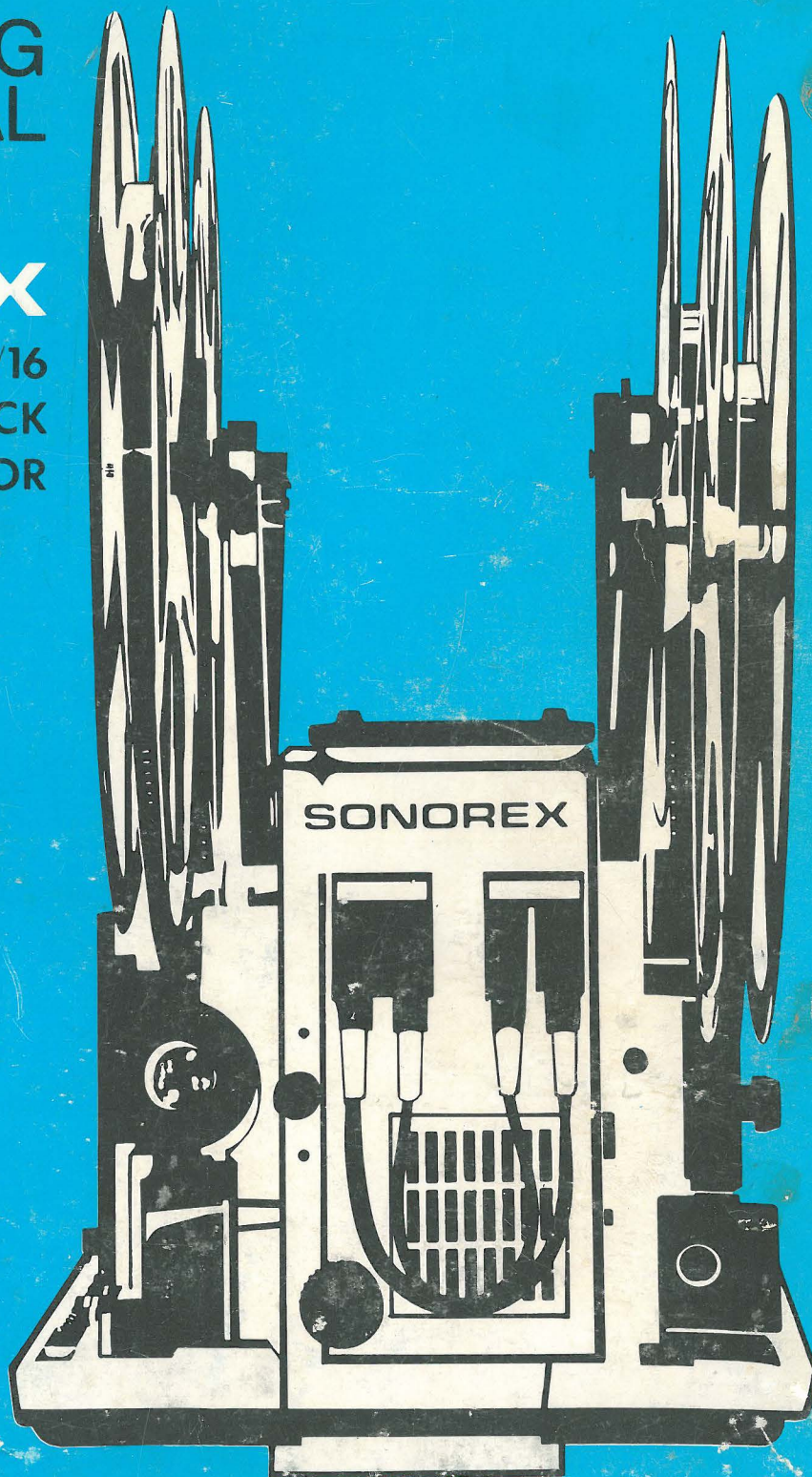


OPERATING MANUAL

SONOREX

16/16
INTERLOCK
PROJECTOR



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The Operating Elements

When reading these instructions, please open the first and the last cover leaf for better guidance and understanding.

- 1 "Record" control light
- 2 Level control for phono input **73**
- 3 Level control for microphone input **74**
- 4 Treble and bass control
- 5 Volume control
- 6 Amplifier magnetic deck side
- 7 Amplifier picture film side
- 8 Optical sound reproduction — playback
- 9 Magnetic sound reproduction — playback
- 10 Magnetic sound recording
- 11 Indicator instrument for recording level control
- 12 Projection leveling
- 13 Exciter lamp control window
- 14 Exciter lamp cover
- 15 Tensioning lever / film end switch
- 16 Setting lever / monitoring head / picture film
- 17 Frame line adjustment knob
- 18 Screw for lamphouse cover
- 19 Film guide roller
- 20 Magnetic fading control
- 21 "Off" switch for magnetic recording (green)
- 22 "On" switch for magnetic recording (red)
- 23 Main operating switch for projector
- 24 Inching button (forward run)
- 25 Guide rollers
- 26 Lamphouse cover
- 27 Hinge bolt for lens carrier
- 28 Focusing knob
- 29 Lens carrier
- 30 Lens
- 31 Manual inching knob (film transport mechanism)
- 32 Threading lamp with switch
- 33 Coupling lever for rapid rewinding (picture film side)
- 34 Release buttons for unlocking spool arms
- 35 Supply arm for picture film
- 36 Spool securing lever (2×)
- 37 Take-up arm for picture film
- 38 Release button for unlocking projector cover
- 39 Front carrying handle
- 40 Sockets for double-band connecting cable
- 41 Built-in monitoring speaker
- 42 1.5 V output jack of the monitoring amplifier
- 43 Earphone connection for monitoring
- 44 Rear carrying handle
- 46 Power cord receptacle
- 47 Bridge-plug for standard power operation

- 48 Jack for connecting extension speaker
- 49 Volume control for extension speaker during magnetic sound recording
- 50 Main power switch
- 51 Spool securing lever (2×)
- 52 Release button for unlocking rear cover
- 53 Take-up arm for magnetic film
- 54 Supply arm for magnetic film
- 55 Release buttons for unlatching spool arms
- 56 Retaining screw for magnetic head carrier
- 57 Push-button / center track (combination head)
- 58 Push-button / edge track (combination head)
- 59 Magnetic head carrier
- 60 Push-button monitoring magnetic head / center track
- 61 Push-button monitoring magnetic head / edge track
- 62 Retaining screw for magnetic head carrier
- 63 Operating hours counter
- 64 Magnetic film deck
- 65 Centering knob for compensating rollers
- 66 Locking lever for compensating rollers
- 67 Monitoring amplifier
- 68 Operating switch for monitoring amplifier, also serves as level control for outputs **42** and **43**
- 69 Selector switch for monitoring the picture side or the magnetic deck side
- 70 Projector speed selector (24 and 25 fps.)
- 71 Pick-up to separate VU-meter
- 72 Input 1.5 V / 600 ohms, symmetrical (pins 1—3)
- 73 Phono input
- 74 Microphone input
- 75 Output 1.5 V / 600 ohms, symmetrical (pins 1—3)
Output 1.5 V / 600 ohms / non-symmetrical (pins 2—5) (adjustable)
- 76 Level control for output **75** (non-symmetrical)
- 77 Switch for built-in speaker

All specifications subject to change without notice

Part I • Silent Operation

All later instructions and explanations are based on the knowledge of the basic functions and operating techniques described in this part. For this reason, we recommend that you study this part very carefully even if you should intend to use the projector for sound film operation exclusively.

Projector Set-up

The projector should be set up in a place where you have free access from all sides. Preferably on a reasonably rigid projection table.

Depress the release button **38** to unlatch and remove the projector cover. Fold out spool arms **35** and **37** to their operating positions. Put the full reel on the front arm **35**. The perforations of the film must be towards the operator with the film coming off the reel in a clockwise direction.

Put the empty take-up reel on the rear arm **37**. Secure reels with safety latches **36**. Maximum film capacity is 2000 feet (600 m). The maximum permissible reel diameter is 15" (382 mm).

The film core diameter of dismountable spools must not be smaller than 4" (100 mm).

The projector-to-screen distance should be chosen in such a way that the entire screen is illuminated from edge to edge (see table on page 20). The projector should preferably be set up horizontally in reference to the screen. However, minor adjustments are possible by raising the front of the projector turning knurled knob **12**.

Power Connection

Insert the bridging plug **47**.

The projector is to be connected to a voltage of 115 V/AC/60 Hz. Plug the mains power cable into the receptacle **46** and into the available mains outlet.

Important:

The projector is ready for operation when the main operating switch **50** is in position ☉ and the film end switch lever **15** is engaged in its lower position!

For operation in connection with synchronizers or pilot frequency amplifiers see page 13.

Functions of the Tension Roller 15

(picture film side)

This roller ensures sufficient tension of the film as it passes over the sound drum. Without film, or in case of film breakage during operation, the tension roller **15** automatically cuts off the power supply for the projector mechanism and the projection lamp (the supply of the amplifier is not interrupted however).

When the projector is operated without film (for aligning it to the screen or rewinding), the tension roller **15** must be engaged in its lower position.

Main Operating Switch 23

O	Off
Rotation to the right	forward run
Step 1	motor and blower
Step 2	lamp operates at reduced output, extending lamp life
Step 3	lamp operates at full brightness
Rotation to the left	reverse run
Step 1	motor and blower
Step 2	lamp operates at lamp-saver setting
The operating hours counter 63 works automatically when film runs through the projector (forward and reverse).	

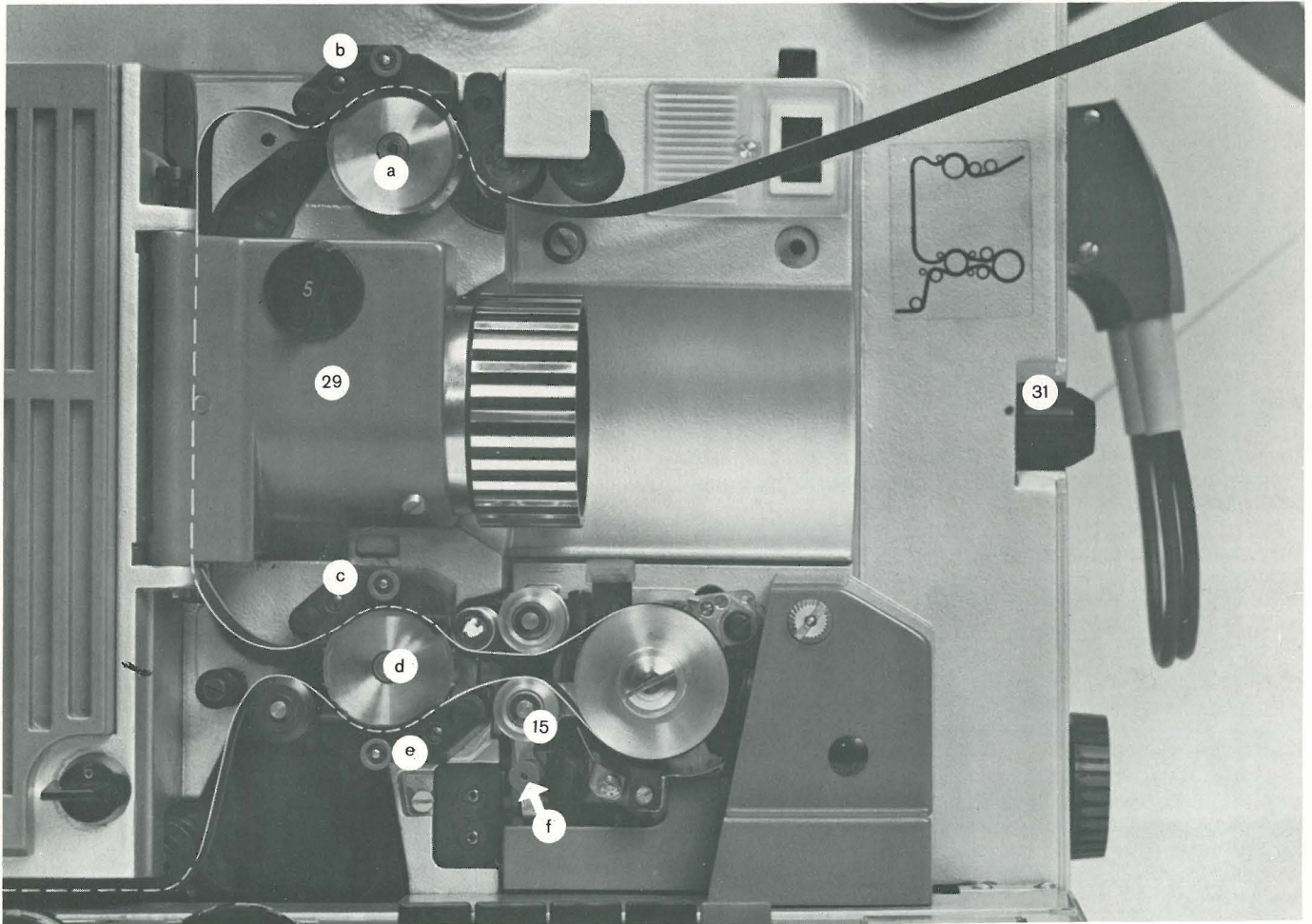


Fig. 1

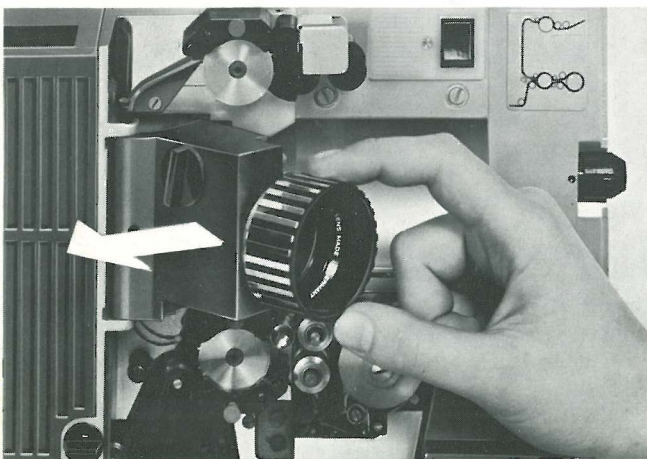


Fig. 2

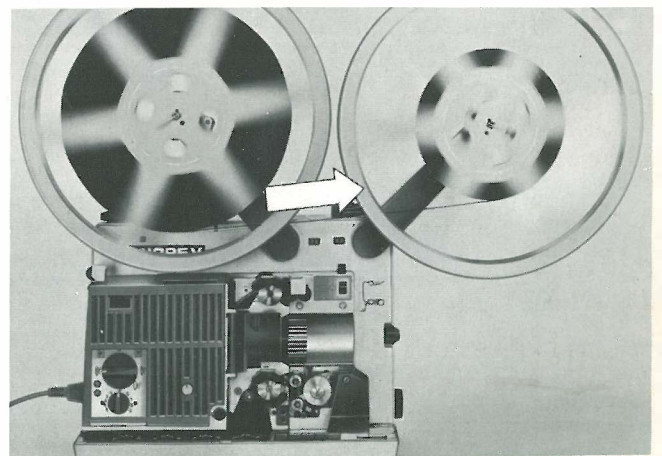


Fig. 3

Film Threading (picture side)

Figure 1

Swing out the lens carrier **29** (fig. 2) or remove it completely after pulling out the hinge bolt **27**. Lift the film retainers **b**, **c** and **e** off the transport sprockets.

Rotate knurled knob **31** by hand until the white index line is opposite the black dot on the projector housing. In this position, the claw protrudes enough so that the perforations of the film engage the three (3) tips of the claw. Depress the tension roller **15** using knob **f** until it engages in its lower position.

Run approximately 9 feet (2.5 m) of film off the supply reel and thread it through the machine according to the threading chart. Pay special attention to the following points when threading the film:

- The teeth of the feed sprocket **a** and the take-up sprocket **d** must properly engage with the perforation of the film, before closing the film holders **b**, **c**, and **e**.
- Film loops must be formed above and below the film gate. These loops must exactly match the drawings on the projector.
- Do not forget after threading:
Pull the stop knob **f** to release the tension roller **15**, so it swings upward and tightens the film. Also, make sure that the lens carrier **29** is properly closed.
- For checking the film run, briefly depress the inching button **24**.

Silent Film Showing

Select the running speed by turning the inching knob **31** and simultaneously setting the switch-over lever **70** (with the aid of a screwdriver or a similar tool) to the desired running speed.

Never change the running speed when the projector is running! Turn the selector switch **23** clockwise for forward to step 2, or 3 (reduced or full brightness setting). The projector is now in operation.

Focus the image by turning knob **28** and adjust the frameline with knob **17**.

For repeating a scene, run the projector in reverse for desired length by turning switch **23** counter-clockwise to step 1 or 2 (to the left of center position) then stop the projector by turning switch **23** to "0" and proceed to the right to step 2 into forward operation as described previously.

Automatic Film End / Film Break Switch

(picture film side)

The projector is automatically switched off when the end of the film passes the sound unit. To run the film completely out of the projector, depress tension roller **15** until it re-engages in its lower position. After all the film has passed through the machine, set the switch **23** to "0".

Lack of film tension on the roller **15** or film break (due to a bad splice) will automatically cut-off the power supply. This prevents film damage. **Please refer to:** Film tension on the sound drum (page 6).

Film Rewinding

(Figure 3)

Attach the end of the film to the core of the empty supply reel. The film must wind up counter-clockwise. Press the tension roller **15** down and turn switch **23** counter-clockwise to step 1. Pull the coupling lever **33** out all the way to its end stop; simultaneously brake the left reel briefly by hand so the rewind clutch catches. After the rewinding is accomplished, turn switch **23** back to "0" — this will automatically reset lever **33** to its original position.

Important: The clutch lever **33** should only be activated for rewinding.

Post Screening Operations

Turn off the main switch **50** (position "O") and/or disconnect the power cord (receptacle **46**). After depressing the two release buttons **34**, fold down the spool arms. The projector should be closed completely with both covers to protect it against dust. The following accessories can be stowed away inside the film side cover:

- 240 m spool (800 feet)
- Power cable
- Spare projection lamp
- Spare exciter lamp
- Spare fuses
- Splicer
- Film cement
- Dusting cloth
- Dusting brush
- Felt strip for cleaning the film channels

Part 2 • Sound Film Operation

The following are additional preparations to be made for sound film operation:

- Selection of the operating mode (push-button selection and plug connections)
- Threading of the perforated magnetic full coat film for double-band operation
- Connection of sound sources for recordings
- Connection of an extension speaker or another separate sound system for sound reproduction

Start Mark on Picture Film

The picture film is threaded according to the instructions on page 5. For double-band operation, the picture film must bear an exact start-mark as follows for the exact synchronization of picture and sound.

For this purpose, apply a start-mark (or scratch a starting mark on the film) to the leader of the film. Take into consideration that the projector needs a few seconds to reach running speed. For this reason, the starting mark should be well ahead of the beginning of the first scene.

To facilitate aligning of the visual mark on film with the one on the fullcoat tape, the film must be threaded into the projector so the start-mark is right in the picture aperture.

Film Tension at the Sound Drum

(picture film side)

Damaged perforations may cause a drop of film tension around the sound drum **a** (figure 4).

The projector signals such dropping of the tension immediately: In case the film tension on the tension roller **15** drops, the projector stops automatically. Turn switch **23** back to "0" and press the film holder **b** downward. Pull the film to the left in running direction until the lever **15** is again properly tensioned (to do this, lift the perforations off the take-up sprocket **c**).

Close the film holder **b** and restore the lower film loop **d**, if need be.

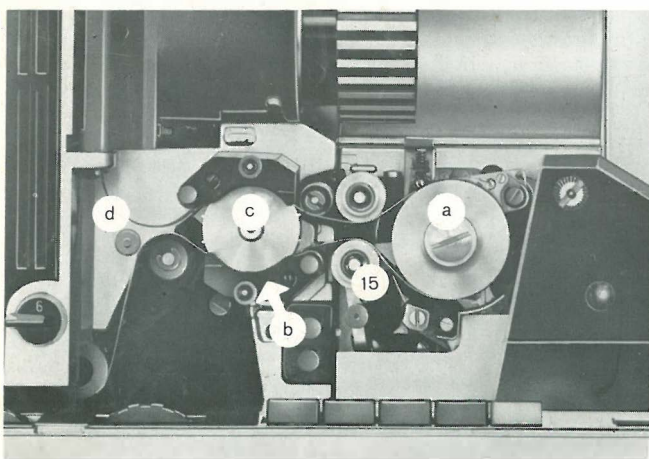


Fig. 4

Threading of Magnetic Film Deck

Depress release button **52** and remove the side cover. Fold out spool arms **53** and **54** to their operating position. Put the full reel on the supply arm **54**. The perforations should be toward the machine with the magnetic film coming off the reel in a clockwise direction (dull magnetic emulsion on the inside).

Put the empty film reel on the take-up arm **53**. Secure reels with safety latches **51**. The film capacity is 2,000 ft. the maximum permissible spool diameter is 15" (382 mm).

The film core diameter on split reels should not be smaller than 4" (100 mm).

Run off about seven (7) feet of film and put a starting mark on the glossy side of the film.

(Figure 6)

Firmly press the lever **66** downward until it catches — this will swing the right compensating roller **f** into the proper position for threading. Now the film can be threaded according to the threading chart. Watch the following points:

- First thread the film on the left side and close the film retainer **g**. Continue threading as indicated and tighten tape as much as possible while threading it around the right side of the sprocket **i**. Then close the film retainer **h**. Make sure the film is properly placed into the recessed idler rollers and the teeth of the sprocket **i** engage the perforations of the magnetic film.
- Starting the projector will release the compensating roller **k** and both loop dampeners **f** will swing towards the center applying tension to the film.
- To check the transport of picture and magnetic film: Rotate the manual inching knob **31** or briefly depress the inching button **24**.
- To change the position of the magnetic film in relation to the picture film: The starting mark on the magnetic film must be right under the record/playback head **c** (for exceptions refer to operating modes Q, R and S). If need be, the position of the start-mark can be corrected after threading: Push in the knurled ring **i** and turn it to the left or to the right until the starting mark is right under the magnetic head (the starting mark is visible from above in a mirror, see fig. 5). The starting position of the picture film has not changed when applying this procedure on the magnetic film side!
- Due to different characteristics of the magnetic films, the pair of compensating rollers **f** may shift off its middle posi-

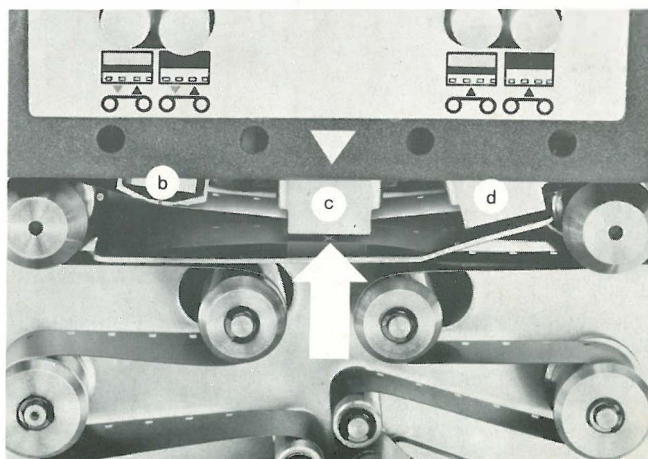


Fig. 5

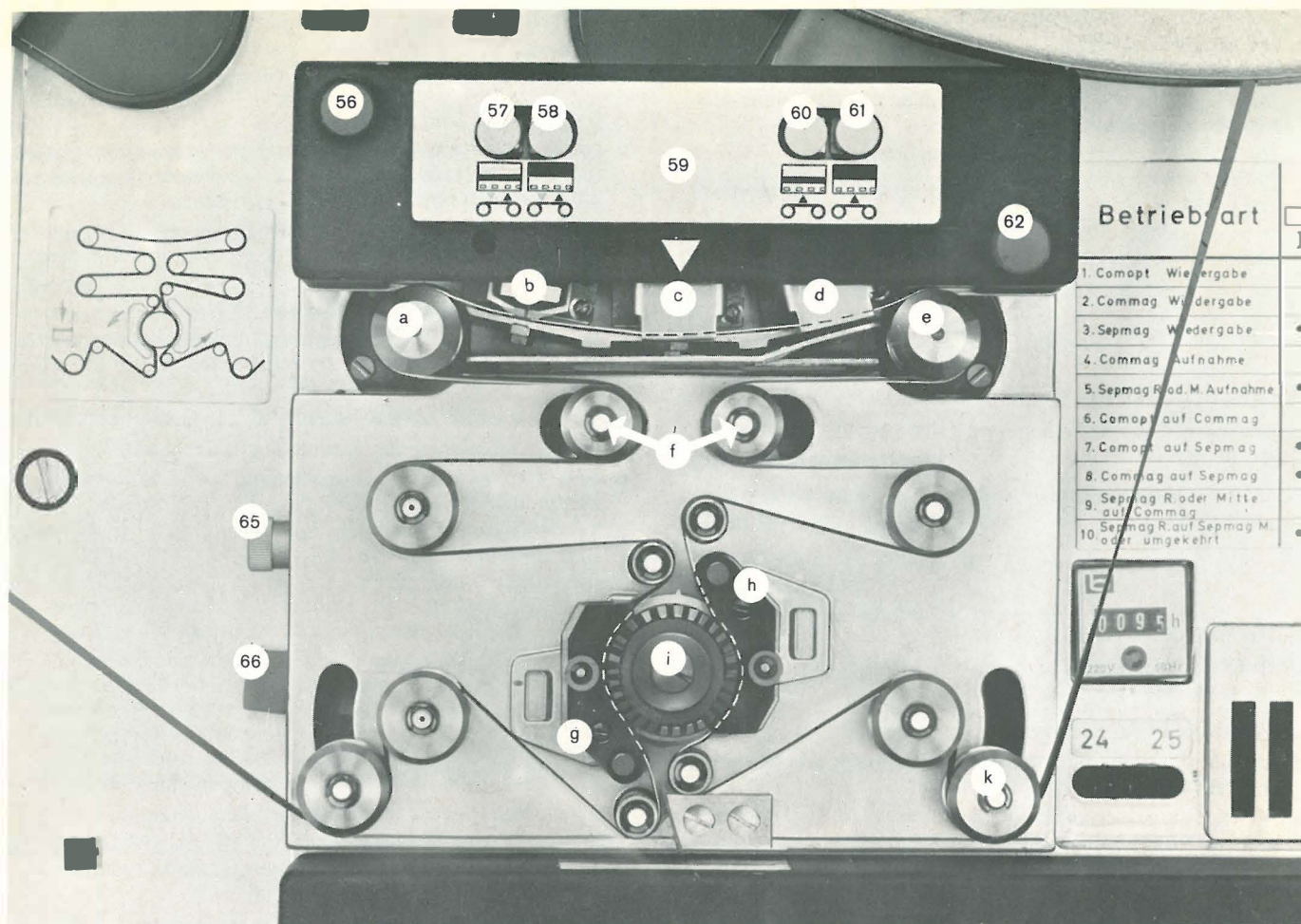


Fig. 6

tion. During a short test run, the position of these compensating rollers *f* should be adjusted by turning the centering knob **65**. Adjustment will guarantee a smooth film run. Run the film back to relocate the start mark after such an adjustment was made.

- After recording or playback, the magnetic film can be power-rewound on the magnetic film side (switch **23** to reverse run), the rapid rewind (lever **33**), however, does not work on the magnetic film side.

It is expedient to rewind large amounts of magnetic film on a separate rewinder or, if need be, use the power rewind on the picture film side.

Electronic Fuse

The built-in electronic fuse will blow immediately in case the main amplifier is overloaded due to a fault in the extension speaker, short in the speaker cable, etc. In the event the fuse blows:

1. Disconnect the projector from the power line, either by disconnecting the power cable or by turning the switch **50** to 'O'. The electronic fuse will regenerate within 10 sec.
2. Remedy the cause of the trouble.
3. Re-connect and switch on the projector.

In case the sound is distorted during reproduction even at a medium-volume setting, check the impedance of your extension speaker. It is probably lower than 8 ohms. The electronic fuse is adjusted to the maximum power consumption of the final output stage. This consumption will rise with increasing volume (just as the power consumption in turn depends on the impedance of the extension speaker). If there should be a problem in the extension speaker, distortions will be noticed clearly before the critical point of the electronic fuse is reached. Ex-

perience has shown, however, that 5 ohm. speakers (such as hi-fi boxes) can be used without danger as long as the amplifier is operated at a medium level in which no acoustical distortions occur.

Sound Operating Modes

The various operating modes with their corresponding switch positions and plug-in connections for the transfer cables are listed alphabetically on the rear of the machine.

The switches which are marked with a full circle (●) in the operating mode table **MUST** be depressed. Switches with an empty circle (○) in the table must be pressed **ONLY** for monitoring. See also page 12.

Connections and wiring of the inputs and outputs may be seen from the diagram (page 21).

On page 19, you will find a survey of the types of film which can be used. The same page also contains an explanation of the technical terms COMOPT, COMMAG and SEPMAG which by now are accepted as international standard in studio operation.

General hints for the recording of sound will be given in the annex to these modes of operation.

Operating Mode A

Picture film with optical sound track (COMOPT) Playback

1. Depress push buttons **7** and **8**.
2. Connect the extension speaker to jack **48**.
3. Adjust the volume with control **5**.

4. Adjust treble and bass with controls 4.
5. To use built-in speaker:
Turn switch 77 to "full", "half" (or "off").
6. For connection of an extension amplifier for sound reproduction, see 1.5 V output on page 12.
7. Additional sound sources used during operation:
Connect record player or tape recorder to jack 73 — fade-in with control 2.
Connect microphone (200 ohms, symmetrical) to socket 74 — fade-in with control 3.
For 1.5 V input, see page 12.

Operating Mode B

**Picture film with magnetic edge-track (COMMAG)
Playback**

Same as in Mode A, except: Depress push buttons 7 and 9 (see also on table).

Operating Mode C

**Magnetic film (SEPMAG)
Center-track playback**

1. Depress push button 6, 9 and 57.
2. Sockets 40: Connect double-band cable to sockets ② and ③ (see figure 7).
3. Connect the extension speaker to socket 48.
4. Adjust the volume with control 5.
5. Adjust treble and bass with controls 4.
6. To use built-in speaker:
Set the switch 77 to "full", "half" or ("off").
7. For connection of an extension amplifier for sound reproduction, see 1.5 V output, page 12.
8. Additional sound sources used during operation: Connect record player or tape recorder to socket 73 — fade-in with control 2.
Connect microphone (200 ohms, symmetrical) to socket 74 — fade-in with control 3.
For 1.5 V input, see page 12.

Operating Mode D

**Magnetic film (SEPMAG)
Edge-track playback**

Same as described under Operating Mode C except: Depress push buttons 6, 9 and 58 (see table).

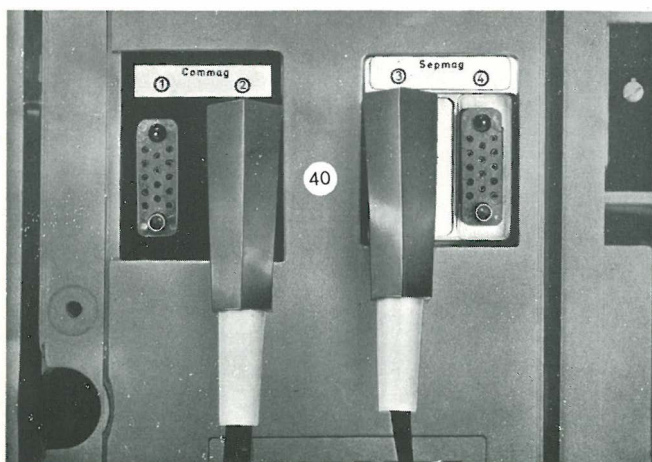


Fig. 7

Operating Mode E

Picture film

Recording on magnetic edge-track (COMMAG)

1. Depress keys 7 and 10.
2. Connect record player or tape recorder to socket 73. Adjust the recording level with control 2 — indicator 11 should not enter the +dB area, not even at peak volume.
3. Connect the microphone (200 ohms, symmetrical) to jack 74. Adjust the recording level with the aid of control 3 (indicator 11).
4. Recording via 1.5 V input, see page 12.
5. For monitoring during recording, connect the extension speaker to jack 48. Adjust the volume with the aid of control 49.
6. Built-in speaker: Set the switch 77 to "full", "half" or "off".
7. Delayed monitoring during recording, see page 12.
8. After starting and run-up, depress red button 22 — the record control lamp 1 will light up and the recording begins.
9. To terminate the recording, depress the green button 21 or turn the switch 23 to "0" — the record control lamp 1 will dim out.

Operating Mode F

**Magnetic film (SEPMAG)
Recording on center-track**

Same as described for operating mode E.

Except:

1. Depress push buttons 6, 10 and 57.
2. Sockets 40:
Connect the double-band cable to sockets ② and ③ (see figure 7).
3. Delayed monitoring during recording, see page 12.

Operating Mode G

**Magnetic film (SEPMAG)
Recording on magnetic edge-track**

Same as described for operating mode F.

Except:

Depress push buttons 6, 10 and 58 (see table).

Operating Mode H

**Picture film with optical and magnetic half-track (MAGOPT)
Re-recording the optical sound track (COMOPT)
on the magnetic sound track (COMMAG)**

1. Depress push button 7.
2. Depress push button 8 and 10 simultaneously.
3. Connect an extension speaker to socket 48 for recording control. Adjust the volume with control 49.
4. Built-in speaker: Set the switch 77 to "full", "half" or "off".
5. Adjust the recording level in a trial run with the aid of control 5. Indicator 11 should not enter the red +dB area at peak volume. Do not depress push button 22 during such a trial run.
6. During re-recording it is well possible to mix-in additional signals from different sound sources: Connect the record player or the tape recorder to jack 73 — and adjust the volume with control 2.

Connect the microphone (200 ohms, symmetrical) to jack 74 — adjust the volume with control 3.

For 1.5 V input, see page 12.

7. Delayed monitoring during recording, see page 12.
8. After starting and run-up depress the red push button **22** — the record control lamp **1** will light up and the recording begins.
9. To terminate the recording, depress the green push button **21**, or set the switch **23** to "0" — the recording control lamp **1** will dim out.

Operating Mode J

**Re-recording the optical sound track (COMOPT)
on magnetic film (SEPMAG) center-track**

1. Depress push button **6, 7** and **57**.
2. Depress push button **8** and **10** simultaneously.
3. Sockets **40**: Connect the double-band cable to sockets **②** and **③**, see **figure 7**.
4. For monitoring connect an extension speaker or a head-phone to socket **48**. Adjust the volume with control **49**.
5. Built-in speaker: Set the switch **77** to "full", "half" or "off".
6. Adjust the recording level in a trial run with control **5** — the indicator **11** should not enter the red +dB area at peak volume. Do not depress key **22** during such a trial run!
7. During re-recording it is well possible to mix in further sound signals from other sound sources: Connect the record player or the tape recorder to jack **73** and adjust the volume with control **2**. Connect the microphone (200 ohms, symmetrical) to jack **74** — and adjust the volume with control **3**. For 1.5 V input, see page 12.
8. Delayed monitoring during recording, see page 12.
9. After starting and run-up, depress the red push button **22** — the record control lamp **1** will light up and the recording begins.
10. To terminate the recording, depress green push button **21** or set the switch **23** to "0" — the record control lamp **1** will dim out.

Operating Mode K

**Re-recording the optical sound track (COMOPT)
on magnetic film (SEPMAG) edge-track**

Same as described for operating mode J.

Except:

Depress push buttons **6, 7, 8, 10** and **58** (see table).

Operating Mode L

**Re-recording the magnetic sound track (COMMAG)
on magnetic film (SEPMAG) center-track**

Same as described for operating mode J.

Except:

Depress push buttons **6, 7, 9, 10** and **57** (see table).

Operating Mode M

**Re-recording the magnetic sound track (COMMAG)
on magnetic film (SEPMAG) edge-track**

Same as described for operating mode J.

Except:

Depress push buttons **6, 7, 9, 10** and **58** (see table).

Operating Mode N

**Re-recording magnetic film (SEPMAG) center-track
on magnetic sound track (COMMAG)**

Same as described for operating mode J.

Except: (see table)

1. Depress push buttons **7, 9, 10** and **57**.
2. Sockets **40**:
Connect the double-band cable to sockets **①** and **③** (see **figure 8**).

Operating Mode P

**Re-recording magnetic film (SEPMAG) edge-track
on magnetic sound film track (COMMAG)**

Same as described for operating mode J.

Except: (see table)

1. Depress push buttons **7, 9, 10** and **58**.
2. Sockets **40**:
Connect the double-band cable to sockets **①** and **③** (see **figure 8**).

Operating Mode Q

**Re-recording magnetic film (SEPMAG) center-track
on magnetic film (SEPMAG) edge-track**

Same as described for operating mode J.

Except: (see table)

1. Depress push buttons **6, 9, 10, 58** and **61**.
2. Sockets **40**:
Sockets **②** and **③** as well as **①** and **④** must be connected via double-band cables (see **figure 9**).

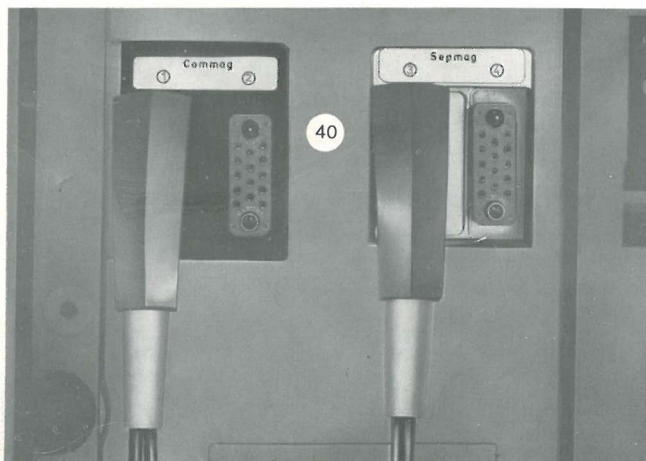


Fig. 8

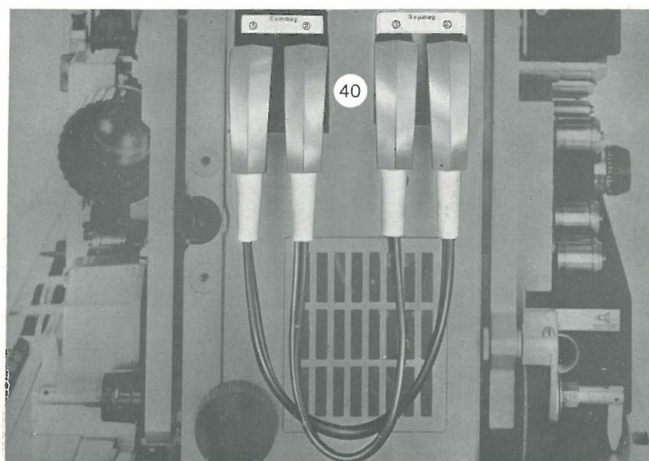


Fig. 9

This operating mode is used for:

1. Change of the sound track position for program exchange (compatibility). Watch the different position of the start-marks!
2. For mixing the center-track into the edge-track (or vice versa, see operating mode R) with the aid of the magnetic fading control **20** (see page 13).

Shifting of the start-mark

The re-recording from one track to another on the double-band side (SEPMAG) needs some further explanation:

1. During separate recording and reproduction of the SEPMAG center-track and the SEPMAG edge-track both recordings or reproductions are made right at the magnetic combination head **c** (figure 5) (operating modes F/G and C/D).
2. During subsequent re-recording (i. e. mixing with the aid of the magnetic fading control **20**), for instance from SEPMAG center-track to SEPMAG edge-track, the center-track is picked up by the monitoring head **d** and is recorded on the magnetic film by the combination head **c**. This means that the center-track is shifted to the rear by the distance between the two (2) heads which is four (4) 16 mm frames (about $\frac{1}{6}$ sec.).
3. This shift can be compensated for before the recording of the center-track, by repositioning the start-mark to the erase head **b**. For all other sound operations, align the start-mark with the combination head **c** again.

Operating Mode R

Re-recording from magnetic film (SEPMAG) edge-track on magnetic film (SEPMAG) center-track

Same as for the operating mode Q.

Difference: (see table)

Depress push buttons **6, 9, 10, 57** and **60**.

Subparagraph under operating mode Q regarding the shifting of the start-mark applies equally to the operating mode R.

Special Operating Modes S 1 — S 3

These operating modes deal with simultaneous and synchronous re-recording and mixing of 2 magnetic sound tracks on the remaining third track. The levels of the two tracks to be re-recorded can be mixed freely.

Advantages:

- "true" mixing from a sound technical point-of-view without changing or deteriorating the sound characteristics which inevitably happens when mixing a second recording (with magnetic fading control) over an existing track.
- Re-recording and mixing two separate tracks onto a third permits acoustical control of the levels and the degree of mixing (contrary to mixing with a magnetic fading arrangement).
- If any mistakes are made during re-recording it is always possible to repeat the mixing since the two original tracks remain unaltered (contrary to mixing with a fading arrangement, where such mistakes inevitably require a repetition of the original recording).

Operating Mode S 1

Simultaneous re-recording from magnetic film (SEPMAG) center- and edge-track to the magnetic sound track (COMMAG) (mixing in the projector)

This method is usually accomplished in three steps:

1. A first recording at full level on SEPMAG edge, or center-track (according to operating mode G or F).
2. A second recording at full level on the remaining SEPMAG track (according to operating mode F or G).

3. Simultaneous re-recording and mixing of both SEPMAG tracks on the COMMAG magnetic sound track of the picture film.

NOTE: To get the best possible fidelity, music recordings should always be made on the 200 mil track of the SEPMAG side (edge-track).

Shifting of the start-mark

During such subsequent simultaneous re-recording of both SEPMAG tracks on COMMAG, the 200 mil track is scanned with the combination head **c** (figure 5), and the 100 mil track with the monitoring head **d**. Since the recording of the two tracks is made with the combination head **c**, the re-recording will result in a shifting by the length of four frames which is equivalent to a time lag of about $\frac{1}{6}$ seconds. This shift can be avoided from the very outset by shifting the start-mark for recording of the 100 mil track to the erase head **b**. For mixing (transferring) place the start-mark back on the combination head **c** again.

Re-recording the SEPMAG tracks to COMMAG

1. Thread picture film and magnetic film according to their respective start-marks.
2. **For SEPMAG edge-track (200 mil):**
Depress push button **7, 9, 10** and **58**.
Sockets **40**:
Connect the double-band cable to sockets **①** and **③** (see figure 8).
3. **For SEPMAG center-track (100 mil):**
Switch on the monitoring amplifier **67** via control knob **68**.
Depress push button **60**.
Set the selector switch **69** to **II**.
Connect the sound cable to sockets **42** and **72** (see accessories).
4. For monitoring the recording connect an extension speaker or a headphone to socket **48**.
Adjust the volume with control **49**.
5. Built-in speaker:
Set the switch **77** to "full", "half" or "off".
6. Adjust the recording level (the degree of mixing) in a trial run:
SEPMAG edge-track with control **5**,
SEPMAG center-track with control **68**.
Indicator **1** should not enter the red +dB area at peak volume. Do not depress key **22** during such a trial recording.
7. During re-recording you may mix the two sound levels (watch the record level instrument **11**). It is recommended to monitor the mixing with the extension speaker or a headphone.
8. In addition, it is possible to mix-in additional sound signals from other sources:
Connect record player or tape-recorder to jack **73** — adjust volume with control **2**.
9. Delayed monitoring is not possible during such a recording because the monitoring amplifier is needed for the SEPMAG center-track during the re-recording.
10. After starting and run-up, depress push button **22** — the record control lamp **1** will light up and the recording begins.
11. To terminate the recording, depress the green push button **21** or turn the switch **23** to "0" — the record control lamp dims out.

Operating Mode S 2

Simultaneous re-recording from two magnetic films (SEPMAG) to magnetic film (SEPMAG) edge-track (mixing with separate mixing console)

To allow for creative and accurate editing, sound tracks are usually recorded singularly on separate rolls of fullcoat magnetic stock. The mixing of the sound is done after each track has been individually edited and conformed with all others. Such separately prepared sound tracks can be transferred onto the SEPMAG (200 mil) side of the machine using a separate mixing console (through 1.5 V balanced line in/out).

The so derived master tape can now be re-recorded onto pre-stripped picture film.

Operating procedures:

First recording at full level on magnetic film 1 SEPMAG 100 mil center-track

Thread picture film and mag. film 1 according to their respective start-marks. Make a recording as in operating mode F.

Important:

The magnetic film with 100 mil center-track **must** be laced on the SEPMAG deck for mixing. During mixing this track is scanned with the monitoring head **d** (watch for compensation of that shift when recording, see special note in operating mode Q).

Second recording at full level on magnetic film 2 SEPMAG 200 mil edge-track

Thread picture film and magnetic film 2 according to their respective start-marks. Make a recording as in operating mode G.

Mixing and re-recording

Mixing and re-recording on the SEPMAG edge-track is done **without** picture film.

1. Thread mag. film 1 on the double-band side and position the start-mark exactly under the SEPMAG combination head (see fig. J, pos. c).
2. Thread mag. film 2 on the picture film side and position the start-mark exactly under the COMMAG combination head (see fig. 13, pos. g).
3. **For magnetic edge-track on picture film side:**
Depress the push buttons **6, 7, 9, 10** and **58**.
Turn volume control 5 to the left end stop (lowest level).
Sockets **40**:
Connect the double-band cable to sockets ② and ③ (see fig. 7), and connect the symmetrical 1.5 V output **75** to the symmetrical 1.5 V input of the mixing console.
4. **For magnetic center-track on the double-band side:**
Depress push button **60**.
Switch on monitoring amplifier via knurled knob **68**.
Set switch **69** to II.
Connect the symmetrical output **42** to the symmetrical 1.5 V input of the mixing console.
During a trial run, adjust the playback level to the sensitivity of the mixing console using level control **68**. Then return to the start-mark.
5. Connect the symmetrical 1.5 V output of the mixing console to jack **72**.
6. Built-in speaker:
Set switch **77** to "full", "half" or "off".
7. Monitoring during recording:
 - a) Connect extension speaker or headphone to jack **48**.
 - b) Via monitoring amplifier (if available) in the mixing console.
8. Set the switch **23** to forward run (without lamp).
9. After run-up, depress recording button **22** — and the record control lamp **1** will light up.
10. During re-recording both levels on the console can be freely mixed. If need be, further sound sources may be connected to the mixing console.
11. Record level control:
 - a) On the recording control instrument of the mixing console, or,
 - b) On the separate volume control instrument (see accessories) connected to jack **71**.
12. Delayed monitoring of the tape during re-recording is not possible as the monitoring amplifier is needed for the scanning of the SEPMAG center-track.
13. To terminate the recording, depress the green button **21**, or turn the switch **23** to "0" — the recording control lamp **1** will dim out.

Operating Mode S 3

In case a suitable mixing console with symmetrical 1.5 V input and output is not available, operating mode S 2 can be modified as follows:

- a) **Recording on the two separate magnetic films**
is done as described under operating mode S 2.
- b) **Mixing and re-recording**
 1. Thread the magnetic films for mixing as described under S 2.
 2. **For magnetic edge-track on picture film side:**
Depress push buttons **6, 7, 9, 10** and **58**.
Sockets **40**:
Connect the double-band cable to sockets ② and ③ (see figure 7).
 3. **For magnetic center-track on the double-band side:**
Switch on the monitoring amplifier **67** via knurled knob **68**.
Depress the push button **60**.
Set selector switch **69** to II.
Connect the sound cable to sockets **42** and **72** (see accessories).
 4. Adjust the record level (degree of mixing) in a trial run — but do not depress the red button **22** during such a trial. Even at peak volume, the indicator of the recording control instrument **11** should not enter the +dB area. The level of the magnetic film on the picture film side is adjusted with control **5**; that of the magnetic film on the double band side is adjusted with control **68**.
 5. During re-recording both sound levels can be freely mixed (watch the recording control instrument **11**).
It is recommended to monitor the mixing with an extension speaker or with a headphone (connect these to jack **48**, adjust the monitoring volume with control **49**).
 6. If required, it is possible to mix in further sound sources: Connect record player or tape-recorder to jack **73** — fade-in with control **2**.

For further operational hints see operating mode S 2.

NOTE: The scope of an instruction manual limits the number of general hints that could possibly be given. We have to confine ourselves to the ones pertaining to this machine. Further details about the technique of working with sound can be found in a vast number of publications in this field.

All standard perforated 16 magnetic films available on the market are suitable for the double-band side of the projector.

Important Prerequisites for good Sound Recording and Reproduction

1. Exact and clean splicing

Preferably use a double-tapering splicer for your picture film editing. Magnetic film is spliced like regular sound tape with the aid of special adhesive tape (ARRI butt-end splicer with adhesive tape). If for some reason or other, it is necessary to do subsequent splicing on a film to which sound has already been added, you will always lose a corresponding length of sound-track. In the double-band method, it is imperative to cut out an equal number of perforations from picture film and magnetic film, otherwise synchronism is lost. Make sure to splice the magnetic film at the point corresponding to the picture film.

2. Dustfree storage of the film

At certain intervals it is advisable to clean the films with a conventional film polish.

3. Cleaning of the sound heads

(see page 15)

Adding Music or other Recordings

The following hints apply to all magnetic sound recording on the picture film side and on the double-band side:

1. First check and determine the screen times of the various scenes with the aid of a stopwatch, and cue all scenes on the sound script.
2. To prepare the final sound script, correlate the musical pieces and the changes in music with the record on scenes and scene lengths. Also determine the scene transitions. The sound script now provides the necessary organization for the later step-by-step adding of sound. Using a well organized script, it is very easy to repeat exactly, any recordings that did not come out quite satisfactory.

The following is a typical sequence of operations during sound recording:

3. Thread the film according to the start-mark.
4. Set push buttons and sockets **40** according to the corresponding operating mode and track position.
5. Connect a record player or tape recorder. It is expedient to re-record records on to tape to facilitate exact starting with the aid of the quick stop key on a tape recorder.
6. Start the record player or tape-recorder and find the best modulation level with the aid of the level control instrument **11**.
Music recordings on which narration or sound effects will have to be superimposed later (magnetic fading control) should be recorded only at about $\frac{2}{3}$ of the full level (peak volume about -6 dB, as indicated on instrument **11**). Music is usually too loud if recorded at full volume, because of its wide frequency range as compared to voice recordings.
7. Before the final recording is made, a trial recording or trial mixing is recommended (see also under magnetic fading control, page 13).
8. Run the film back to its start-mark. Take into consideration that the projector needs a few seconds for run-up. For this reason, the leader between the start-mark and the beginning of the film should be sufficiently long.
9. Start the projector and depress button **22** at the beginning of the recording ("flying start"). If music is to be faded in gradually, turn the gain control slowly from "0" up to the pre-determined level.
10. For "fade-out" of music at the end of a scene turn the gain control slowly to "0" shortly before the end of the scene. The zero position should be reached at the desired position in the film.
11. For the following recording, allow for run-up again, therefore run the projector backward for about 5–6 seconds.
12. Set the level for the musical piece to be added to the next scene as described.
13. Start the projector and depress button **22** where the next recording is to start. Do the fade-in as described under 9.
14. In this manner — and according to the sound script — you add recording after recording to the entire length of the film.

An excellent aid in finding the starting points of recordings, is the frame counter (see accessories, page 16).

For monitoring of any signal (from record player, tape recorder, microphone or mixing console) during recording, it is possible to connect an extension speaker or a headphone (minimum 8 ohms) to jack **48**. Adjust the sound volume with control **49**. Whenever the magnetic fading control **20** is used for the recording of "sound over" it is not possible to hear the new signal being recorded.

Monitoring

For monitoring off the tape (delayed) during recording, connect a headphone (or speaker) to jack **43** of the monitor amplifier **67**.

Monitoring (delayed) off the tape/COMMAG:

Press lever **16** down to its end stop. Set switch **69** to I. Switch on the monitor amplifier and adjust volume with control **68**.

When the COMMAG side is not monitored off the tape (delayed), lever **16** should remain at its upper position to prevent unnecessary wear of the monitor head.

Monitoring (delayed) off the tape/SEPMAG:

Depress push button **60** (center track) or **61** (edge-track).

Set the switch **69** to II. Switch on the monitor amplifier and adjust volume with control **68**.

When operating according to modes S 1 — S 3, it is not possible to monitor off the tape, because the monitor amplifier **67** is used for the re-recording of one SEPMAG track.

1.5 V input 72

The 1.5 V input jack **72** (contacts 1–3, symmetrical) is intended for connection of the projector with sound systems equipped with a 1.5 V symmetrical output. Gain is controlled on the connected unit, i.e. outside the projector. The incoming signal cannot be controlled with the projector controls.

1.5 V output 75

This output jack **75** can be used for the following purposes depending on the contact arrangement:

1. Contact arrangement pins 1–3 (symmetrical)

Connection to studio equipment with symmetrical 1.5 V inputs. The output voltage is fixed (1.5 V at full level). It cannot be influenced by the controls on the projector.

2. Contact arrangement 2–5 (non-symmetrical)

Additional possibility of connection for extension amplifiers etc. fitted with non-symmetrical inputs. The maximum output voltage is 1.5 V; it is adjustable by means of the volume control **5** and can be influenced with the level control **76**. The frequency response is controlled via the treble and bass adjustment **4**. At first, we recommend to set the treble and bass controls to their respective middle positions to insure linear frequency response.

Microphone Recording

Connect a low-impedance (200 ohm) microphone with symmetrical connections (Cannon plug) to jack **74**.

Adjust the recording level with control **3**.

All further manipulations and operations are the same as those listed in the chapter "adding of music, or other recordings".

For direct monitoring as well as for tape monitoring during a microphone recording, it is advisable to use a headphone. If an extension speaker is used for this purpose there is the danger of acoustical feedback (whistling or howling sound, or unwanted echo effects).

For speech recordings it is advisable to record the texts first on a separate tape. Completing this text recording, a trial run (without recording), starting the tape at all the points where sound is to be added later, is recommended. Every time the commentary for a film scene has ended, stop the tape recorder with the aid of the quick-stop device. This is the best method to check whether the prepared texts will fit properly into the respective film scenes.

Sound Over, Recording with the Magnetic Fading Control

For special effect recordings i.e. for subsequent dubbing of speech, or sound effects onto an existing recording the projector has been equipped with the magnetic fading control 20.

The erasing current is switched off by pulling the fading control knob 20. Any turning of the control causes a continuous pre-magnetization.

The dampening of the initial recording is achieved by what may be called a "partial erasing" (especially erasing of the higher frequencies). This means that the initial recording loses some of its original sound characteristics. The change in the frequency scope of the original recording (music or sound effects) is, however, hardly noticeable, because the subsequent recording becomes more dominant. For such recordings it is advisable to adopt the following sequence:

1. Music
2. Sound effects
3. Speech

The fading control can be used for recording on any magnetic sound track (COMMAG and SEPMAG) when operating in modes E—R, as well as S 1—S 3.

Application

1. After the initial recording the film must be reversed by the desired length or must be completely rewound and rethreaded.
2. The position of the push buttons and the cable connections on sockets 40 depends on the operating mode (see table).
3. Pull the magnetic fading control 20 and turn it to its left end stop.
4. Connect the sound source and adjust the level with the respective control. For the operating modes H—R and S the level is determined in a short trial run (afterwards run the film back to its starting position). Take into consideration that the projector needs a few seconds for run-up.
5. Start the projector and depress the button 22.
6. At the fade-in point turn the fading control 20 from its left end stop clockwise to the tangible engaging point (roughly the middle position). This gradually fades out the initial recording — and at the same time the sound from the sound source is recorded (or the sound tracks to be mixed in the operating modes H—R and S). At the engaging point (middle position), the initial recording is dampened to about half volume. During speech fade-ins the beginning of the narration should be delayed until the fading control 20 is in its engaging point (middle position).
it is recommended to determine the degree of mixing through a trial recording (on a test film — not on an original!).
7. At the end of the fade-in turn the fading control 20 back to its far left position (counterclockwise). This means that the initial recording returns to its original level without any break.
8. For a subsequent continuous fade-out (without a second recording) of an existing recording — e.g. at the end of a film — turn the fading control 20 from its left end stop position all the way to its right end stop.
9. At the end of such a special effect recording, set the fading control to its middle position and press it back into its "off" position.

Important:

The factory-adjusted engaging position of the fading control determines the pre-magnetizing voltage for the combination heads. Any change or subsequent adjustment of this point may be made only by an authorized service station.

Erasing

A previous recording is automatically erased during a new recording on the same track. The only exception is the second or

multiple recording with the aid of the magnetic fade control 20 (see preceding paragraph). For a complete erasure proceed as follows:

1. Do not connect any sound sources to the input jacks.
2. Turn the controls 2, 3, and 5 counter-clockwise to their left end stops.
3. Thread the film.
4. Position of push buttons and sockets 40: Refer to the respective recording mode for the desired track.
5. Set the projector to forward run with main switch 23 and depress button 22 — any existing recording will be erased from this track.

How to Operate in Conjunction with other Synchronizing Equipment

Principle

In professional film editing, the synchronous original sound is recorded from the original 1/4" tape on to perforated magnetic film. To achieve the necessary synchronism, the pilotone signal added during the original picture-and-sound recording, is fed into a "synchronizer". This amplified pilot frequency is then fed right to the synchronous drive motor of the projector. Any change in the pilot frequency (which corresponds to a change in the running speed during the original recording) causes a change in the projector run. This means the projector runs at the same speed as the camera/recorder during shooting. Synchronism of picture-and-sound is consequently retained.

The result of such re-recording, the perforated magnetic film with sound signals, can be further used for studio sound synchronizing and editing.

The same synchronous transfer can be obtained using a resolver which varies the tape-recorder speed during playback.

Application

1. Remove the bridging plug 47.
2. Connect the pilot frequency amplifier (synchronizer) or any synchronizing system to multiple socket 47 (special plug, see accessories) via a connecting cable.
3. For further operations see the instructions for the respective accessory.

Part 3 • Small Service

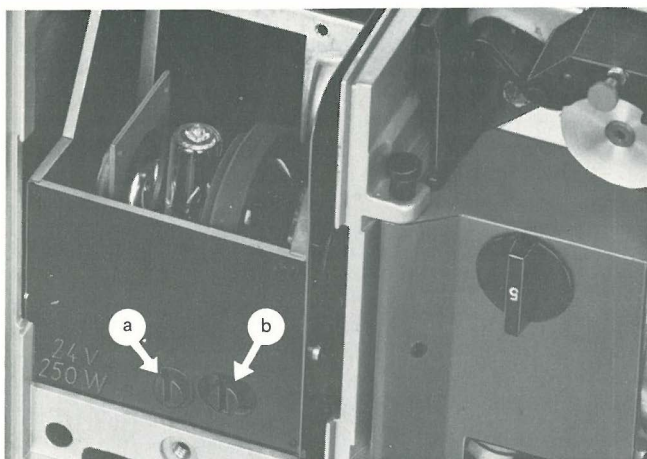


Fig. 10

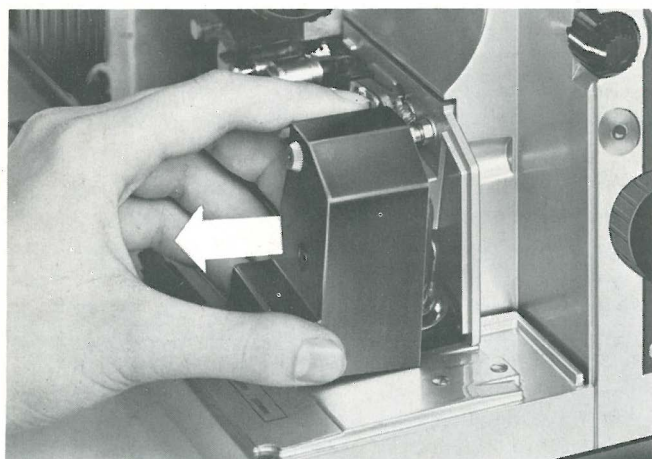


Fig. 11

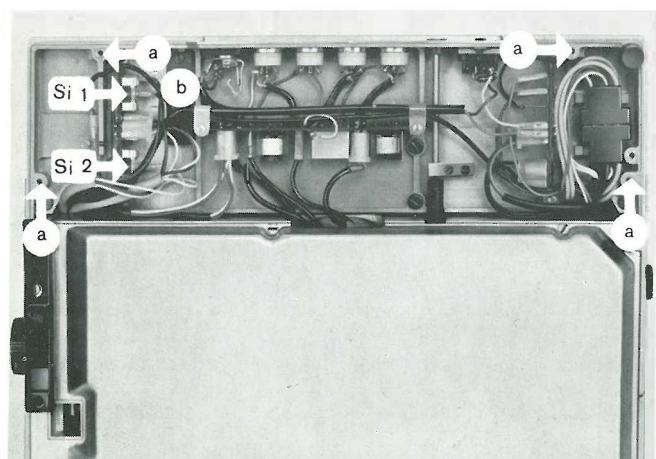


Fig. 12

How to exchange the Projection Lamp

Switch off the projector and pull the mains cable. Let the lamp cool off. Loosen screw **18** and remove lamphouse cover **26**. Pull the defective lamp upward. Insert the new lamp (24 V/250 W, halogen) into the socket until you feel the contact pins have come to an end stop. Avoid any fingerprints on the quartz bulb (insert the lamp with its protective sleeve, which should be removed only after complete installation of the lamp). Replace lamphouse cover **26**.

How to adjust the Projection Lamp

In case the screen illumination should be uneven or simply unsatisfactory, it is possible to adjust the lamp in the following way: Remove lamphouse cover **26** and switch projector and lamp on. With the left adjustment screw **a** (fig. 10) adjust the lateral illumination of the screen image. The right screw **b** permits adjustment of the lamp for maximum evenness in screen illumination over the entire image. After completing this adjustment, switch off the projector and remount the lamphouse cover **26**.

How to exchange the Exciter Lamp

Loosen the knurled nut and remove exciter lamp cover (fig. 11). Press the exciter lamp downward and turn it to the left of the socket. Insert the new lamp (6 V/1 amp.) by turning it to the right. The exciter lamp base has a special shape so that false insertion is impossible. Remount the exciter lamp cover.

Electrical Fuses

In addition to the self-resetting electronic fuse for the final stage of the amplifier (see page 7) the projector is equipped with the following electrical fuses (see fig. 12):

- Si 1/1.6 amps, slow — for amplifier circuit
- Si 2/1.6 amps, slow — for exciter lamp, recording relay and volume control circuits.

Before exchanging any of the fuses, disconnect the projector from the main power supply. Pull the power cord!

There is access to the fuses after removing the four screws **a** and the small bottom cover.

Spare fuses are located under the plastic plate **b**.

Maintenance and Care

The projector requires practically no maintenance as most of its bearings are lifetime-lubricated. However, we recommend to have the projector checked at certain intervals (after about 200 to 400 operating hours) watch the operating hours counter **63**.

Care of the projector can be limited to cleaning. For cleaning the film path, use the brush and/or the felt strip supplied with the projector.

Cleaning the Picture Film Side

COMMAG sound heads and sound optics
(fig. 13)

Loosen screw **b** and remove the sound drum from its shaft (if need be, use a special tool, see accessories). Loosen knurled nut **14** and remove exciter lamp cover. Remove exciter lamp.

1. Clean the photo cell **d**, the slit optics **e** and the opening of the sound optics **f** with a fine hair brush.
2. Clean the running surfaces of the erase head **c**, the combination head **g** and the monitoring head **a** with an alcohol-soaked tab of cotton.

Attention!

Never work with metallic objects (such as screwdriver, etc.) in the vicinity of the magnetic heads!

Picture aperture

1. Remove hinge bolt **27** upward and remove the lens carrier **29**. Lubricate the hinge bolt slightly before replacing the carrier.
2. Clean the edge of the aperture and the pressure plate with a fine hair brush.
3. Emulsion deposits on the film handling surfaces can be removed with a plastic scraper (see accessories), or with a wooden stick.

Projection lens

Pull the lens **30** from the lens carrier. For cleaning the front and the rear lens elements use a fine, grease-free hair brush, or preferably lens tissue. When re-inserting an old-type short-focal length lens with recessed lens barrel, watch that the spring-loaded film pressure plate is not blocked.

Film rollers

Remove film deposits from the film handling rollers with a soft hair brush. If need be, use an alcohol-soaked piece of cotton wool.

The horizontal film channel

which is located right under the lamphouse, should be cleaned with the supplied felt strip.

Cleaning of the Double Band Side

SEPMAG sound heads
(fig. 6)

1. Loosen the knurled screws **56** and **62**. Remove the sound head carrier **59**.
2. Clean the running surfaces of the three magnetic sound heads (erase head **b**, combination head **c**, monitoring head **d**) with alcohol-soaked cotton wool.

Attention:

Never use any metallic objects (screwdriver, etc.) in the vicinity of the magnetic heads!

Film rollers

Remove magnetic film deposits from the film handling rollers with a soft hair brush, or, if need be, use a piece of cotton wool.

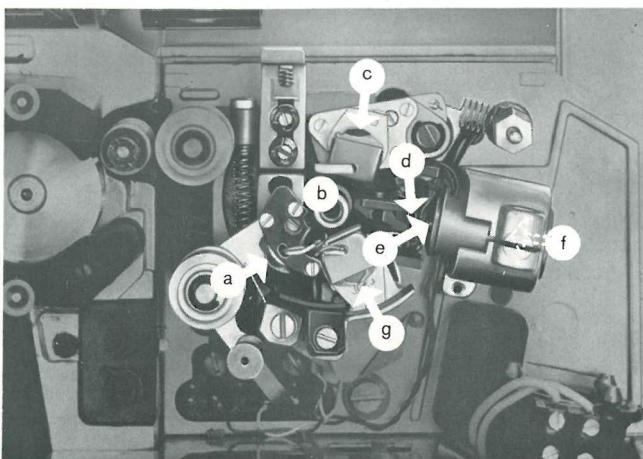


Fig. 13

Demagnetizing of the Sound Heads

(COMMAG and SEPMAG)

An increasing loss of high frequencies or increasing hiss from magnetic films may be due to the following causes:

1. Dirty magnetic sound heads (see "cleaning").
2. Wear of the magnetic sound heads.

Remedy: Replacement of the sound heads by an authorized service station.

3. Magnetizing of the sound heads causes hissing.

Remedy: De-magnetize the sound heads with the aid of a conventional de-magnetizing capacitor. Consult the instruction manual for the de-magnetizer.

The most important Spare Parts

Lens carrier 29

Pressure plate	8 696 576 246
Hinge bolt 27	8 693 170 194

Switch panel (picture film side)

Main switch 23	8 697 272 081
Knob for main switch	8 692 070 074
Knob for magnetic fading control 20	8 692 070 076
Inching button 24	8 692 070 138
Green push button (magnetic recording) 21	8 697 272 348
Red push button (magnetic recording) 22	8 697 272 346

Projection system

Projection lamp (24 V/250 W)	8 697 570 042
Concave mirror	8 695 375 006
Condenser (on the lamp side)	8 695 370 025
Condenser (on the shutter side)	8 695 370 027

Pilot light 32

Glow lamp (12 V/2 W)	1 907 572 515
Switch	8 697 272 184

Film transport (picture film side)

Sprockets (top and bottom)	8 696 670 293
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Drive belts

Timing belt (2×) for motor	8 694 770 038
V-belt (4×) in spool arm (picture film side)	8 694 770 022
Timing belt (1×) for spool arm (picture film side)	8 694 770 014
Timing belt (1×) for spool arm (double-band side)	8 694 770 101

Feet

Front projector foot	8 692 370 092
Rubber buffer (rear projector feet, 3×)	8 692 370 025

Sound system (picture film side)

Sound drum	8 696 670 347
Exciter lamp (6 V/1 amp)	8 697 570 090
Combination record/playback head	8 697 276 254
Erase head	8 697 276 012
Level control instrument 11	8 697 276 082
Recording control lamp (18 V/1 amp) 1	1 907 575 210
Switch for built-in speaker 69	8 697 272 182
Exciter lamp cover 14	8 695 570 881
Monitoring head	8 697 276 218

Magnetic head carrier assembly 59 (double band side)

200 mil edge-track, 100 mil center-trak	8 697 276 229
Combination record/playback head	8 697 276 225
Erase head	8 697 276 226
Monitoring head	8 697 276 225
Monitor amplifier 67 (double-band side)	8 698 075 048
Bridge plug assembly 47	8 694 472 085
Double band cable (2×)	8 694 472 804
Operating hours counter 63	8 697 276 235
Main power switch 50	8 697 272 319

Film rollers (double band side)

Transport roller (12 teeth) assembly	8 698 875 287
Film guide roller (6×)	8 698 875 540
Upper compensating roller (2×)	8 698 670 539
Small reverse roller (4×)	8 696 670 538

20 W amplifier assembly

Fuses

1.6 amp., slow	1 904 522 740
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Part 4 • Accessories

Projection Lenses

(Barrel diameter 42.5 mm)

Schneider Xenon f/1.4/25 mm
ISCO Kiptaron f/1.3/35 mm
ISCO Kiptaron f/1.3/50 mm or
ASTRO Kino Color f/1.4/50 mm
Emo Emostar f/1.5/65 mm or
ASTRO Kino Color f/1.5/65 mm
Emo Emostar f/1.6/75 mm or
ASTRO Kino Color f/1.6/75 mm
ASTRO Kino Color f/1.6/85 mm
ASTRO Kino Color f/1.8/100 mm
BAUER VARIO Zoom Lens f/1.6/35–65 mm

Anamorphic Lenses

(Fig. 14)

Möller anamorphic attachment 32/2×
(for lenses of 35 and 50 mm focal length)
holder for the above lens

Möller anamorphic attachment 46/2×
(for lenses of 50–100 mm including vario lens)
holder (for 50–100 mm lenses)
holder (for 100 mm and Vario lens)

Hi-Fi Speaker 35

(Fig. 15)

This 35 W speaker has been especially designed for use with this projector. It meets the requirements of Hi-Fi standards (DIN 45.500) and ensures outstanding sound quality. This speaker is fitted with a 70 ft. extension cable.

Remote Control

(Fig. 16)

The following functions of the projector can be remotely controlled with this accessory:

Projector run forward and backward with lamp on
Volume control during playback

Magnetic sound recording "on/off"

Collective level control during recording (this function can also be switched "off").

Four-track Magnetic Head Assembly

(Complete with carrier)

This SEP MAG magnetic head assembly permits the recording and reproduction of four separate sound tracks on the double-band side. This accessory is of particular interest for multilingual recordings and reproductions. A special output permits the connection of suitable four-channel amplifiers for simultaneous reproduction of all four tracks.

Control Instrument (VU-Meter)

Separate, illuminated desk-type control instrument.

Large, well readable panel.

Connection: Socket 71.

Sound Cable for Operating Modes S 1 and S 3

Multiple Plug

for operation with pilot frequency amplifier, etc.

Special Tool for removing the Sound Drum

(picture film side)

Facilitates the removing of tight sound drum without any damage to the drum.

Connecting Gear

(Fig. 17)

This special gear permits mechanical interlocking of the projector with other studio equipment (via shaft or timing belt).

Frame Counter

(Fig. 18)

This practical, 5-digit counter can be mounted to the front of the projector right on the main shaft.

Adapter for Endless Film Arrangement

For uninterrupted showings of endless film loops (up to a length of 150 m/500 feet) we recommend the RCA endless film arrangement. This can be attached to the projector, using our adapter.

Gate Scraper

For removing hardened emulsion deposits from the runners of the film gate.

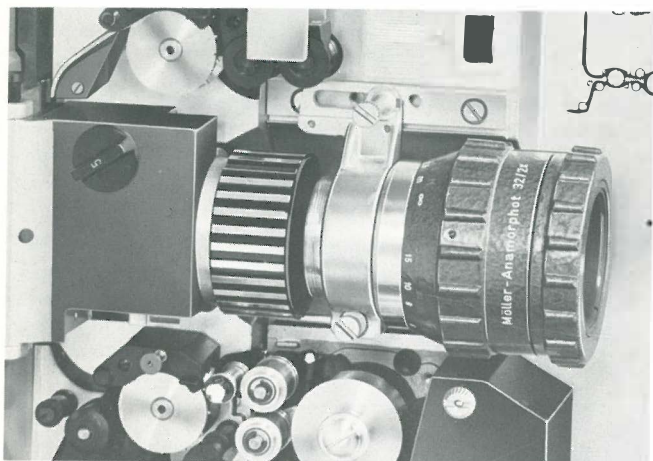


Fig. 14

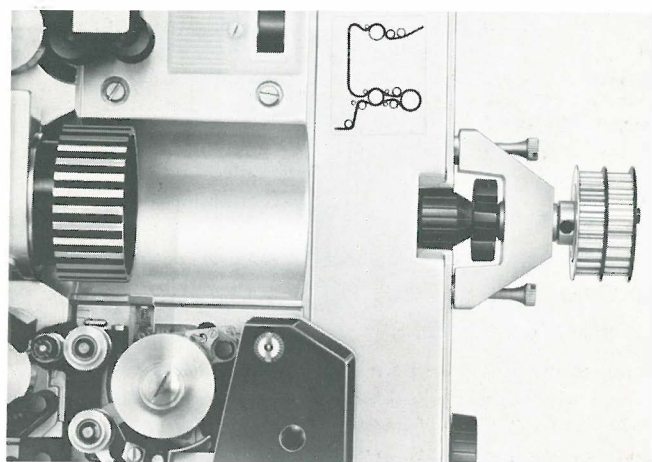


Fig. 17



Fig. 15

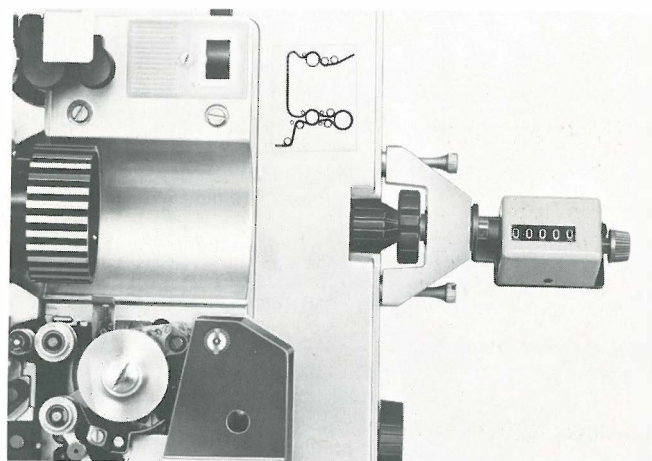


Fig. 18



Fig. 16

Part 5 • Technical Specifications and Tables

Technical Specifications

Dimensions:	See dimensional drawing, page 22	Outputs:	Speaker 8 ohms Output 1.5 V/600 ohms, symmetrical (+ 6 dB) Output 1.5 V/600 ohms, symmetrical (adjustable) Output for separate control instrument contact wiring: 2-ground/3 AF (5.2 V \approx 220 ohms)
Weight:	About 64 lb, complete without reels	Magnetic Head Assembly: (double-band)	Plug-in (with erase head) combination head for recording and reproduction, monitoring head, switchable from center- to edge-track)
Reel Capacity:	600 m or 2,000 feet	Monitoring (Off Tape):	On the picture film and magnetic film side can be picked up via symmetrical 1.5 V/600 ohm output and 5–15-ohm speaker output (both outputs are adjustable), can be switched to picture film side and magnetic film side.
Threading:	Diagram on the picture film side and on the double-band side	Magnetic fading control:	Continuously adjustable for fade-in and fade-out recordings (on picture film side and on magnetic film side)
Lenses:	Optional (see accessories)	Volume Control Indicator:	dB indicator instrument
Picture Aperture:	7.16 \times 9.6 mm (acc. to DIN standard 15650 SMPTE-PH 22.8)	Frequency Response for Optical Sound (picture film side):	40 Hz . . . 7 KHz \pm 3 dB
Projection Lamp:	24 V/250 W halogen	Frequency Response magnetic sound:	40 Hz . . . 12 KHz \pm 3 dB
Light Output:	About 450 lumens	Signal-to-noise Ratio:	> 45 dB
Power Requirements:	115 V/60 Hz, A.C.	Wow and Flutter (picture film side):	0.4% (acc. to DIN standard)
Drive:	Three-phase synchronous motor, permits synchronous single operation, or operation in conjunction with other studio synchronizing equipment (such as Rotosyn), via multiple socket on the projector	Wow and Flutter (magnetic film side):	0.3% (acc. to DIN standard)
Running Speed:	24 and 25 fps. can be switched mechanically, forward and reverse run	Run-up on picture film side:	Maximum 5 seconds
Claw:	Film-saving three-tooth claw	Run-up on double-band side:	Maximum 3 seconds (run-up and braking gears for flywheels)
Sprocket Coupling:	Sprockets on picture film and double-band sides are mechanically coupled. This coupling can be disengaged for shifting the double band side against the picture film side and vice versa		
Rewinding:	Picture film: Rapid power rewind Magnetic film: power rewind (for long film use separate rewinder)		
Film end/Film break Switch:	The projector is automatically shut off at the end of the film, and in case of operating troubles due to damaged films		
Operating Hours Counter:	Built-in		
Auxiliary Lighting:	Built-in pilot light with switch		
Amplifier:	Built-in, 20 W sine, clearly arranged push buttons and rotating controls, electronic fuse, studio-type inputs and outputs, some of which are adjustable; microphone and record player inputs are separately adjustable. The speaker can be controlled during recording.		
Built-in Speaker:	0.5 W (switch "O", "half", "full")		
Exciter Lamp:	6 V/1 amp., D.C.-supplied		
Inputs:	Phono 1.5 V/600 k ohms Microphone 0.5 mV/200 ohms, symmetrical Input 1.5 V/600 ohms, symmetrical (+ 6 dB)		

All specifications subject to change without notice

The Film

(see illustrations)

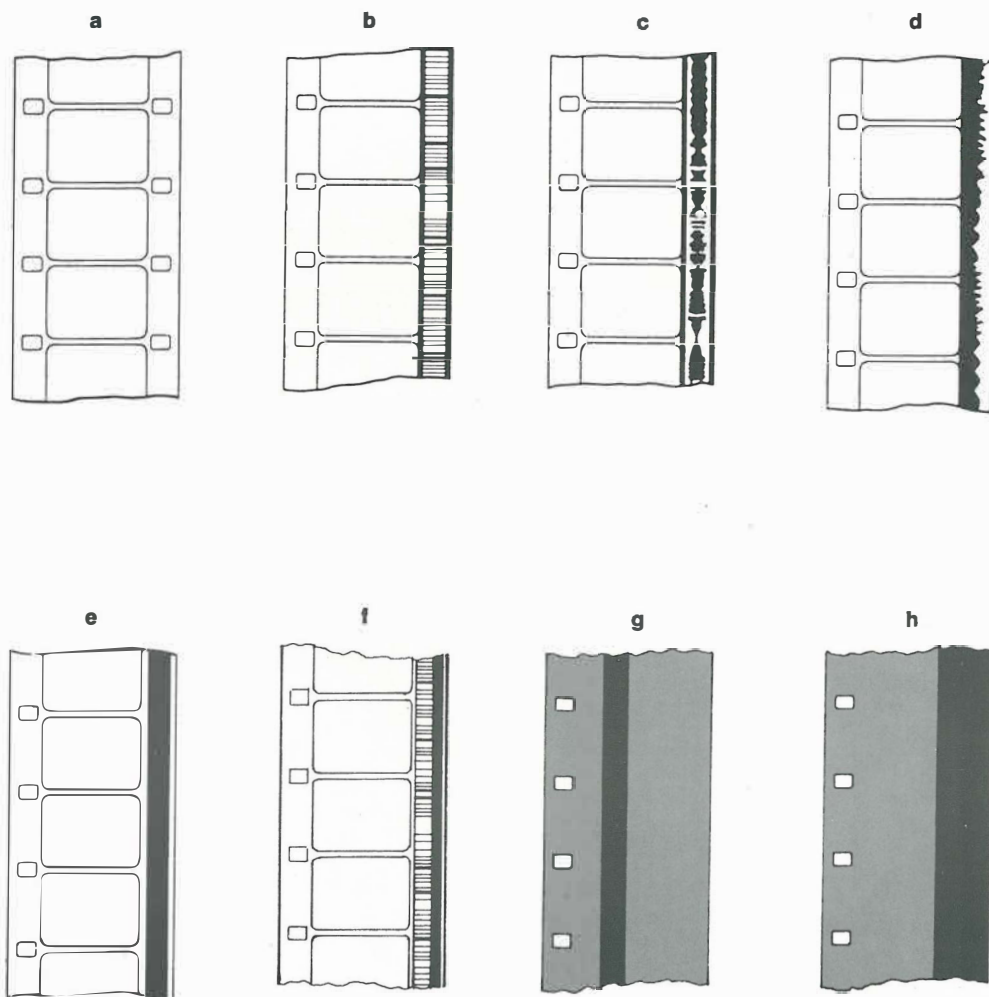
Width of the film: 16 mm
 Image size: 7.5×10.36 mm
 Size of the projector picture aperture: 7.16×9.6 mm

Picture Film

- a** silent film, ie. picture film only (**SEPPIC**)
- e** picture and optical sound (**COMOPT**)
- b, c, d**, picture and magnetic sound recording (**COMMAG**)
- f** picture with combined magnetic and optical sound recording (**MAGOPT**)

Magnetic film (for double-band side)

- g** Magnetic sound recording on center-track (**SEPMAG/center**)
- h** Magnetic sound recording on edge-track (**SEPMAG/edge**)



Screen Time and Film Length

frames p. meter		131 1/4			
perforations		7.619994 mm			
frames p. second		24		25	
length p. second		7.20" / 18.3 cm		7.51" / 19.1 cm	
meters	feet	min.	sec.	min.	sec.
1	3.28		5.5		5.3
2	6.56		11		11
3	9.84		16		15
4	13.12		22		21
5	16.40		27		26
6	19.68		33		32
7	22.96		38		37
8	26.24		44		42
9	29.52		49		47
10	32.80		55		53
20	65.60	1	49	1	46
30	98.40	2	44	2	38
40	131.20	3	39	3	30
50	164.00	4	33	4	23
60	196.80	5	28	5	15
70	229.60	6	23	6	8
80	262.40	7	17	7	0
90	295.20	8	12	7	53
100	328.00	9	7	8	45
200	656.00	18	14	17	30
300	984.00	27	21	26	5
400	1312.00	36	27	35	0
500	1640.00	45	34	43	45
600	1968.00	54	41	52	30
sec.	min.	meters	feet	meters	feet
1		0.183	0.6	0.191	0.62
2		0.37	1.21	0.38	1.24
3		0.55	1.80	0.57	1.87
4		0.73	2.37	0.77	2.52
5		0.91	2.98	0.96	3.14
6		1.10	3.60	1.15	3.74
7		1.28	4.20	1.34	4.40
8		1.46	4.80	1.53	5.00
9		1.65	5.40	1.72	5.64
10		1.83	6.00	1.91	6.25
20		3.66	12.00	3.82	12.52
30		5.49	18.00	5.73	18.80
40		7.32	25.00	7.64	25.05
50		9.15	30.00	9.55	31.32
	1	10.97	36.00	11.45	37.55
	2	21.96	72.00	22.90	75.11
	3	32.92	108.00	34.35	112.66
	4	43.90	144.00	45.80	150.22
	5	54.87	180.00	57.25	187.78
	6	65.84	216.00	68.70	225.33
	7	76.82	252.00	80.15	262.90
	8	87.79	288.00	91.60	300.44
	9	98.77	324.00	103.05	338.00
	10	109.74	360.00	114.50	375.56

Picture Widths

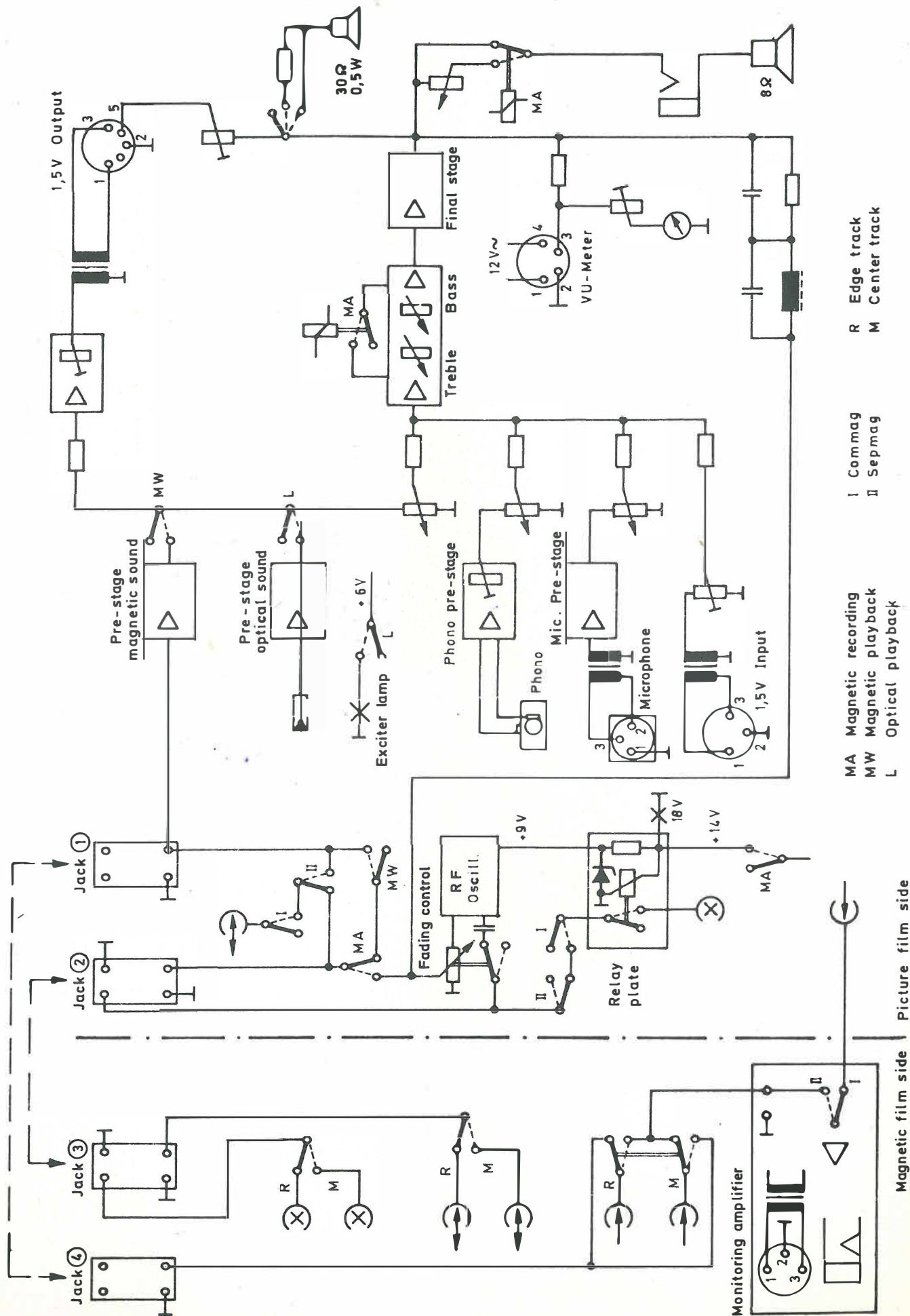
Focal length	SCREEN WIDTH									
	3'	4'	5'	6'	7'	8'	9'	10'	12'	
APPROXIMATE SCREEN DISTANCES										
1" (25 mm)	8'	10'	13'	15'	18'	20'	22'	25'	30'	
1½" (35 mm)	11'	15'	19'	22'	26'	30'	34'	37'	45'	
2" (50 mm)	15'	20'	25'	30'	35'	40'	45'	50'	60'	
2½" (65 mm)	19'	25'	31'	37'	44'	50'	56'	62'	75'	
3" (75 mm)	22'	30'	37'	45'	52'	60'	69'	75'	90'	
3½" (85 mm)	26'	35'	43'	52'	61'	70'	78'	87'	105'	
4" (100 mm)	30'	40'	50'	60'	70'	80'	90'	100'	120'	

Schematic Diagrams

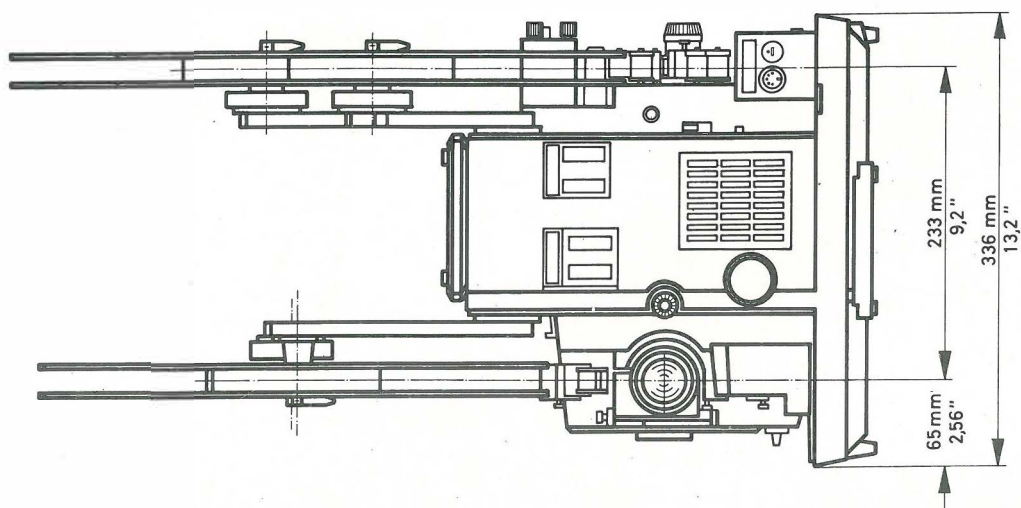
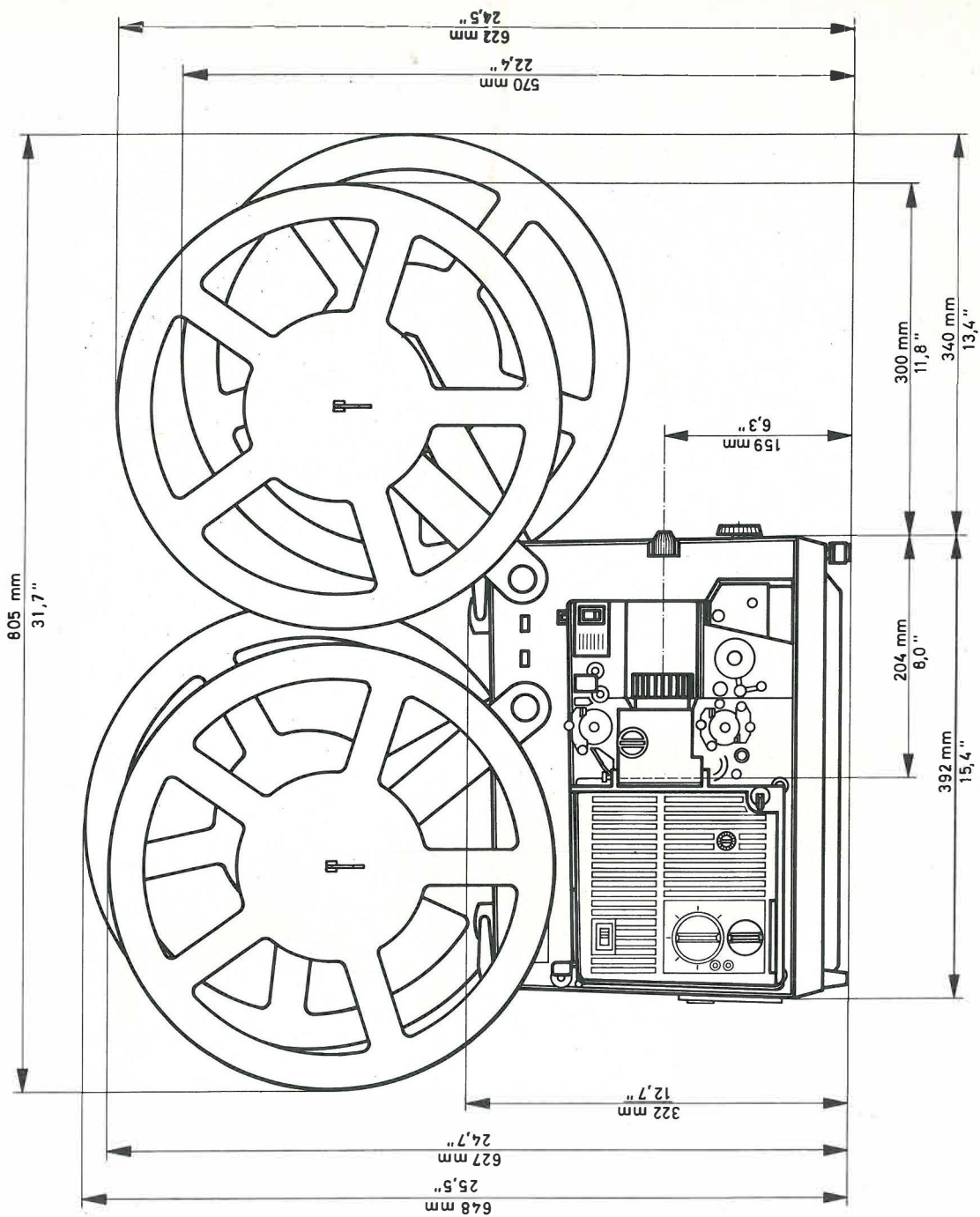
Main amplifier

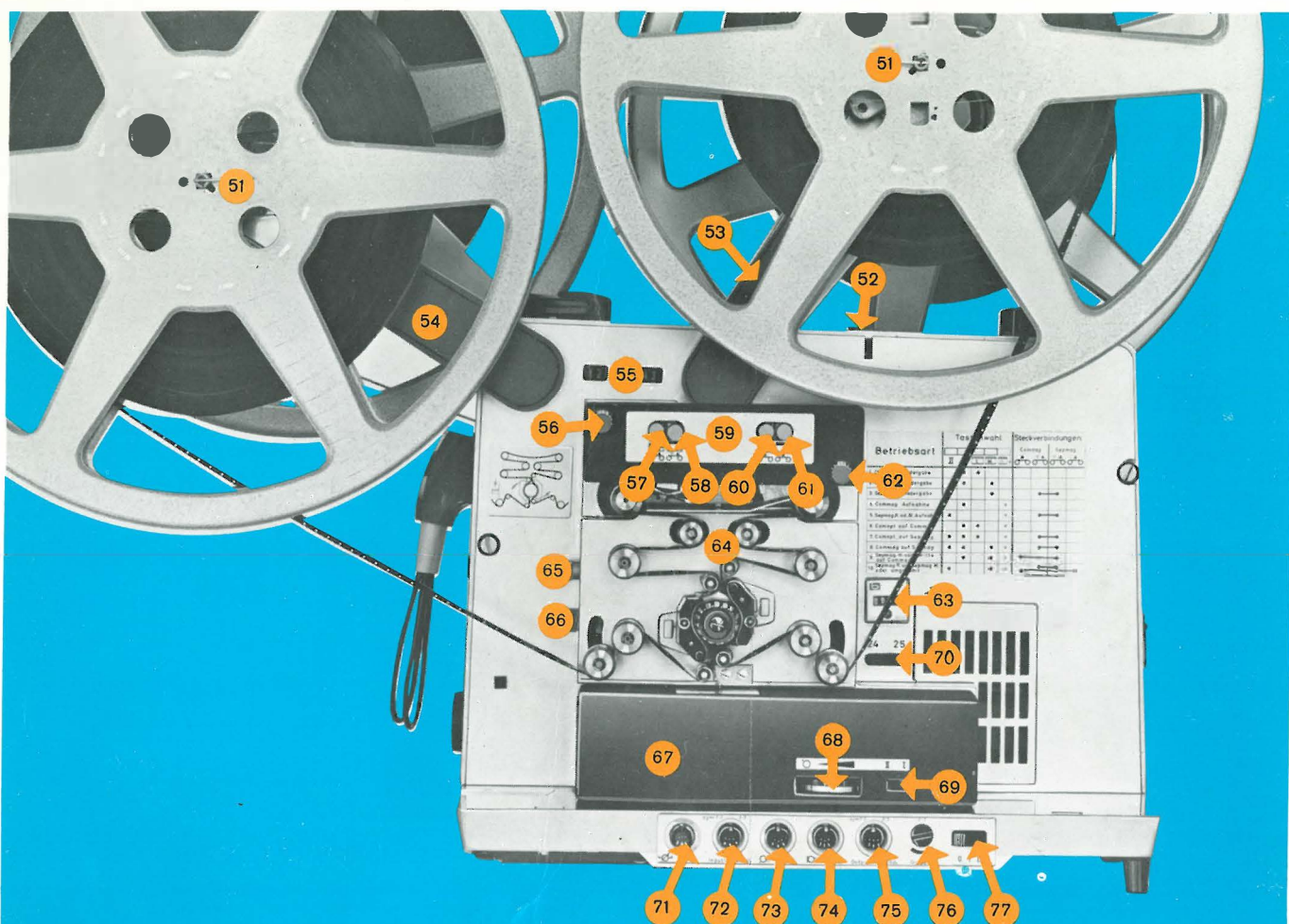
Block diagram No. 8 699 976 156

(see page 21)



Dimensions





OPERATING MODE			AMPLIFIER PUSHBUTTONS					CONNECTIONS				SEPMAG TRACK SELECTOR			
								COMMAG		SEPMAG		Playb./Rec.		Monitor	
			II	I	Playb. Opt.	Playb. Mag.	Rec. Mag.	①	②	③	④	Playb./Rec.	Monitor	Playb./Rec.	Monitor
A	COMOPT	Playback		•	•										
B	COMMAG	Playback		•		•									
C	SEPMAG	Playback	•			•			—	—		•			
D	SEPMAG	Playback	•			•			—	—			•		
E	COMMAG	Record		•			•								
F	SEPMAG	Record	•				•		—	—		•		•	
G	SEPMAG	Record	•				•		—	—			•		•
H	COMOPT	→ COMMAG		•	•		•								
J	COMOPT	→ SEPMAG	•	•	•		•		—	—		•		•	
K	COMOPT	→ SEPMAG	•	•	•		•		—	—			•		•
L	COMMAG	→ SEPMAG	•	•		•	•		—	—		•		•	
M	COMMAG	→ SEPMAG	•	•		•	•		—	—			•		•
N	SEPMAG	→ COMMAG		•		•	•	—	—	—		•			
P	SEPMAG	→ COMMAG		•		•	•	—	—	—			•		
Q	SEPMAG	→ SEPMAG	•			•	•	—	—	—	—	•			•
R	SEPMAG	→ SEPMAG	•			•	•	—	—	—	—	•		•	

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