is filled with oil. The oil replacement is carried out after 2000 operation hours in the following way. For the sake of a better access to the filling opening it is useful to dismantle the rotary shutter cover before the oil replacement. The transparent hose will be carefully loosened from the clamp and its end will be introduced into an empty bottle which will be placed in a lower position than is outlet of this hose from the Maltese chamber. For easier run-off of the oil the plastic stopper should be removed from the filling hole of the chamber. After draining-off of the oil the transparent hose will be secured again by means of clamp in the upper position. The chamber will be filled now with oil in the way formerly described. After filling the rotary shutter cover will be reinstalled. **The manufacturer draws attention to severe interdiction to start the projector unless the Maltese cross chamber is refilled with oil.**

Replacement of the feed, take-up and intermittent sprockets

The replacement or reversing of the feed sprocket will be carried out in the following way. The pressure roller will be swung away, the sprocket screw and the nut of the safety lock against film winding will be loosened, the safety lock will be swung away and the feed sprocket will be pulled off from the shaft. The feed sprocket will be reversed in order to use teeth also from the other sides which were not yet in mesh with the film, or, if need be, the sprocket will be exchanged for a new one. When reinstalling the sprocket, care must be taken to ensure that the carrier pin fits into the sprocket groove. The sprocket will be secured again by means of the screw and the safety lock against film winding will be replaced into the original position and secured by means of the nut. When replacing or reversing the take-up sprocket the process is similar. Before exchange or reversing of the intermittent sprocket it is necessary firstly to set the Maltese cross into idle arrested position by means of the turn-knob for hand turning-over the projector and only then to loosen the fastening screw and to take out the intermittent sprocket. The replacement or reversing of sprockets is carried out for the reason of wear of teeth resulting from contact with the film.

Replacement of guide bars in the film guide

Replacement of bars of the fixed guide which is common for both projector types is carried out in the following way. The fixed film guide is taken out of the projector as described in the foregoing chapter. The turn knob of the tensioning mechanism is moved into zero position. The two screws of the lower suspension of bars will be screwed out and the upper suspension of bars will be taken out of the pin.

The delrin bars which are not marked with the projector number are to be adjusted. If free spare bars, not coupled with the upper and lower suspension, are used, it is firstly necessary to screw on these bars. The adjustment of new bars will be carried out in the following way. Round 0.5 metre film with suspension and dynamometer will be inserted

between the film guides so as it is threaded for projection. The turn knob of the tensioning mechanism will be set to zero. The dynamometer will be pulled with speed of round 0.1 m . s-1. The force with which the film is pulled through is to be 0 + 2 N. If the force is greater than 2 N, it will be decreased by adequate filing of the opening in the upper suspension. The force with which the film is pulled through when turning the turn knob to the greatest value is to be measured to be 5 to 6 N. If this force is lower, the nut is to be loosened and the stop limiting the cam travel of the tensioning segment of bars is to be adjusted. After reaching the said value, the stop is to be secured again by means of nut.

The replacement of delrin bars of the movable film guide with the MEO 5 XB1 projector will be carried out as follows. The delrin bars will be released by loosening four screws and exchanged for new ones. After correct bedding, the bars will be fastened again on the tensioning member by means of screws.

With the MEO 5 XB3 projector, there is a variable film guide instead of the movable one. The guide bars of the variable film guide are of steel and their wear and exchange are not likely. In case of need the exchange would be carried out in a similar way as with the MEO 5 XB1 projector.

Replacement and adjustment of stones in the variable film guide

The exchange of " stones" in the variable film guide is carried out for the sake of format change of the projected picture. The process is as follows. The variable film guide is taken out of the projector. Through the assembling holes in the guide body, screws will be loosened with that couple of steel" stones" that are to be replaced by others. The disc will be slightly turned so as to make the loosened screw accessible and the screw will be taken out using tweezers. The disc will be turned, the disengaged " stone" will be taken out and a new one will be inserted instead. The disc will be slightly turned and the screw will be inserted back on its place and moderately retightened. The second " stone" will be exchanged in the same way as well. Using a test film, with mild displacements of the " stones" the right position will be set so that when rotating the disc within 180° , the screen image remains stationary in height. The right position having been set, the screws are to be retightened through the assembling holes in the film guide body.

Replacement of exciter lamp

The halogen lamp M 3 - 12 V, 55 W of the optical sound head illuminator, fed with a reduced voltage of 7 to 10 V, has a long life. Voltage of this lamp is regulated by a potentiometer on the Z 02 source panel. The lamp replacement comes into consideration only after 1000 operation hours. For replacing the lamp, the lead-in conductor of the halogen lamp will be disconnected from the lead-in conductor by shifting the isolating sleeving protecting the connection of the lamp and of the lead-in conductor (blade and void) and by opening the connection. The insulating sleeving will be slid on the bulb of the halogen lamp to prevent touch by hand, both ends of the wire spring will be squeezed together, the spring will be released from the slots and the lamp will be taken out of the holder. If the lamp is defective, the insulating sleeving needs not be put on.

When putting on new lamp, the sleeving is always to be used and the lamp base is to be correctly oriented by the position of the circular and square pins on the holder. No lamp holder adjustment is needed after the lamp was fixed and the conductors connected. The connection of conductors is protected by drawing-over the insulating sleeve.

Maintenance and replacement of indented belts

The indented belts have been slightly greased with silicon vaseline at the manufacturer s. If the noise of the belts is too high, which is usually after round 300 to 500 operation hours, the belts and the pulleys are to be cleaned and the indented belts are to be gently greased a gain. This applies to the indented belt of the Maltese cross mechanism, driving shaft pulleys of the feed and take-up sprockets and indented belts of the winding-on and winding-off units. The belt tensioning is carried out after loosening 3 screws by moving the gearing downwards. After reaching the right tension when the sag of the belt under the force of 10 N is 10+- 2 mm, the screws are to be retightened. For a better access to the screws there are three assembling holes for the screwdriver available in t he pulley. The belt between the driving motor and the Maltese cross mechanism is additionally tensioned by a tensioning roller (**Fig.16 - pos.7 and Fig.17 - pos.8**). Its axis must be parallel to axes of sprocket pulleys to avoid the run-off of the belt from the tensioning roller to one side. The belt tension of the winding-on and winding-off units when pressing with the force of 10 N is 3+- 1 mm. Generally it goes that too great tension of indented belts shortens the life of bearings and toothed wheels. Indented belts have high service life and their replacement because of wear is not topical in practical terms.

Basic diagram of projector defects and ways of their removal

Defect	*Cause*	*Removing*
Pilot lamps on the panel do not light	source Z 01 defective function, replace source Z b) no mains voltage	If failure signal lamp not in
After depressing the press button 02 projector start projector is idle		*Replace unit RP*
Malfunction of lap-dissolve device and exciter lamp	unit RP 02	Replace unit RP 02
Exciter lamp of sound head	*Source Z 02 (if failure signal*	*Replace Z 02*

does not light	*does not light - source is overloaded,* *line short-circuited*	
Xenon lamp not light up, lamphouse circuits in order, lamphouse doors rightly closed	Unit PL 02	Replace PL 02
Malfunction of winding-on *and winding-off unit, failure* *of rewinding*	*Unit PL 02*	*Replace PL 02*
Motor-operated focusing, framing or indexing of auxiliary lenses turret does not work (goes only for MEO 5 XB 3)		Unit D 02 Replace D 02

In practice, combinations of failures can occur that cannot be simply described and removed. Use service facilities for their removal.

Caution

In the interests of permanent development the manufacturer reserves the right of changes and deviations in the text as well in the figure part of instructions.

Illustrations

Fig.1 MEO 5 XB1 with xenon lamp H1

Fig.2 MEO 5 XB3 with xenon lamp H11

Fig.3 MEO 5 XB3 - rear view

Fig.4 MEO 5 XB3 with threaded film for rewinding

Fig.5 MEO 5 XB1 - lower part of the projector

Fig.6 MEO 5 XB3 - lower part of the projector

Fig.7 Terminal board and interconnection of two projectors

Fig.8 MEO 5 XB1 - control panel

Fig.9 MEO 5 XB3 - control panel

Fig.10 MEO 5 XB1 - upper image panel of the projector

Fig.11 MEO 5 XB3 - upper image panel of the projector

Fig.12 MEO 5 XB1 and MEO 5 XB3 - lower sound panel of the projector

Fig.13 MEO 5 XB1 - projection with basic objective lens with anamorphote without auxiliary lenses

Fig.14 Reduction adapters with diameters of 12.7 mm and 9 mm

Fig.15 Winding-off unit without cover

Fig.16 MEO 5 XB1 - view into the projector casing

Fig.17 MEO 5 XB3 - view into the projector casing

Fig.18 Braking sprocket

Fig.19 Dimensions and fastening of the base in the projection room

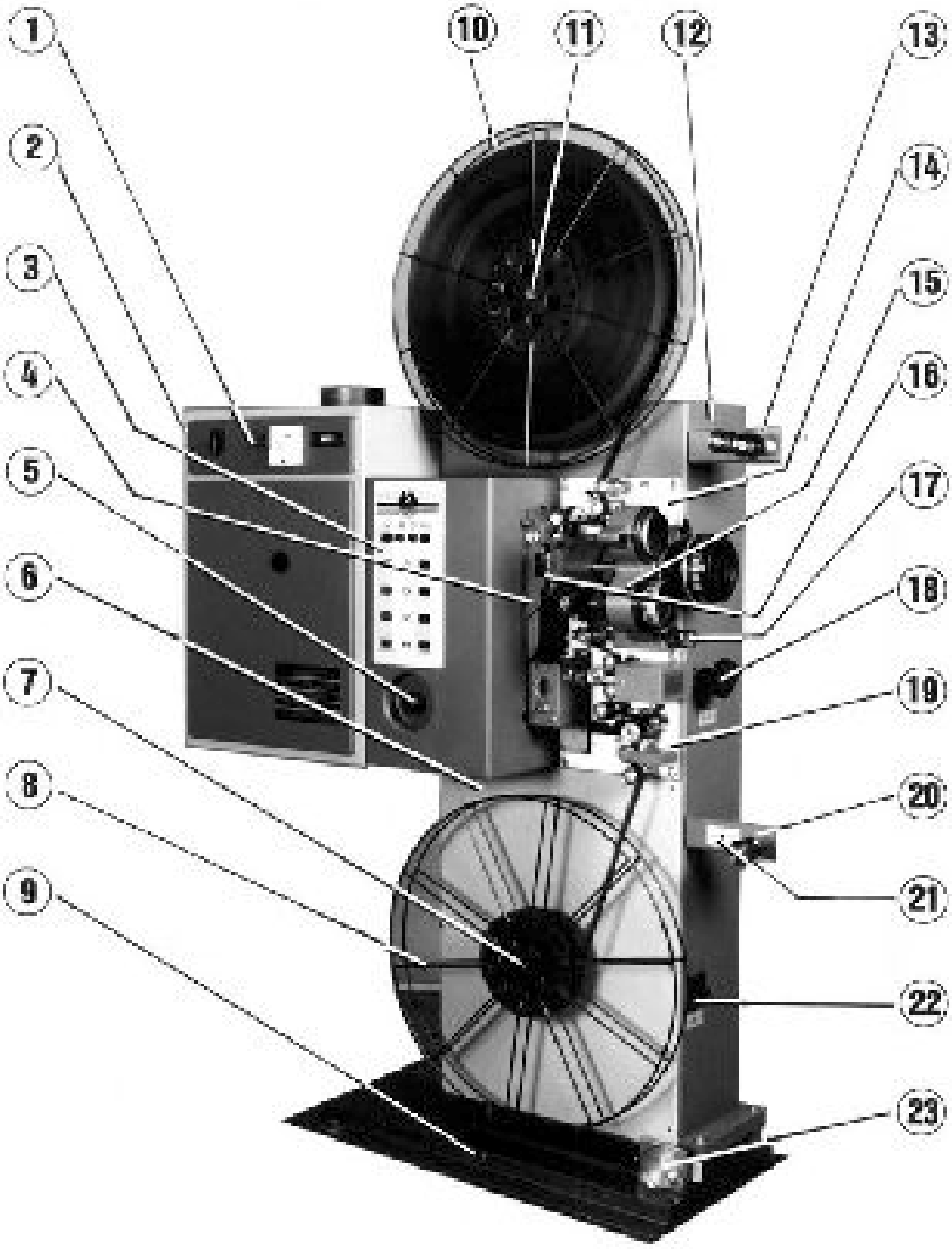
Part of instructions are the following wiring diagrams

Circuit diagram of MEO 5 XB1 Unit RP 02

Circuit diagram of MEO 5 XB3 Unit PL 02.1

Source Z 01.1 Unit D 02

Source Z 02 Unit MT 14.1



obr. 1

Fig. 1

MEO 5 XB1 with xenon lamp H1 with film threaded in the film gate

1. Lamp control panel

2. Lamphouse

3. Projector control panel

4. Fixed film guide

5. Turn knob of hand turning-over of the projector

6. Projector casing cover

7. Winding-on unit shaft

8. Winding-on spool

9. Projector base

10. Winding-off spool

11. Winding-off unit shaft

12. Projector casing

13. Upper rewinding arm

14. Upper image panel

15. Hand turret holder of auxiliary lenses

16. Movable (variable) film guide

17. Hand focusing turn knob

18. Turn knob of hand picture framing

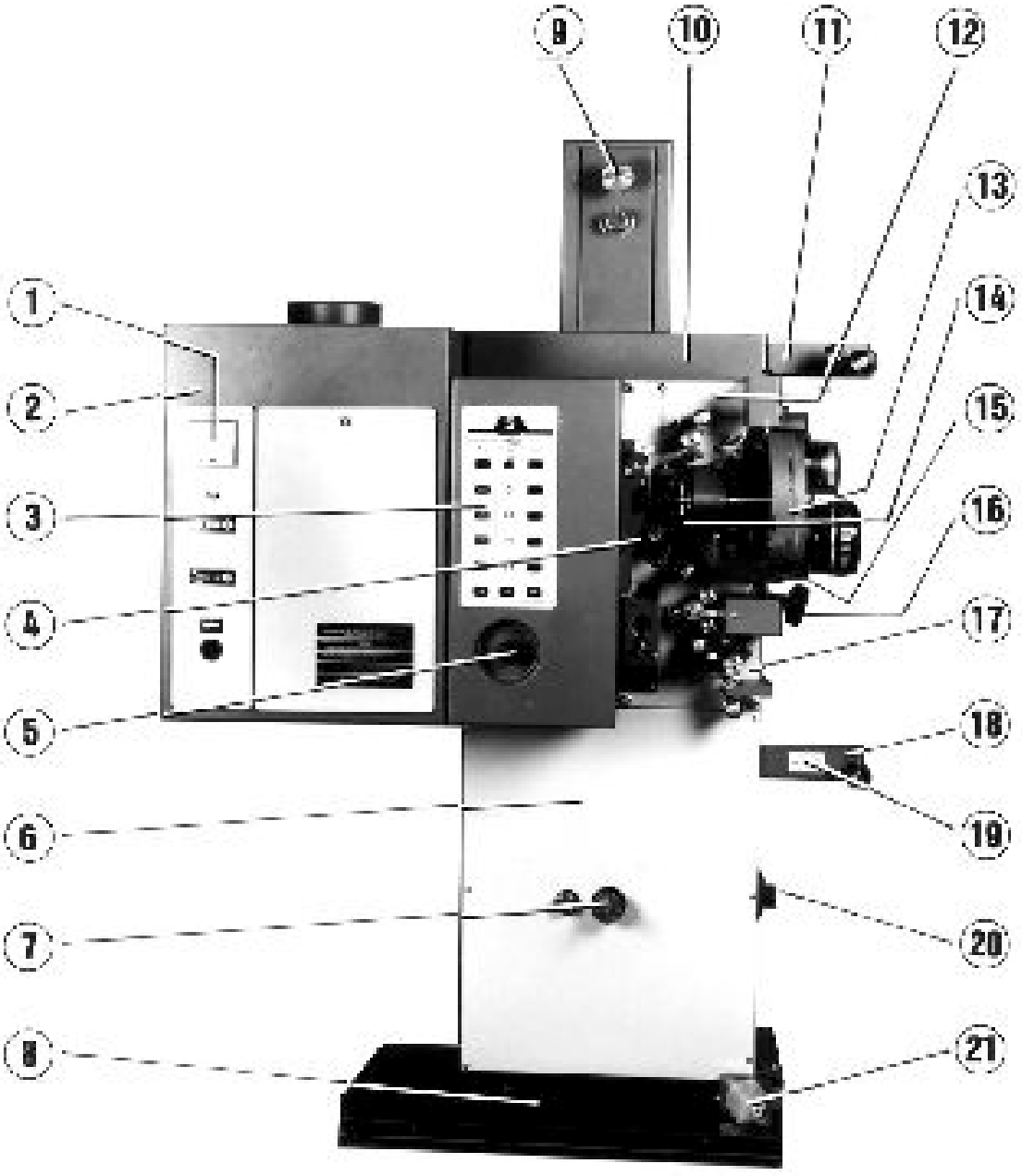
19. Lower sound panel

20. Lower rewinding arm

21. Pull change-over switch

22. Main switch

23. Height setting of the projector



obr. 2

Fig. 2

MEO 5 XB3 with xenon lamp H 11

1. Lamp control panel

2. Lamphouse

3. Projector control panel

4. Fixed film guide

5. Turn knob of hand turning-over of the projector

6. Projector casing cover

7. Winding-on unit shaft

8. Projector base

9. Winding-off unit shaft

10. Projector casing

11. Upper rewinding arm

12. Upper image panel

13. Motor-operated turret holder of auxiliary lenses

14. Variable film guide

15. Turn knob of hand focusing

16. Turn knob of hand picture framing

17. Lower sound panel

18. Lower rewinding arm

19. Pull change-over switch

20. Main switch

21. Hand adjusting of the projector

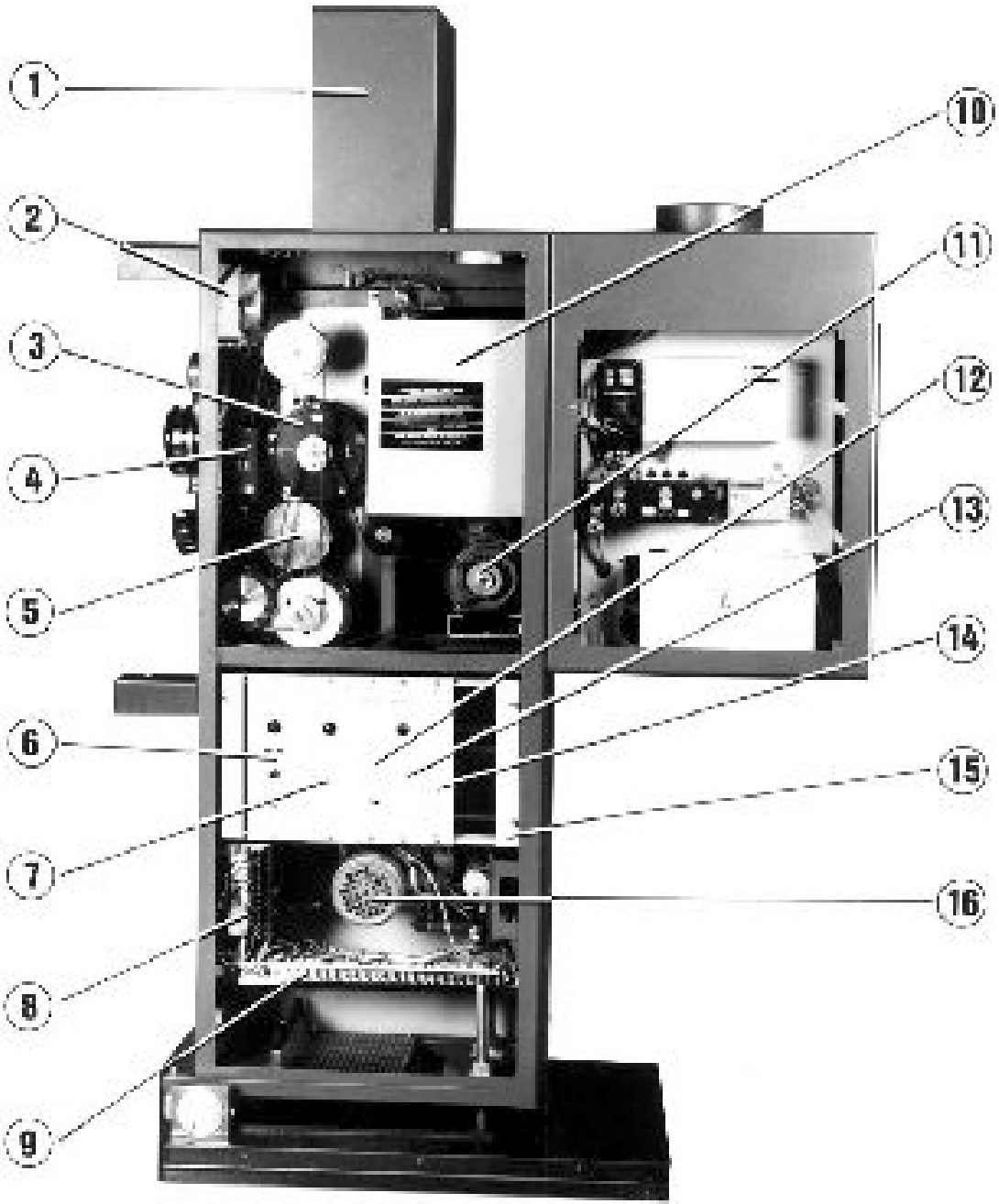


Fig. 3

MEO 5 XB3 with xenon lamp H 11 - rear view

1. Rewinding unit cover

2. Main circuit breaker of the projector

3. Maltese cross chamber

4. Polyurethane belt

5. Flywheel of the sound head

6. Supply source Z 02

7. Supply source Z 01.1

8. Unit MT 14.1

9. Connecting terminal board

10. Rotary shutter cover

11. Main driving motor

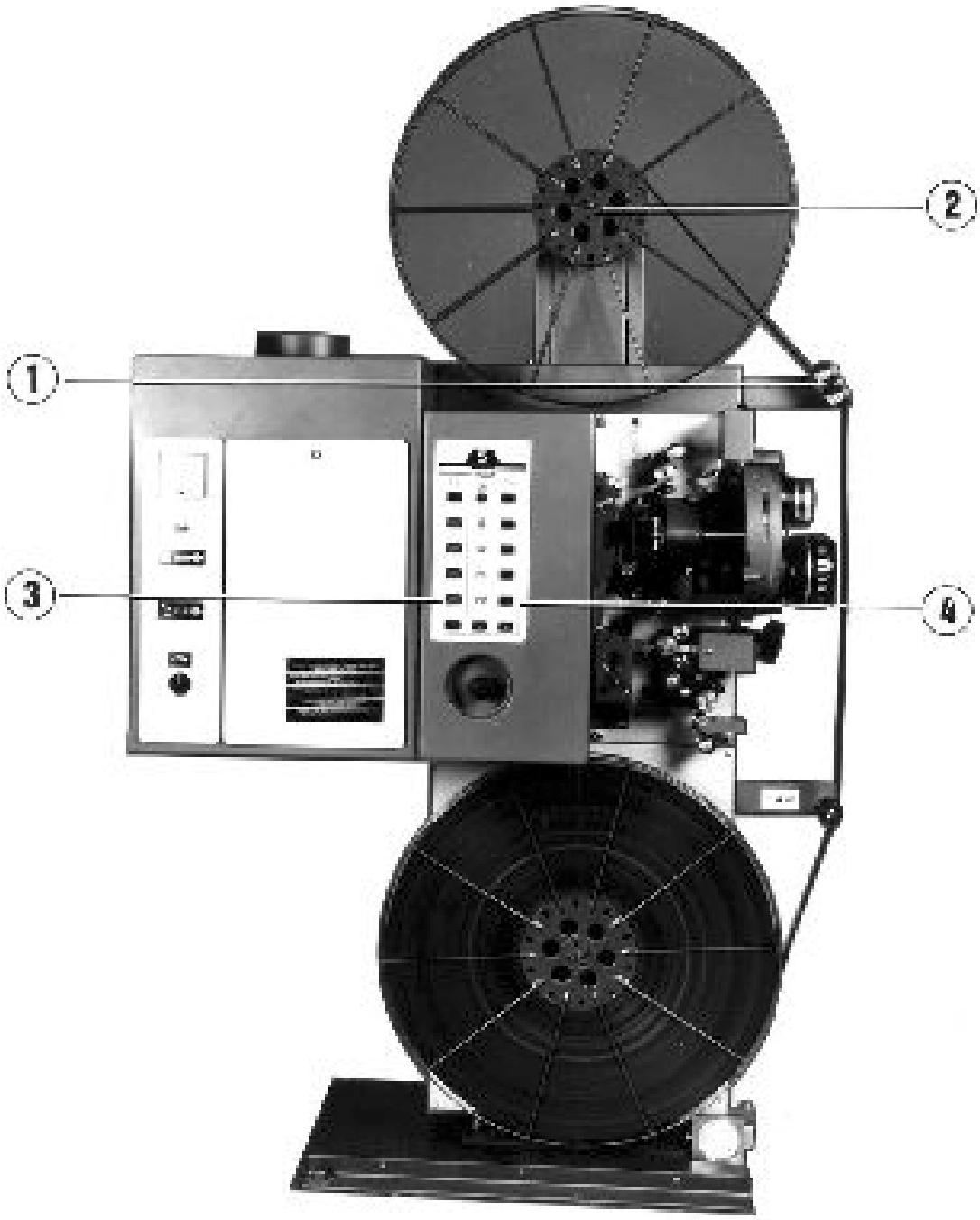
12. Unit RP 02

13. Unit PL 02.1

14. Unit D 02

15. ALMES tank

16. Winding-on unit motor



obr. 4

Fig. 4

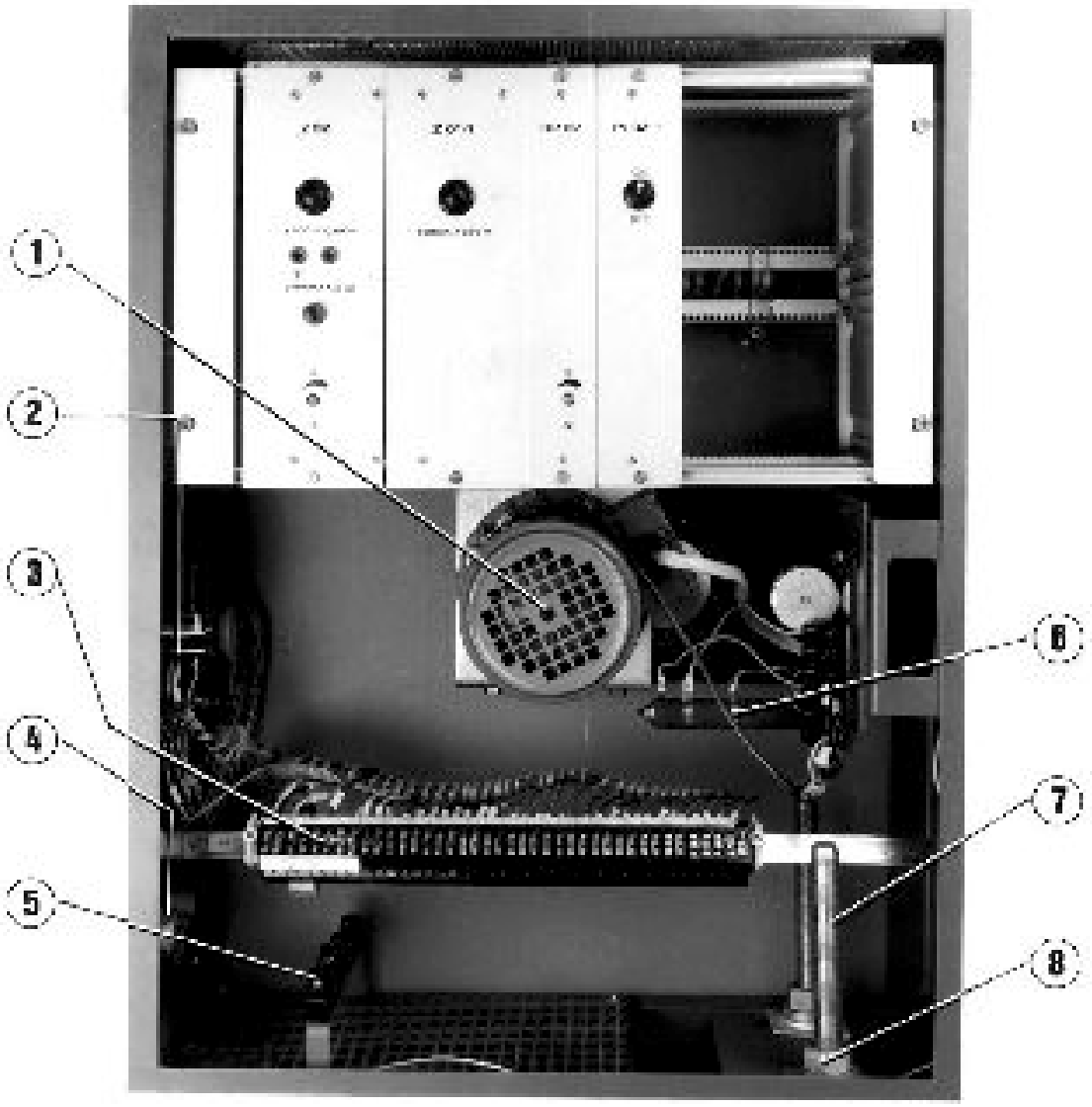
MEO 5 XB3 with film threaded for rewinding

1. Swinging lever with rewinding roller

2. Holes for fastening screws of spools

3. Rewinding stop push button

4. Rewinding start push button



obr. 5

Fig. 5

Lower part of the MEO 5 XB1 projector after opening the rear door

1. Winding unit motor

2. Projector earthing bar

3. Connecting terminal board

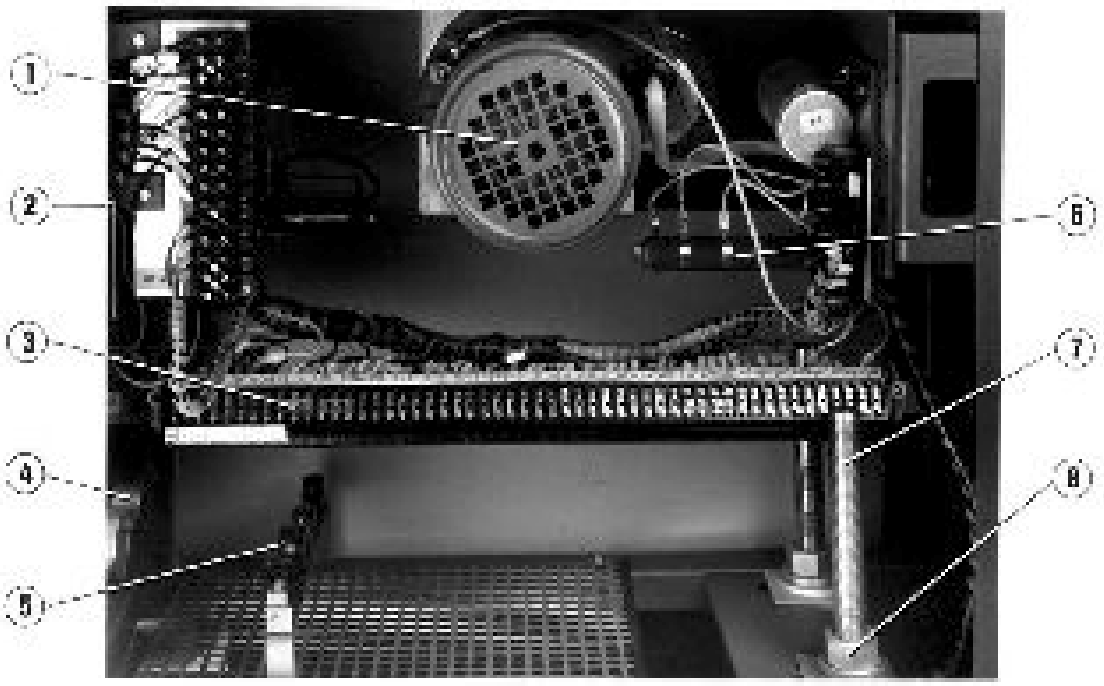
4. Clamps of the protective hose

5. Clips of conductors

6. Slidable cursors of the resistor

7. Adjusting screw of the projector tilt

8. Projector tilt nut



obr. 6

Fig. 6

Lower part of the MEO 5 XB3 projector after opening the rear door

1. Winding-on unit motor

2. Projector earthing bar

3. Connecting terminal board

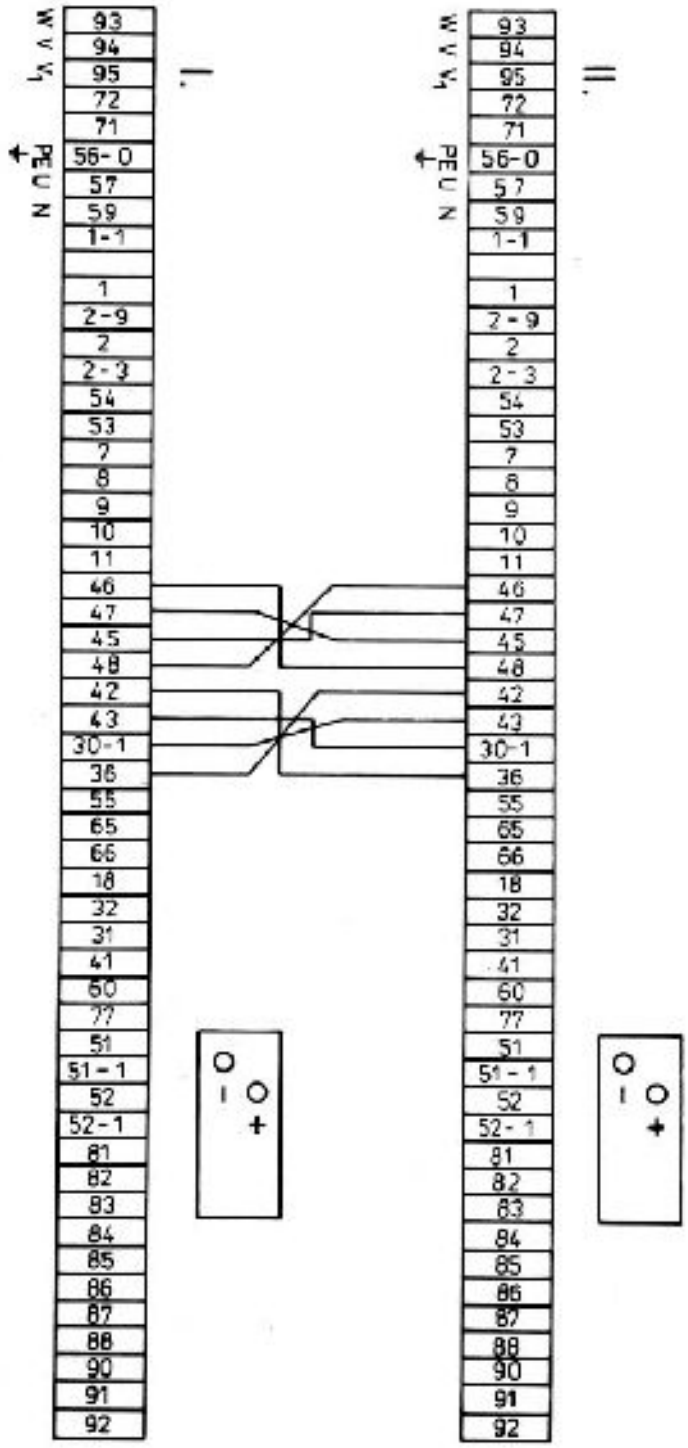
4. Clamps of the protective hose

5. Clips of conductors

6. Slidable cursors of the resistor

7. Adjusting screw of projector tilt

8. Projector tilt nut


I.
II.
W V V1
PE U N
93
94
95
72
71
56-0
57
59
1-1
1
2-9
2
2-3
54
53
7
8
9
10
11
46
47
45
48
42
43
30-1
36
55
65
66
18
32
31
41
60
77
51
51-1
52
52-1
81
82
83
84
85
86
87
88
90
91
92
I
+

obr. 7

Fig. 7

Terminal board and interconnection of two projectors

56-0 Protective conductor 1 mm2 Cu

57; 93; 94; 95 Phase conductor 0.75_mm2 Cu

59 Neutral conductor 0.75 mm2 Cu

54; 53 Focusing control 0.35 mm2 Cu

7; 8 Rectifier control 0.7 5mm2 Cu

9; 10; 11 Discharge tube current control 0.75 mm2 Cu

46; 47 Starting by the second projector 0.35 mm2 Cu

45; 48 Starting of the second projector 0.35 mm2 Cu

42; 43; 30\'f71; 36 Lap dissolve device control 0.35 mm2 Cu

36; 55 Supply of the focusing circuit 0.35 mm2 Cu

65; 66 Amplifier interlocking 0.35 mm2 Cu

18 Lamp start 0.35 mm2 Cu

32 Motor start 0.35 mm2 Cu

31 Lap dissolve flap start 0.35 mm2 Cu

41 Information on the projector state 0.35 mm2 Cu

60; 77 Sound head exciter lamp control 0.35 mm2 Cu

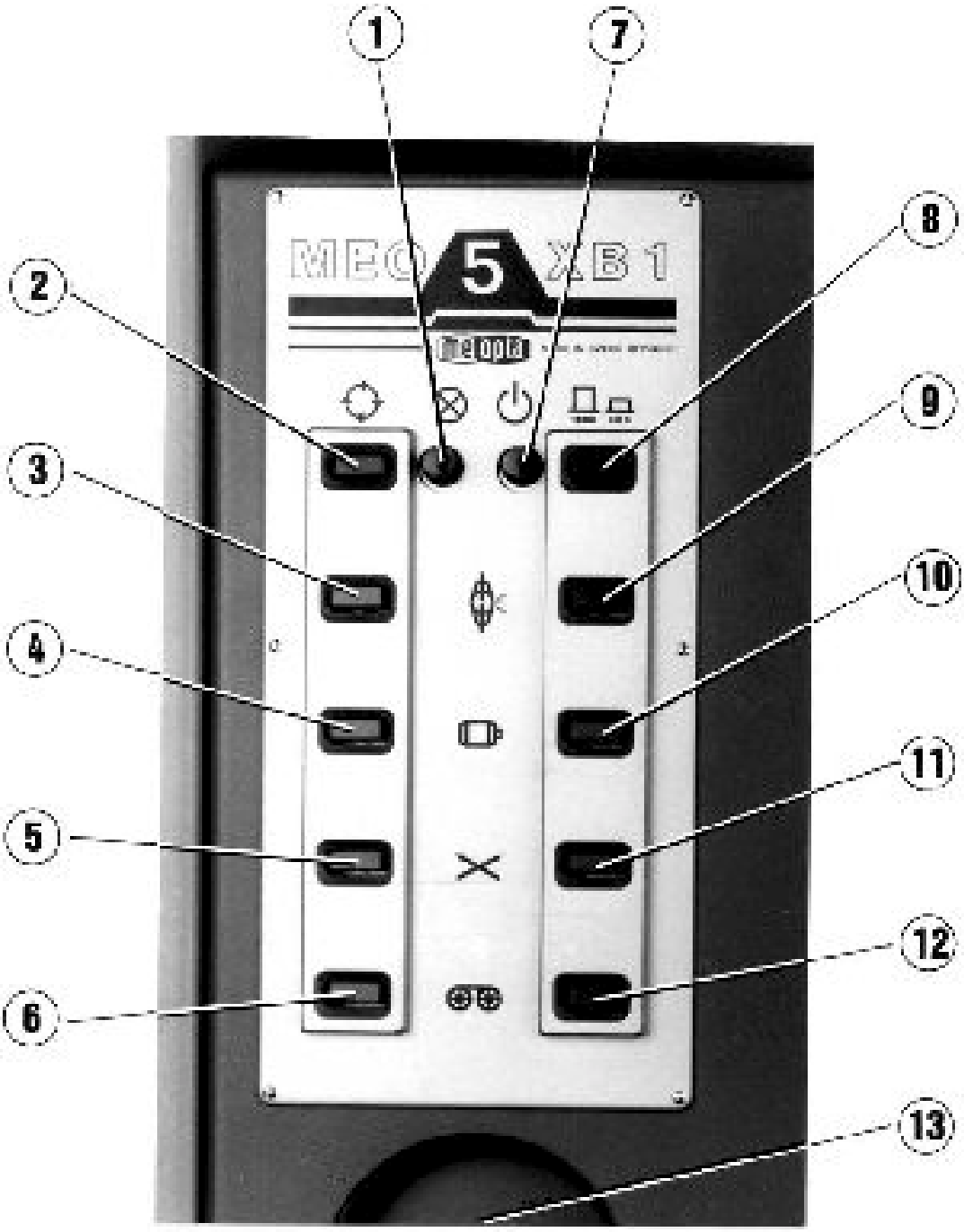
51 Output of the II-nd channel of the mark reader 0.35 mm2 Cu

51/1 Input of the evaluation circuit of the II-nd channel 0.35 mm2 Cu

52 Output of the I-st channel of the mark reader 0.35 mm2 Cu

52/1 Input of the evaluation circuit of the I-st channel 0.35 mm2 Cu

+,- Discharge lamp feeding 0.35 mm2 Cu



obr. 8

Fig. 8

Control panel of the MEO 5 XB1 projector

1. Pilot lamp of condenser disconnection

2 Push button for central start of projector and lamp}

3. Push button for lamp switching-off

4. Push button for projector stopping

5. Push button for closing the lap dissolve flap

6. Push button for rewinding stopping

7. Pilot lamp of film threading

8. Push button for 600/1800 mode selection with reading the film mark

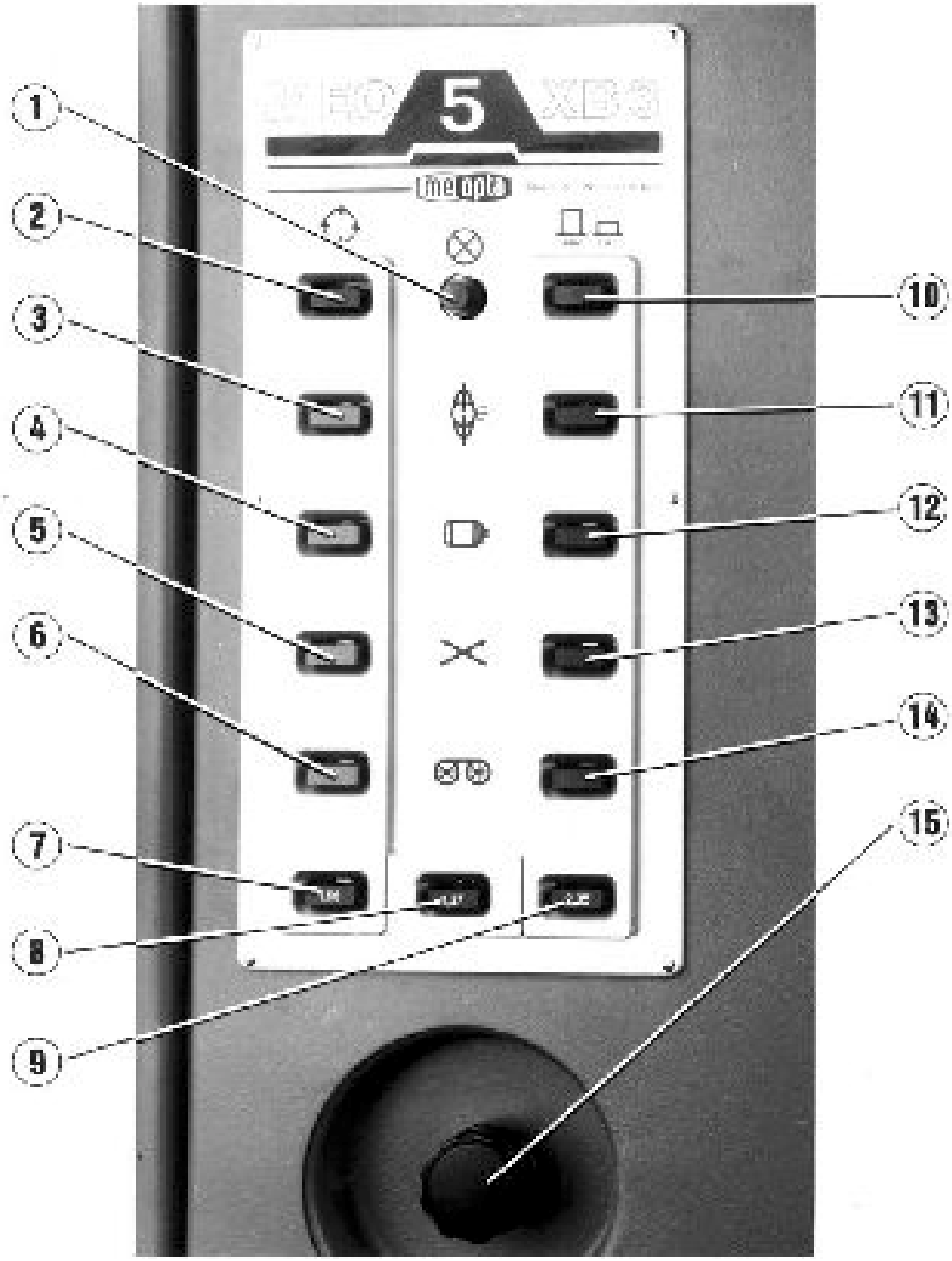
9. Push button for lamp starting

10. Push button for projector starting

11. Push button for opening the lap dissolve flap

12. Push button for film rewinding

13. Turn knob for hand turning-over of projector



obr. 9

Fig. 9

Control panel of the MEO 5 XB3 projector

1. Pilot lamp of film threading

2. Push button central start of projector and lamp

3. Push button for lamp switching-off

4. Push button for projector stopping

5.\tab Push button for closing the lap dissolve flap

6. Push button for rewinding stopping

7. Push button for format 1 : 1.66

8. Push button for format 1 : 1.37

9. Push button for format 1 : 2.35

10. Push button for 600/1800 mode selection with reading the film mark

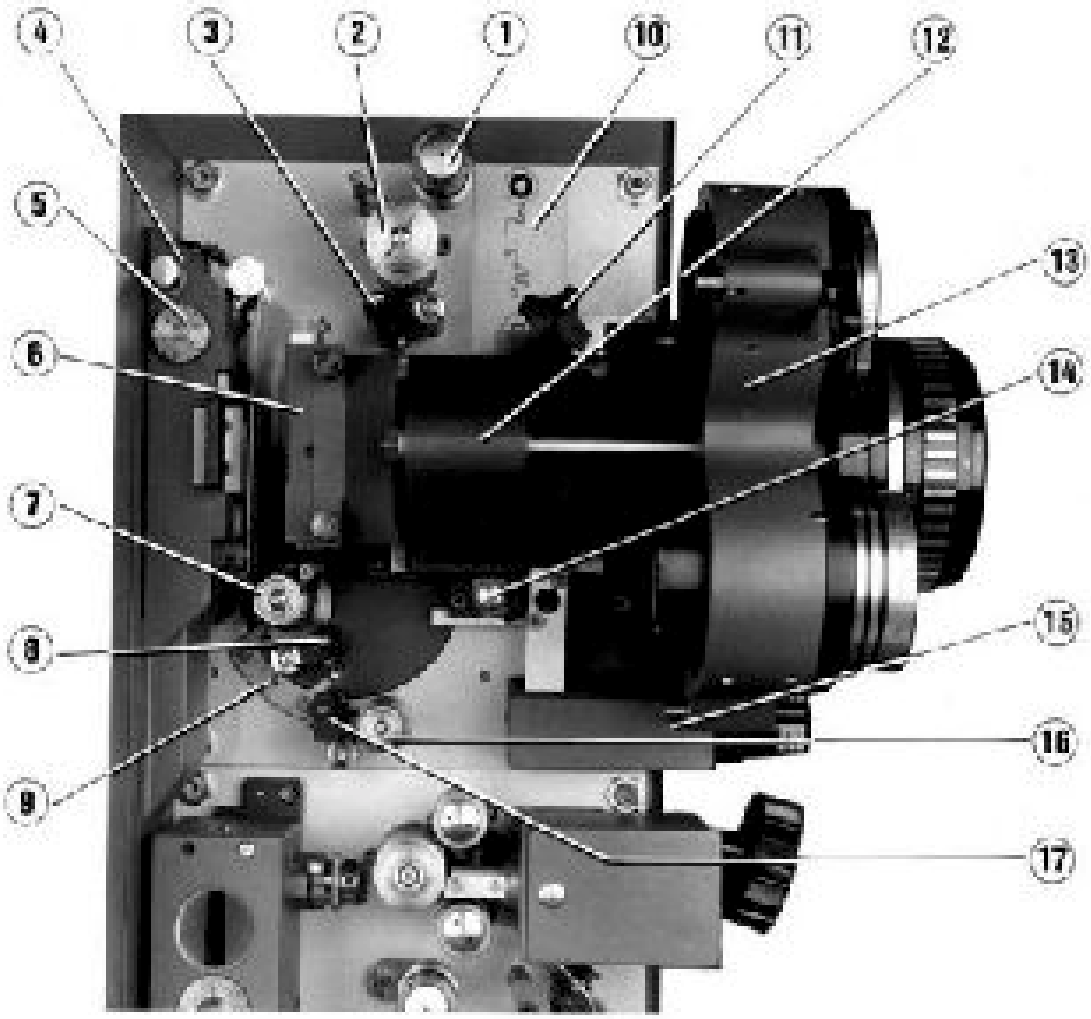
11. Push button for switching xenon lamp

12. Push button for projector starting

13. Push button for opening the lap dissolve flap

14. Push button for film rewinding

15. Turn knob for hand turning-over of projector



obr. 10

Fig. 10

Upper image panel of the MEO 5 XB1 projector

1. Guide sprocket

2. Feed toothed sprocket

3. Pressure plate of the toothed sprocket

4. Fixed film guide

5. Turn knob for setting film guide thrust

6. Variable film guide

7. Intermittent sprocket

8. Pressure plate of the intermittent sprocket

9. Index of Maltese cross position

10. Film threading plate

11. Hand nut of objective lens holder

12. Objective lens holder

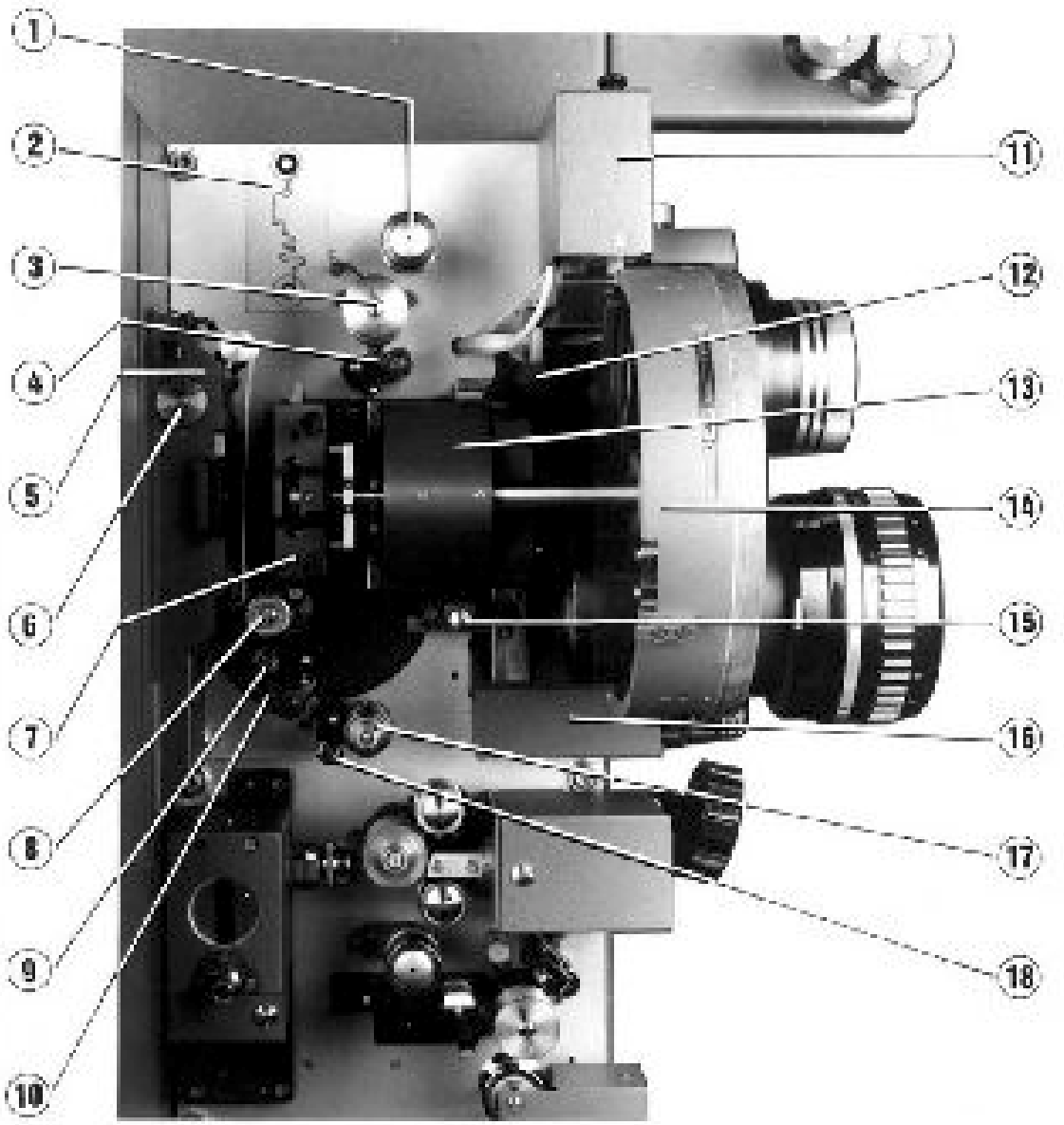
13. Turret holder of auxiliary lenses

14. Push button of objective lens holder

15. Lens focusing box

16. Braking sprocket

17. Braking sprocket pressure plate



obr. 11

Fig. 11

Upper image panel of the MEO 5 XB3 projector

1. Guide sprocket

2. Film threading plate

3. Feed toothed sprocket

4. Toothed sprocket pressure plate

5. Fixed film guide

6. Push button for setting film guide thrust

7. Variable film guide

8. Intermittent sprocket

9. Intermittent sprocket pressure plate

10. Index of Maltese cross position

11. Electromagnet of turret holder of auxiliary lenses}

12. Hand nut of objective lens holder

13. Objective lens holder

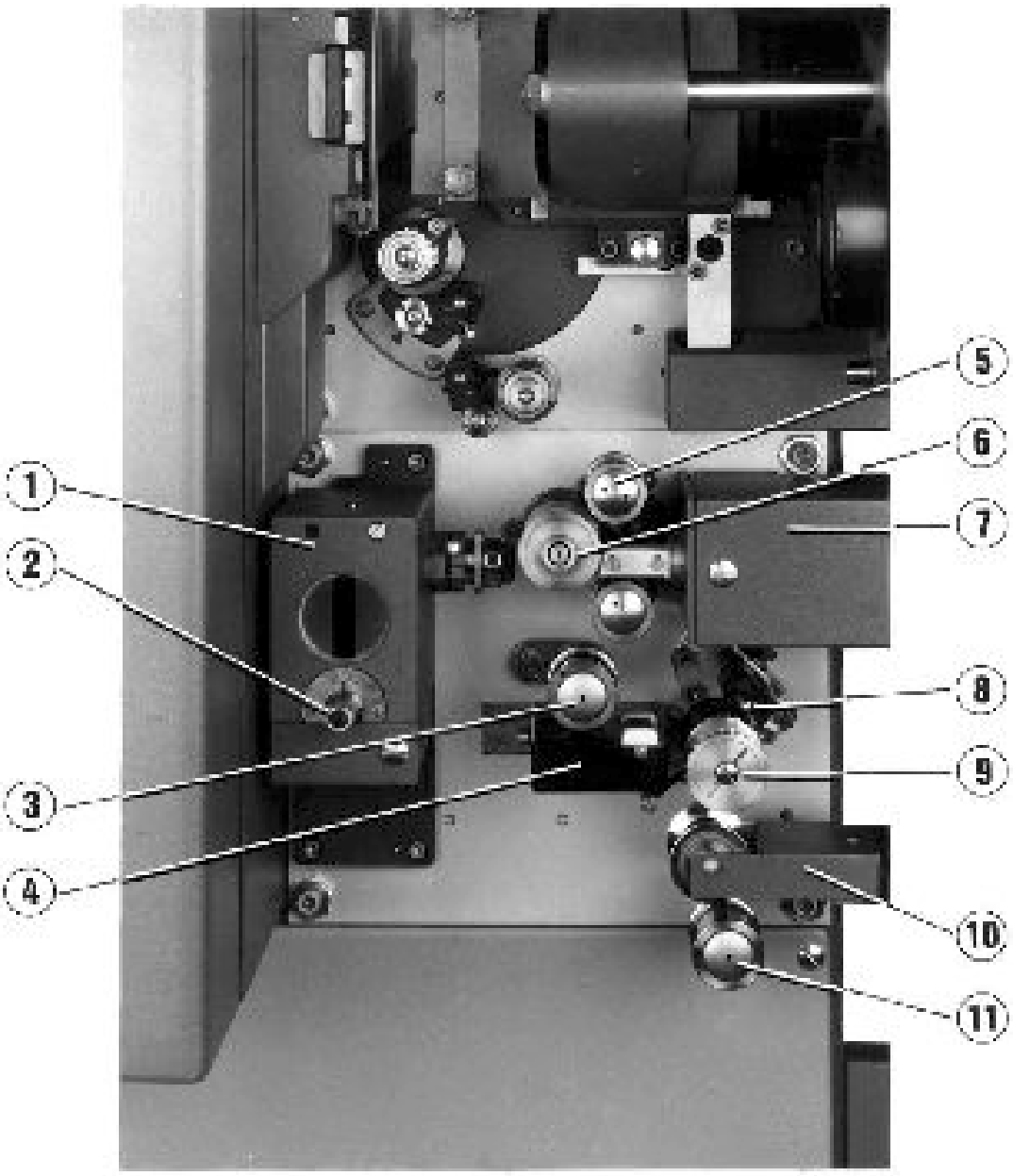
14. Motor-operated turret holder of auxiliary lenses

15. Push button of objective holder lock

16. Lens focusing box

17. Braking sprocket

18. Braking sprocket pressure plate



obr. 12

Fig. 12

Lower sound panel of MEO 5 XB1 and MEO 5 XB3 projectors

1. Macro sound head box

2. Turn knob of setting the scanned sound track

3 . Guide sprocket

4. Contactless mark reader

5. Swimming double-roller

6. Rotary sound gate

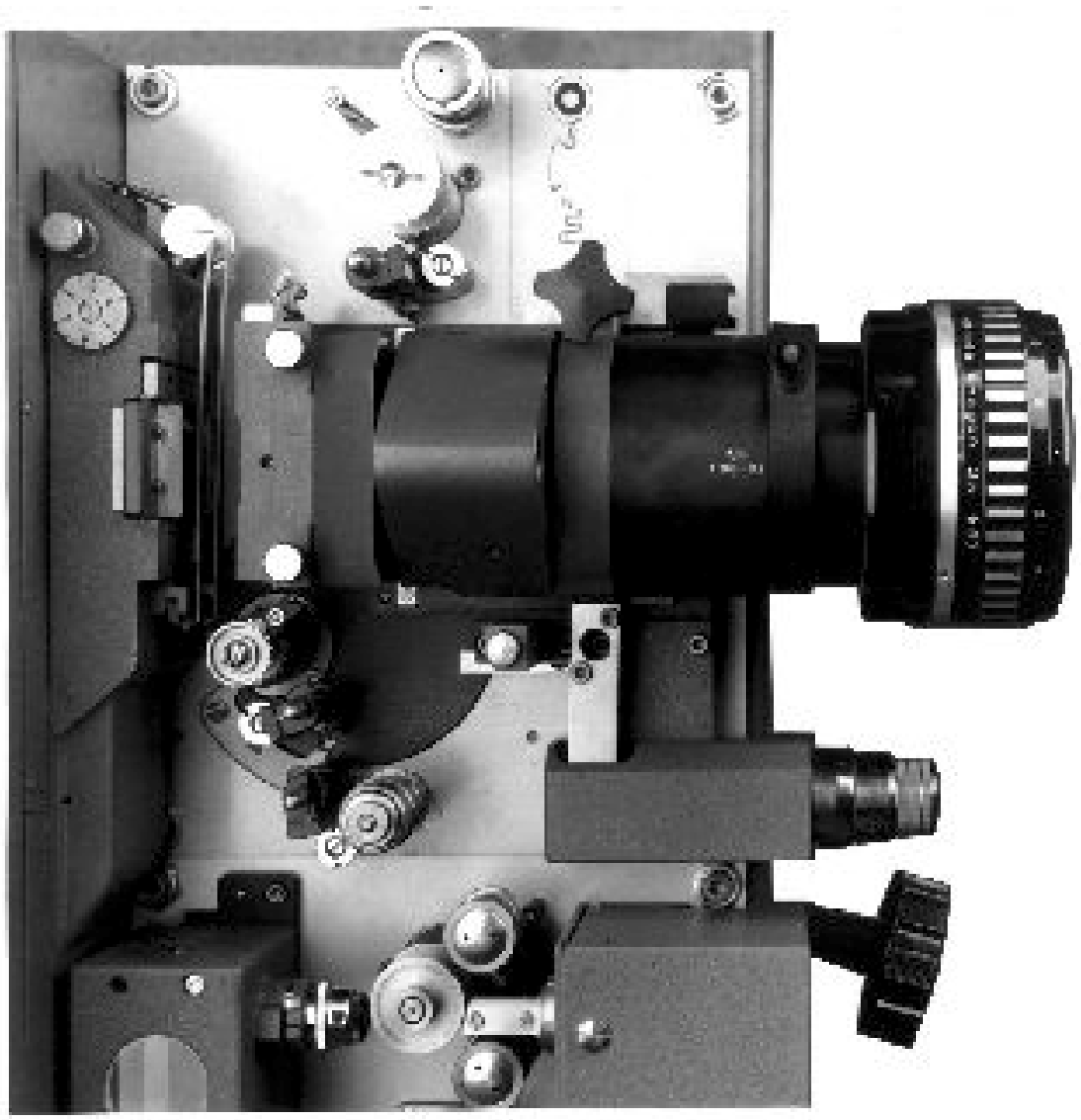
7. Exciter box of macro sound head

8. Take-up sprocket pressure plate

9. Take-up sprocket

10. Terminal switch

11. Fixed guide sprocket

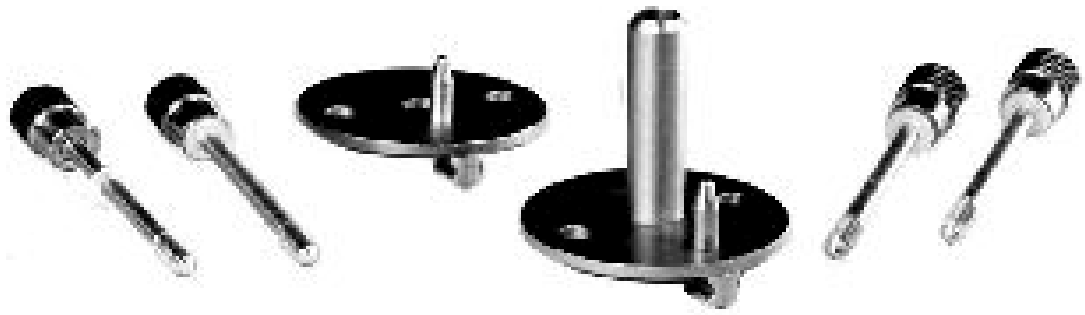


obr. 13

Fig. 13

Upper image panel MEO 5 XB1

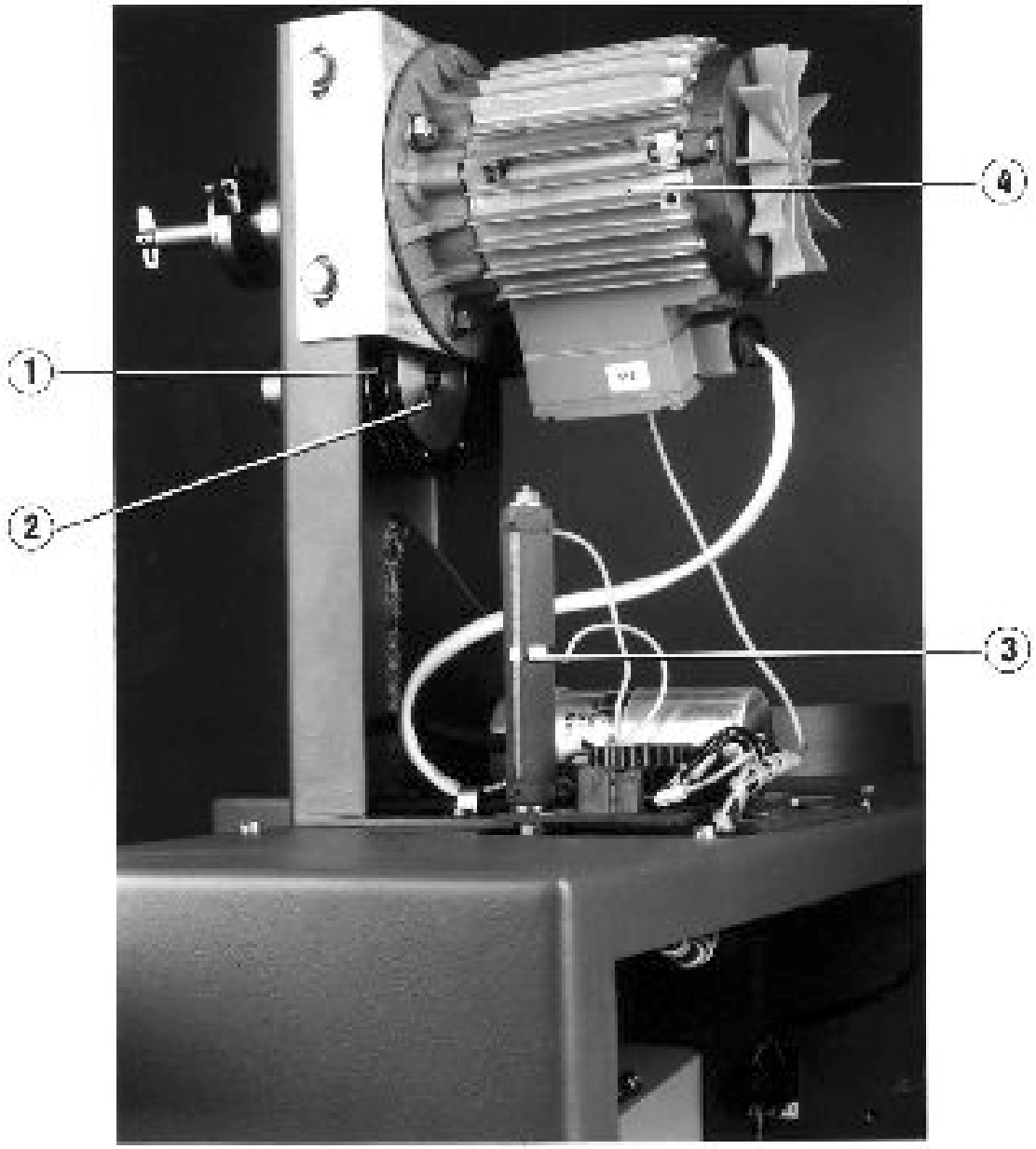
Example of projection with basic objective lens and anamorphote attachment without turret holder of auxiliary lenses



obr. 14

Fig. 14

Reduction adapters of diameters 12.7 mm and 9 mm



obr. 15

Fig.15

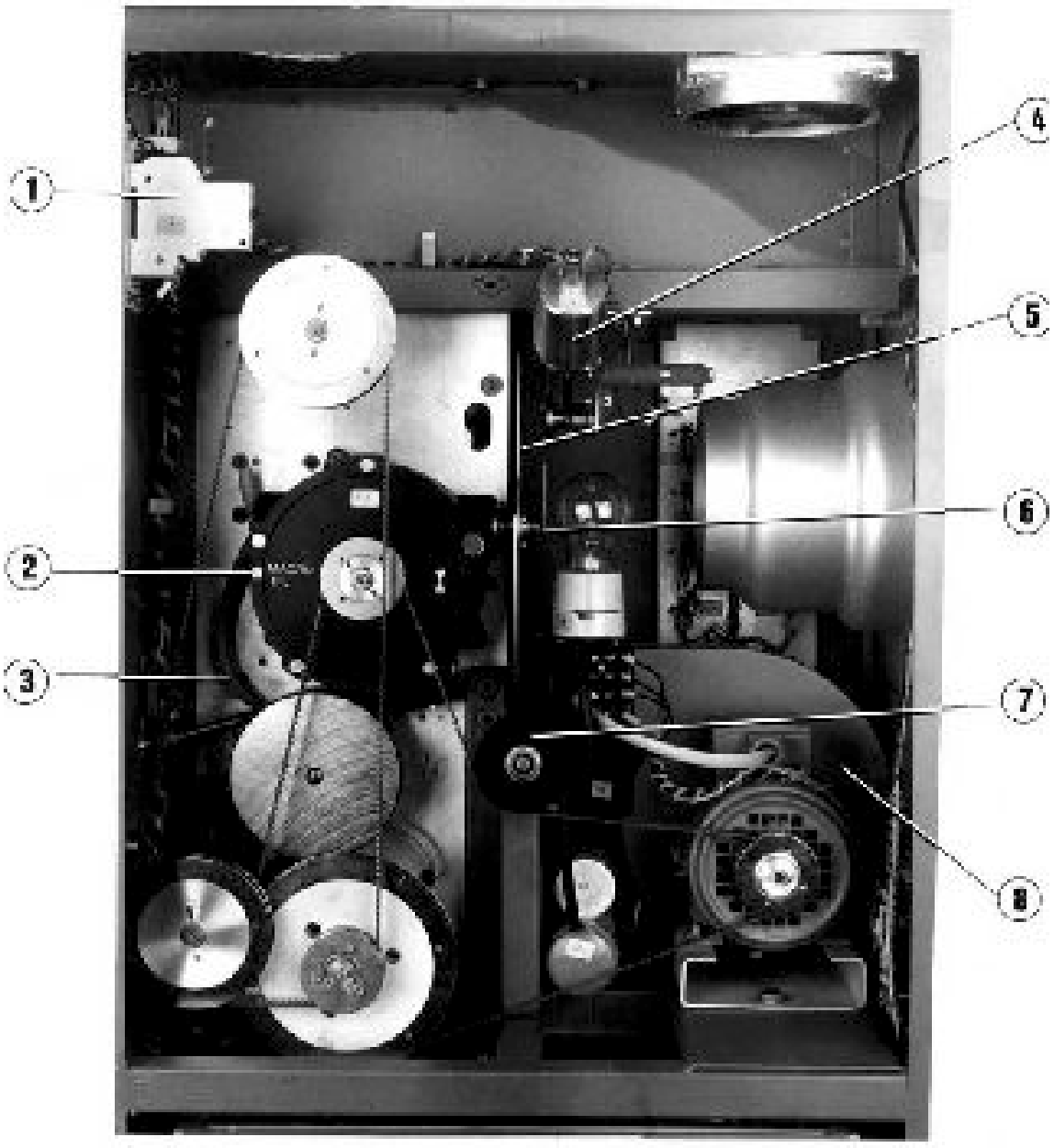
Winding-off unit without cover

1. Indented belt

2. Pulley

3. Slidable cursor of resistor

4. Winding-off unit motor



obr. 16

Fig. 16

View into the MEO 5 XB1 projector casing

1. One-phase projector circuit breaker

2. Mark of oil filling level

3 Transparent hose (oil level indicator)

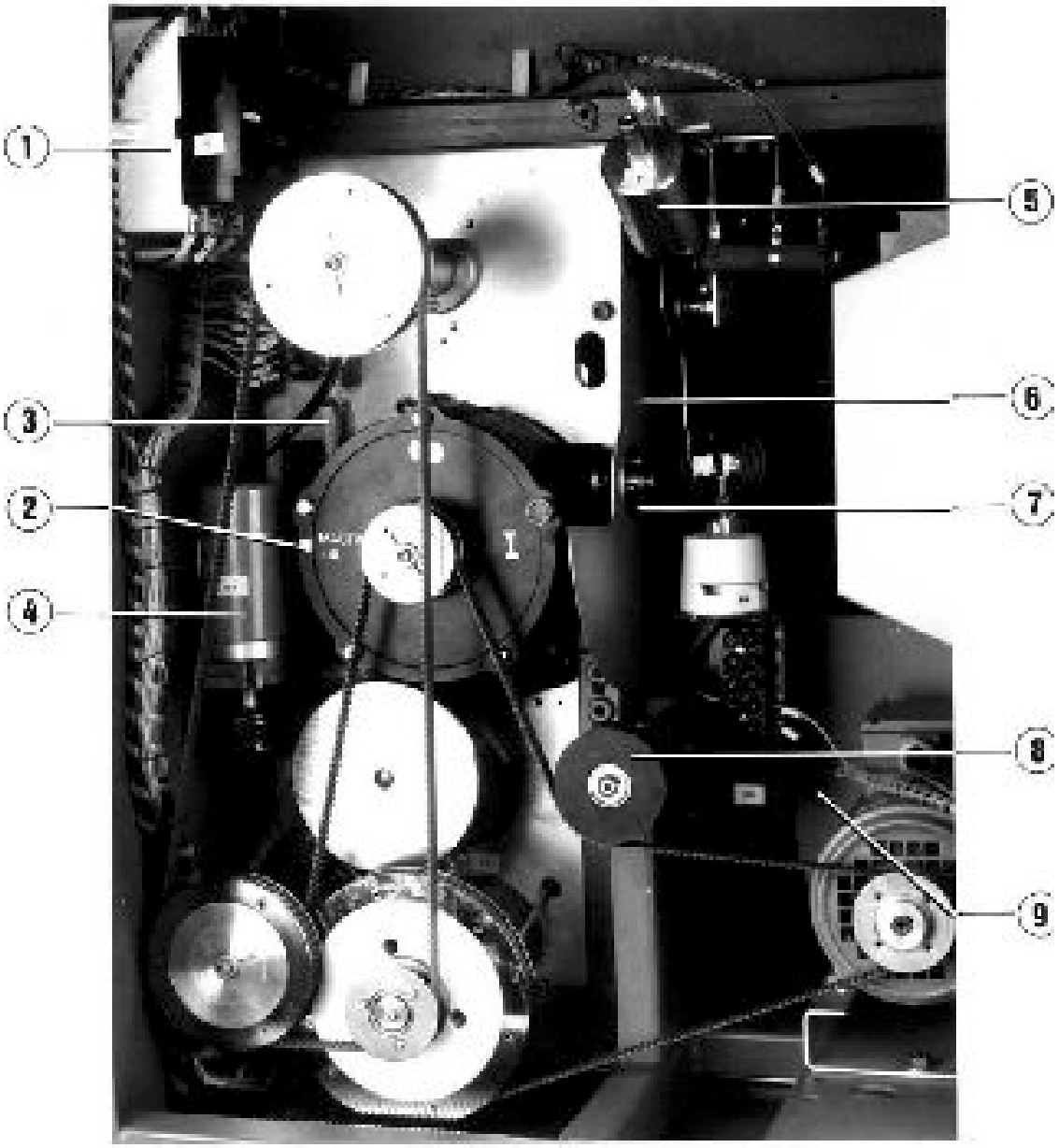
4. Electromagnet of the lap dissolve flap

5. Rotary shutter

6. Pressure plate of the rotary shutter

7. Tensioning roller

8. Film guide cooling fan



obr. 17

Fig. 17

View into the MEO 5 XB3 projector casing

1. Three-phase projector circuit breaker

2. Mark of oil filling level

3 Transparent hose (oil level indicator)

4. Motor-operated image height regulation

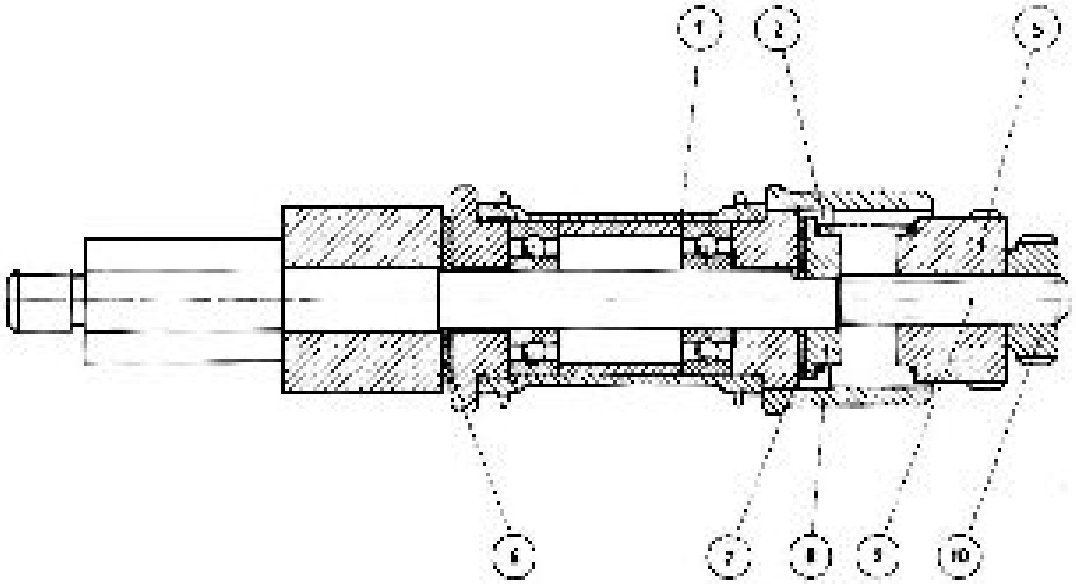
5. Electromagnet of the lap dissolve flap

6. Rotary shutter

7. Pressure plate of the rotary shutter

8. Tensioning roller

9. Film guide cooling fan



obr. 18

Fig. 18

Braking sprocket

1. Body of braking sprocket

2. Spring

5. Milled nut

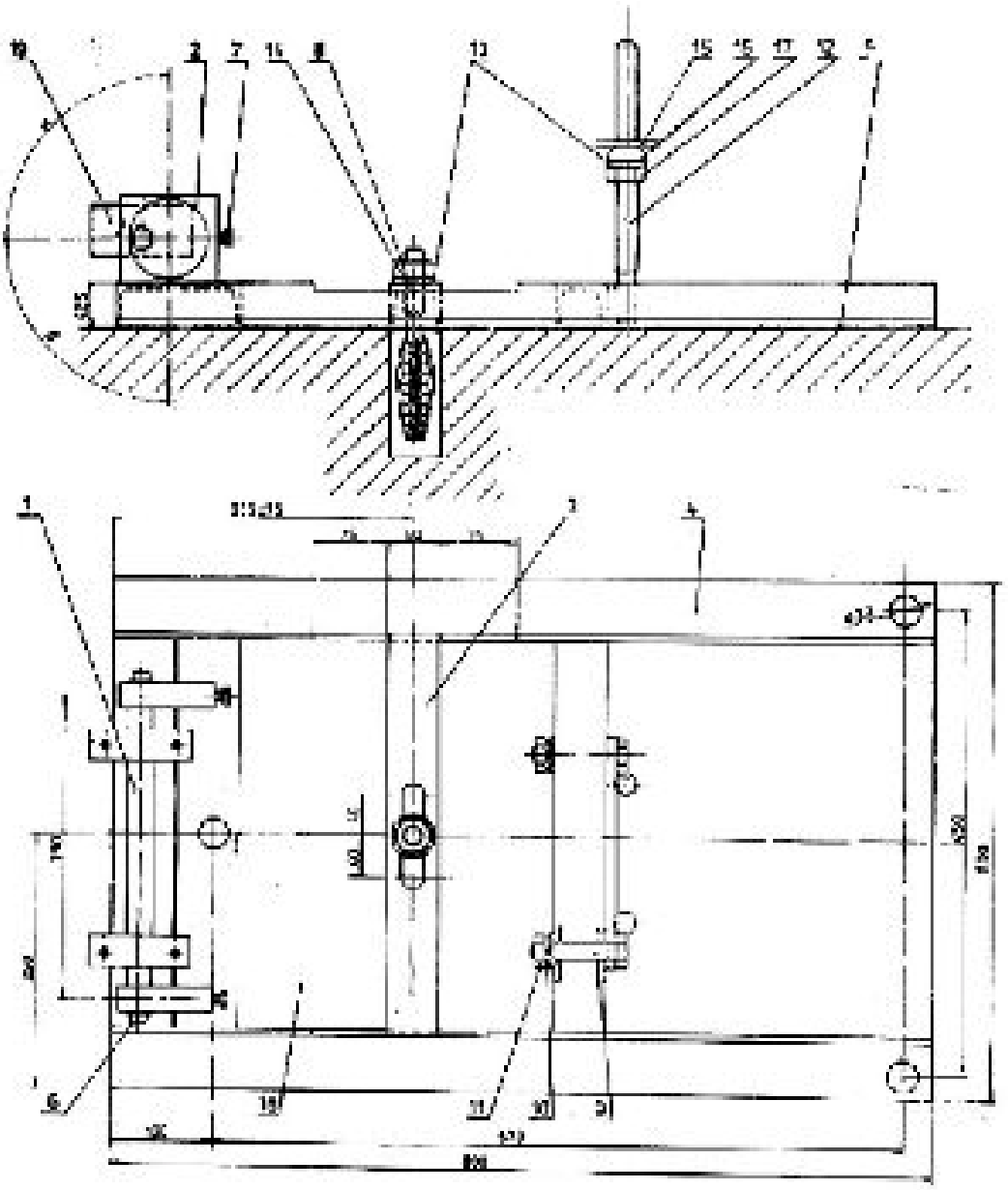
6. Synthetic pad

7. Synthetic pad

8. Thrust collar

9 Shaft

10. Lock milled nut



obr. 18

Fig. 19

Dimensions and projector s base attachment in projector booth

1. Eccentric cylinder

2. Stirrup of the base

3 Mobile anchoring beam

4. Base of projector

5. Rubber washers

6. Necks of the eccentric cylinder (spanner opening 17)

7. Locking screw

8. Anchoring screw M 20x200

9. Screw of beam with bolts

10 Flat and spring washers

11. Nut

12. Bolts with beam

13. Washer B 21

14. Nut M 20

15 Flat washer

16. Ball washer

17. Nut of bolt

18 Base opening

19. Bearings