



PHILIPS

*Cinema*

PORTABLE  
35 mm SOUND-FILM  
EQUIPMENT

DIRECTIONS FOR USE



## *Preface*

The quality of picture and sound reproduced by the Philips portable 35-mm sound-film equipment equals in every respect that obtained with large stationary installations, provided the necessary care is taken in its operation and maintenance. This booklet contains complete directions for this purpose.

Moreover, the Philips Service Dept. will always give any assistance required.





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## General Remarks

Before giving a performance inspect the auditorium. Get into touch with the local authorities in order to ascertain the safety measures which have to be taken. The regulations as regards safety vary with the country and often with the town, so that it is impossible to give general directives in this respect.

If it is allowed to mount the equipment in the auditorium, determine the most favourable place for the projector and for the screen.

The projection lens with a focal length of 105 mm, which is supplied with the installation, gives a picture of 13' × 10' (4 m × 3 m) at a projection length of 65' (i.e. at a distance of 65' between the projection lens and the centre of the screen). If the projection length is shorter the picture on the screen will be smaller, if the projection length is larger the picture will be larger too. In the latter case a projection lens with a larger focal length has to be used, the projection screen supplied with the installation being suitable for a picture of maximum 13' × 10' (4 m × 3 m).



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The focal length required can be calculated with the aid of the following formula:

$$f = 20.9 \frac{L}{B},$$

in which:

f = the focal length required, in mm,

L = the projection length, in ft (or m),

B = the width of the picture, in ft (or m).

If the width of the picture should always be 13' (4 m) the above formula can be simplified to:

$$f \text{ (in mm)} = 1.608 \times L \text{ (in ft), or}$$

$$f \text{ (in mm)} = 5.225 \times L \text{ (in m).}$$

Choose the place for the projector so that there is a distance of at least 7' (2 m) on all sides between the apparatus and the public. See that the apparatus does not block a passage, entrance or emergency exit.

Make sure that the auditorium can be sufficiently darkened.

Investigate how the cable for the loudspeakers and that for the mains connection can be laid without being accessible to the public. Lead these cables preferably along the ceiling or, if this is impossible, along the walls, unless local regulations prescribe otherwise.

The equipment is suitable for connection to A.C. mains of 103-257 V, 40, 50 or 60 c/s.

See whether the group to which the wall socket belongs that is to be used for connecting up the equipment is sufficiently fused; if no other apparatus are connected to the group in question, use a fuse the amperage of which is approximately:

$$\frac{2000}{\text{the mains voltage}}.$$

Thus, for example, a 10 A fuse should be used for 220 V mains and a 20 A fuse for 110 V mains.

- Investigate personally, before the performance, whether all the doors of the auditorium open outwards; if not, see that they are kept open during the performance.

## *Directions for Assembling*



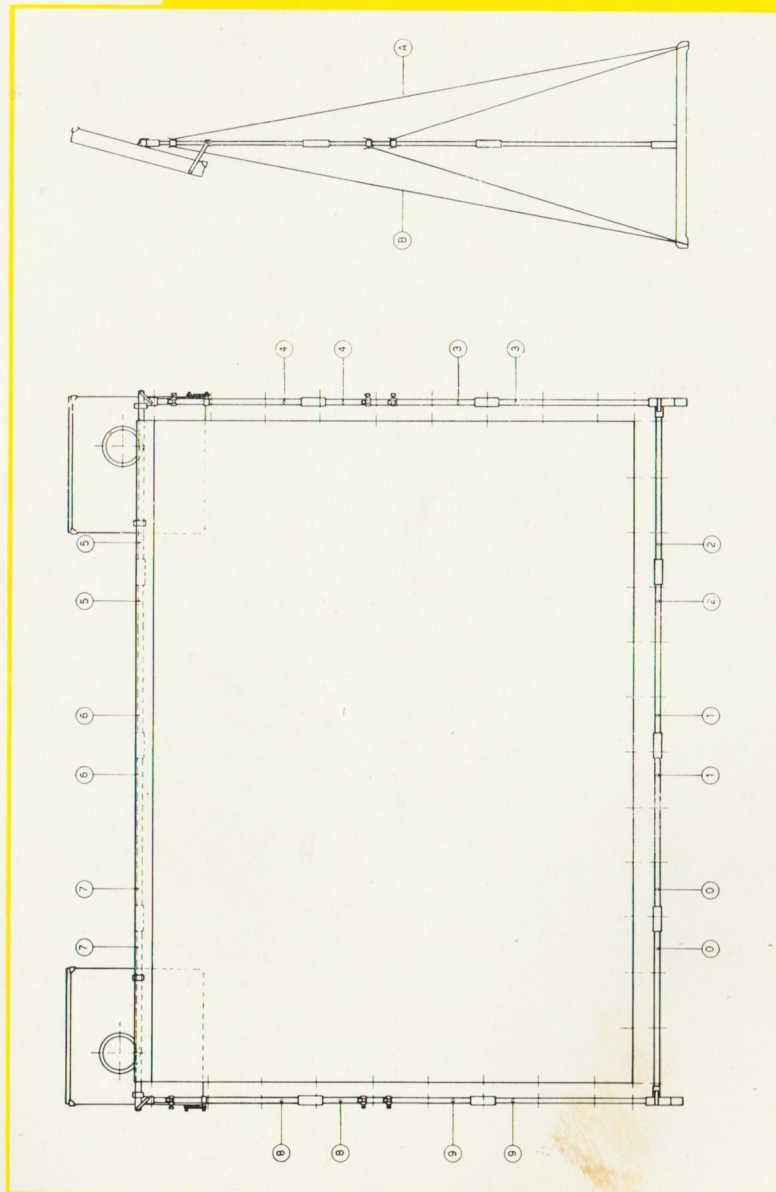


Fig. 1

### *Erection of the screen*

The laths of the frame for the projection screen are numbered and have to be assembled as indicated in the sketch, with the exception of the top lath.

Pass the top lath through the hem of the screen and fix this lath to the frame.

Stretch the ropes as indicated in the sketch :  
A = yellow rope, B = blue rope.

Then stretch the screen with the aid of the fixing tapes provided at the sides and bottom.

Place the screen high; the bottom edge should preferably be about 6' (1.90 m) above the floor.

- When setting up the screen see that it does not come into contact with the floor or dirty objects.





Fig. 2

Complete installation with all its accessories ready for transport.

- 1 = Case with projector.
- 2 = Case with twin spool box.
- 3 = Projection screen and collapsible frame in cover.
- 4 = Case with feed unit.
- 5 = Case with amplifier with built-in gramophone.
- 6 = Loudspeaker case.
- 7 = Programme case.
- 8 = Collapsible projector stand in cover.

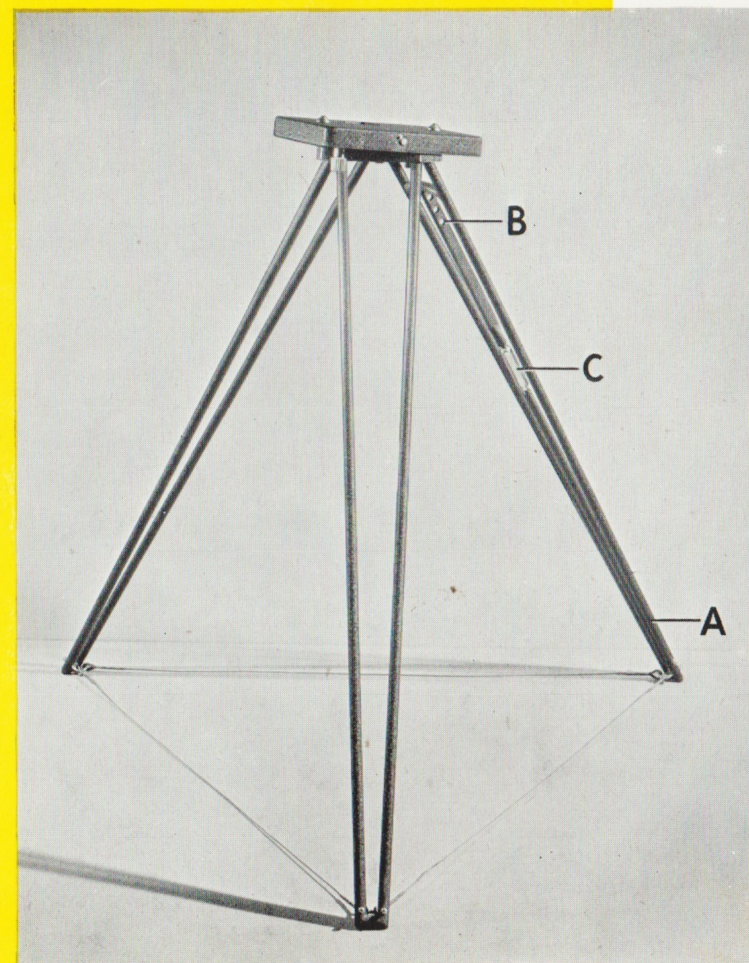


Fig. 3

The stand is placed in such a way that leg "A" is turned away from the projection screen and the wires between the legs are taut.





Fig. 4

The projector is placed on the stand and fixed to the mounting table by means of two milled screws.

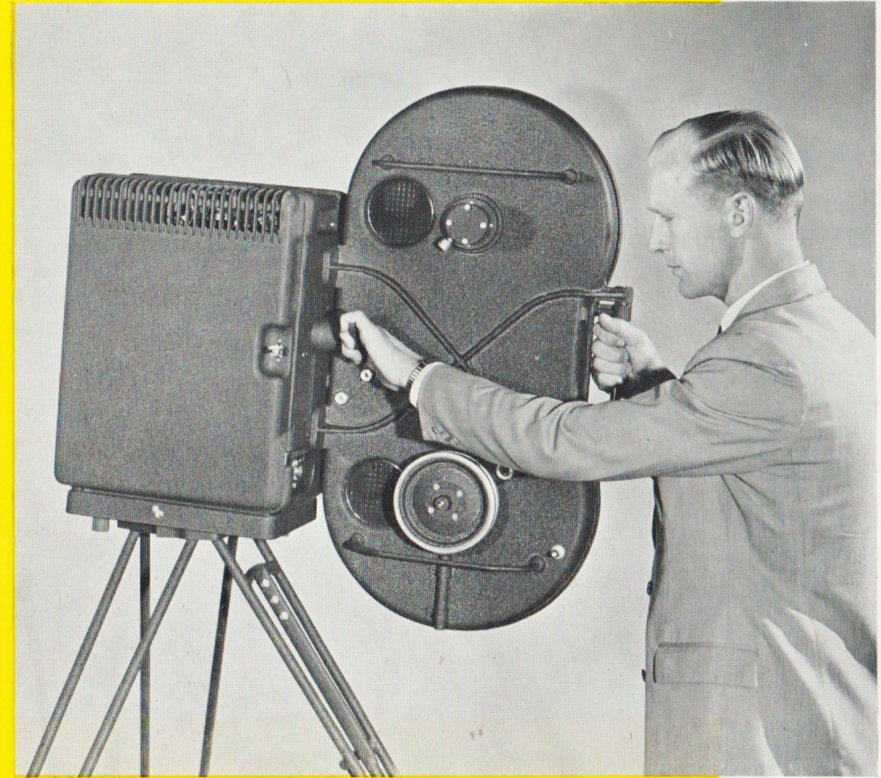


Fig. 5

Fix the spool box on the back of the projector, as shown in the photograph, in such a way that the centering pins of the spool box fit into the holes provided in the back of the projector casing.

Push in the handle as far as possible with the left hand and turn it 90° anti-clockwise.



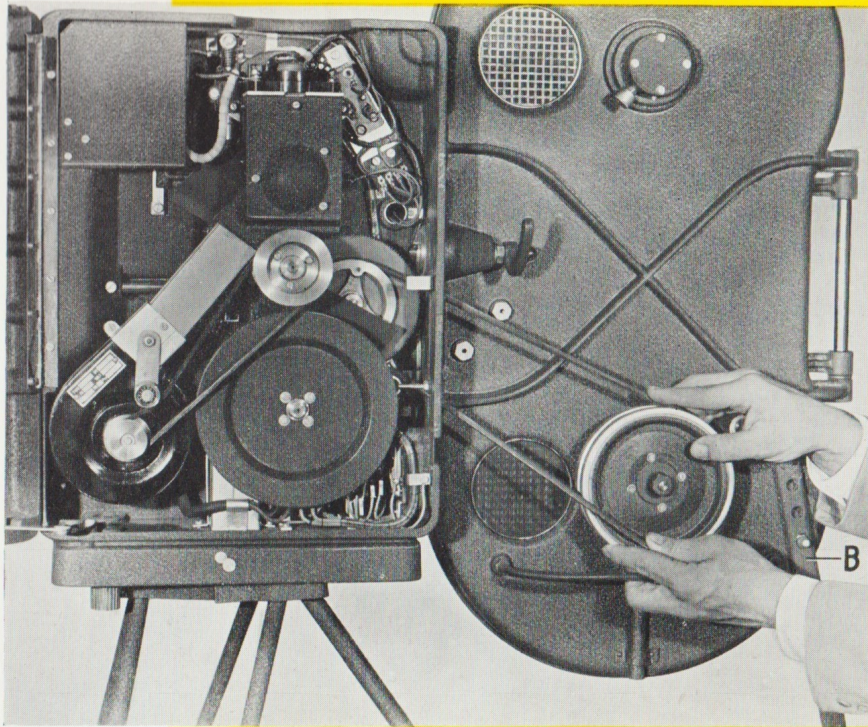


Fig. 6

Loosen rod "B" by turning hexagon "C" (fig. 3) and support the spool box with the aid of rod "B" as shown in the photograph.

Place the driving belt over the pulleys for the take-up spool.



Fig. 7

Place the projector case, the amplifier and the feed unit as shown in the photograph.

The lid of the projector case is provided with rubber blocks for the amplifier to ensure sufficient ventilation space underneath the amplifier.





Fig. 8

- Check whether the screw plug of the feed unit is inserted in the contact marked with the mains voltage available.

The feed unit shown in the photograph is set for a mains voltage of 220 V.

With the aid of the switch the output voltage can be increased or reduced 5% to compensate for differences in the mains voltage.

The feed unit is suitable for 40-60 c/s mains.

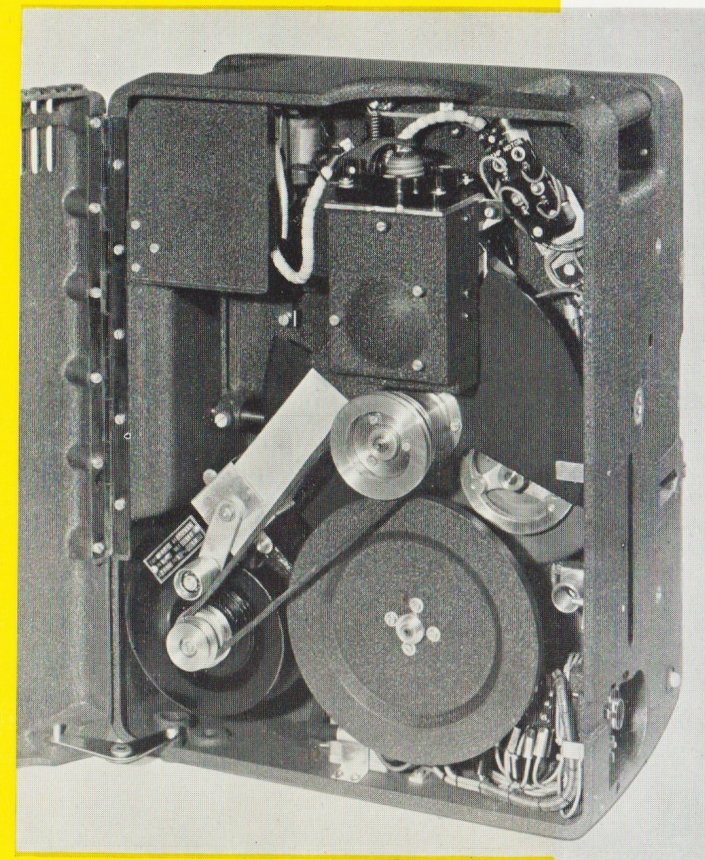


Fig. 9

The motor shaft as well as the main shaft of the projector are provided with triple pulleys, to match the various mains frequencies.

For 60 c/s mains:

Place the belt on the small pulley of the motor shaft and the large pulley of the main shaft.

For 50 c/s mains:

Place the belt on the centre pulleys of both shafts.

For 40 c/s mains:

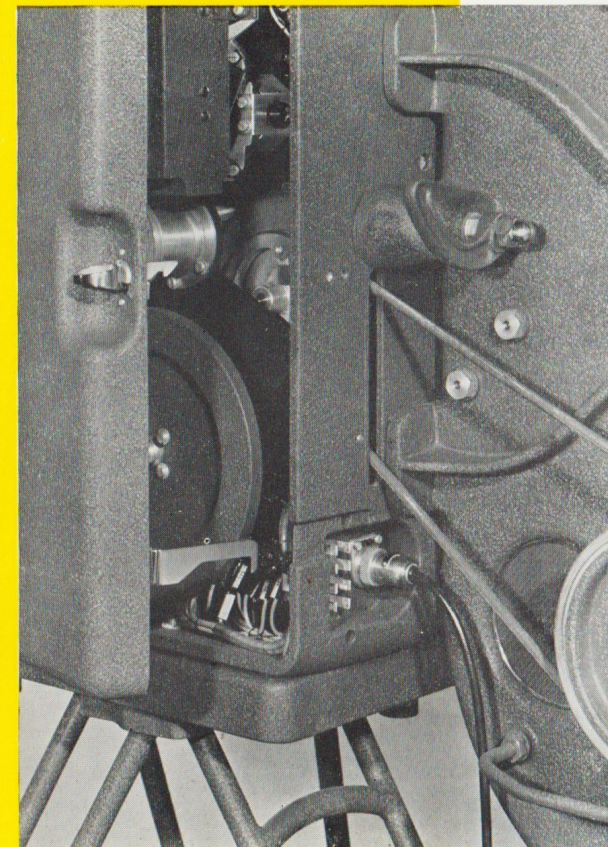
Place the belt on the large pulley of the motor shaft and the small pulley of the main shaft.



### *Connection of the various cables*

Take the following cables out of the loudspeaker case:

1. The thin photocell cable, provided with a 3-pole male and a 3-pole female plug.
2. The big feed cable, provided with a rectangular 8-pole male and a rectangular 8-pole female plug.
3. The connecting cable for the amplifier, provided with a round 6-pole female and a round 6-pole male plug.
4. The long mains cable, provided with a flat-iron plug and a normal 2-pole male plug.



*Fig. 10*

### *Connection of the photocell cable*

Connect the female plug of the photocell cable to the projector.

Insert the male plug of this cable in one of the sockets marked "•)" on the amplifier (fig. 11).

When two projectors are used connect the photocell cable of the left-hand projector to the left-hand socket marked "•)" and that of the right-hand projector to the right-hand socket marked "•)".





Fig. 11

### *Rear view of the amplifier*

From left to right:

control for photocell voltage of projector No. 1,  
 photocell input for projector No. 1,  
 control for photocell voltage of projector No. 2,  
 photocell input for projector No. 2,  
 two loudspeaker sockets,  
 fuse,  
 plug for the feed cable of the amplifier.

### *Connection of the feed cable of the amplifier*

Connect the 6-pole female plug of this cable to the 6-pole mains plug of the amplifier.

Connect the 6-pole male plug of this cable to the 6-pole plug socket of the feed unit (see fig. 13).

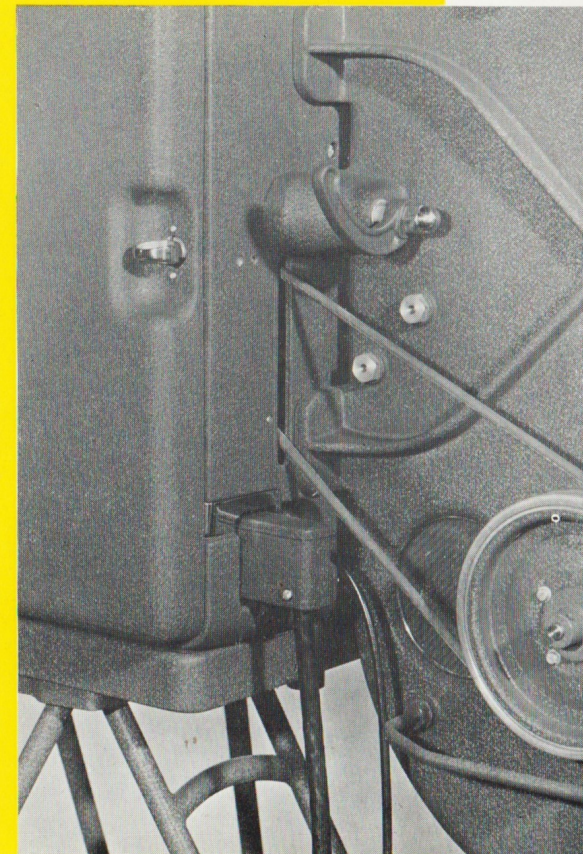


Fig. 12

### *Connection of the feed cable of the projector*

Shut the rear door of the projector and connect the 8-pole female plug of the feed cable to the projector.

Connect the 8-pole male plug of this cable to the 8-pole plug socket of the feed unit (fig. 13 on the right).





Fig. 13

### *Universal feed unit*

From left to right:  
 plug socket for the feed cable of the amplifier and  
 underneath earth terminal,  
 mains plug,  
 plug socket for the feed cable of the projector.

### *Connection of the earth wire*

Take the earth wire from the drum in the loudspeaker case and connect one end to the earth terminal on the feed unit and the other end to the water conduit or some other good earthing point.

### *Connection of the loudspeakers*

Fix the two loudspeakers to the frame of the projection screen (see fig. 1), direct them towards the public and interconnect them by means of the short connecting cable.

Connect the long loudspeaker cable to one of the 3-pole loudspeaker plug sockets on the amplifier (fig. 11).

When a monitor loudspeaker has to be used, connect it to the other 3-pole loudspeaker plug socket on the amplifier.

### *Connection of the microphone*

If the microphone is used connect it to the microphone plug provided beside the turntable of the gramophone.



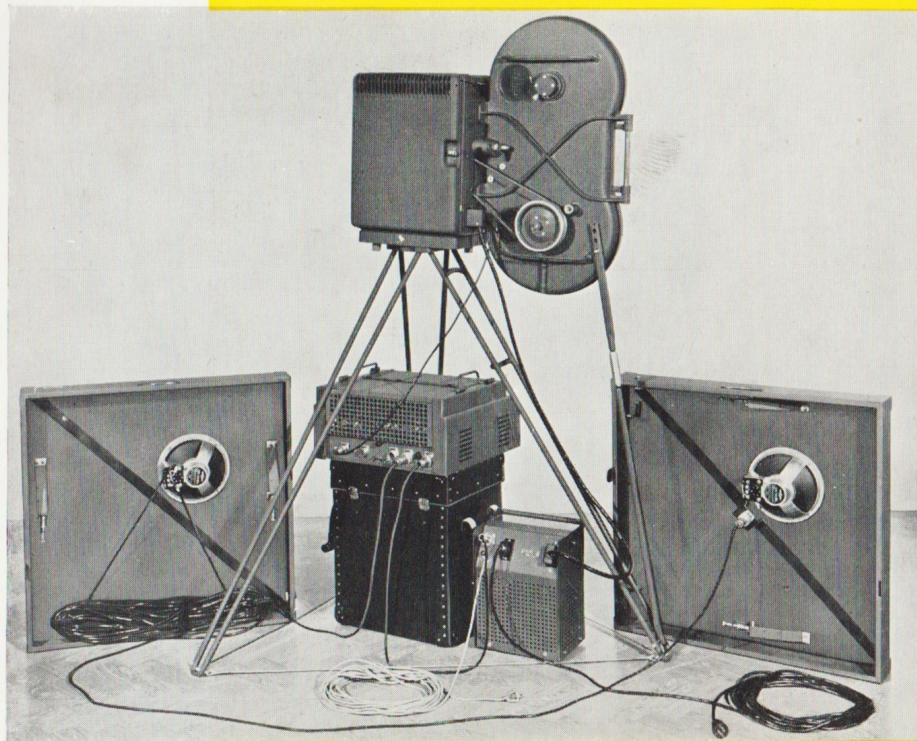


Fig. 14

- Check all the connections with the aid of the above photograph.

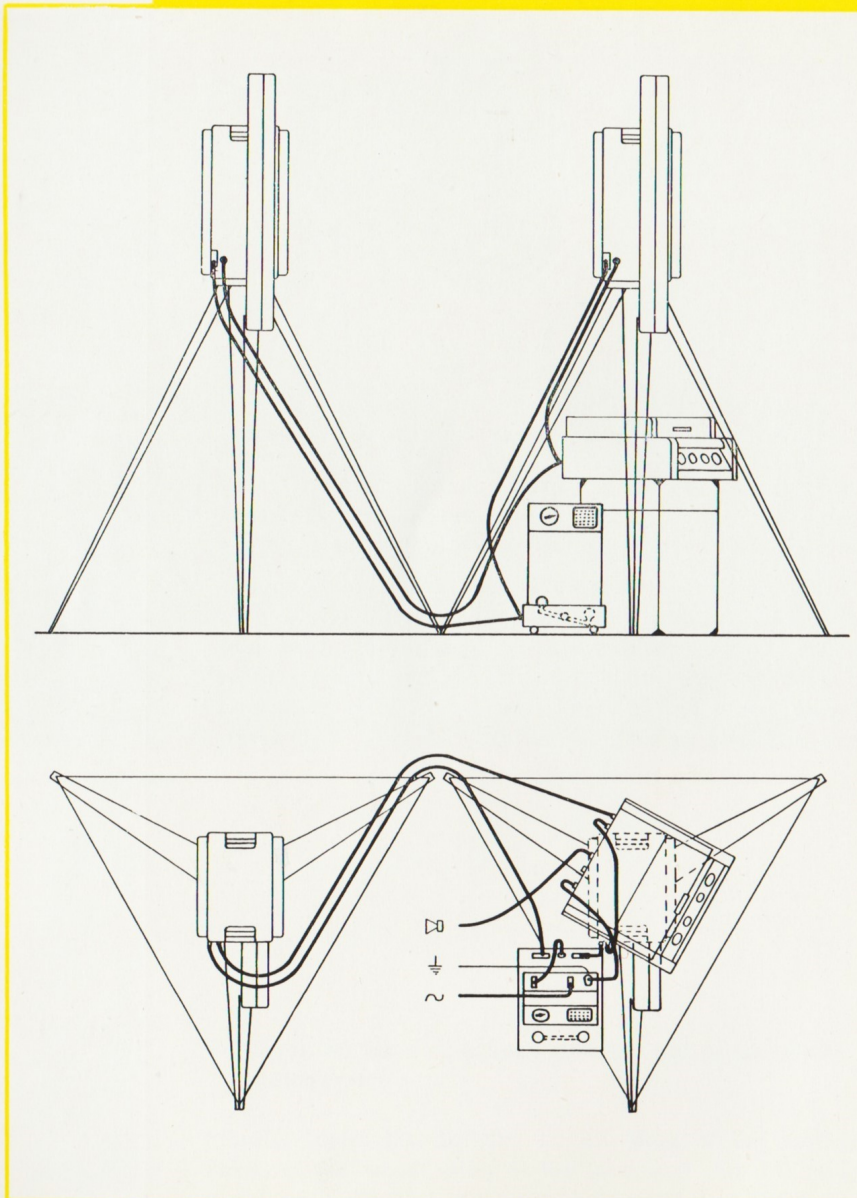
Finally, insert the flat-iron female plug of the mains cable in the mains plug of the feed unit (fig. 13) and the normal 2-pole male plug of this cable in the wall socket. The exciter lamp of the projector, the film-path illumination lamp and the amplifier are thereby switched on automatically.

### *Connection of an equipment with two projectors*

When two projectors are used connect the short 8-core cable which is fixed to the pedal-operated change-over box to the 8-pole plug socket on the feed unit.

Furthermore, connect the left-hand projector by means of the long 8-core cable to the left-hand 8-pole plug socket on the pedal-operated change-over box, and connect the right-hand projector by means of the other 8-core cable to the right-hand 8-pole plug socket on this box (see fig. 15).



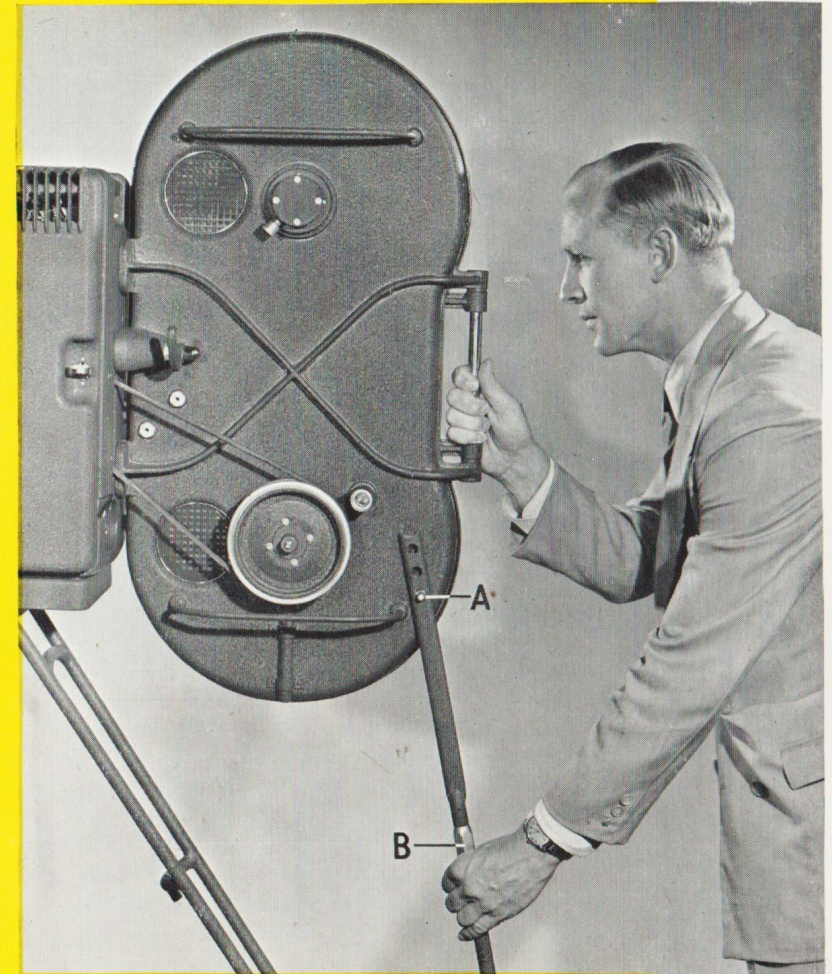


*Directions  
for  
Operation*

Fig. 15

Arrangement and connection of an equipment with two projectors.





*Fig. 16*

Align the projector (or projectors) onto the centre of the projection screen by means of the sighting arrow on the operating side of the projector and the spool box.

Adjust the tilting angle; coarse adjustment by means of the holes in rod "A", fine adjustment by means of hexagon "B".





Fig. 17

### *Front view of amplifier*

On the control panel, from left to right:  
combined volume control for microphone and pick-up  
("a-D"),  
bass control,  
treble control,  
volume control for film reproduction.

### *Operation of the amplifier*

Turn the volume control for film reproduction clockwise from zero to position "8".

Check whether all connections for film reproduction are correct by rapidly moving a piece of paper between the sound-optical system and the sound drum. This should be audible in the loudspeakers.

If required, also check microphone and gramophone reproduction.

The volume of microphone reproduction is controlled by turning the microphone/pick-up volume control "a-D" from the zero position anti-clockwise, and the volume of gramophone reproduction by turning it clockwise.

After checking turn the volume control for film reproduction and the microphone/pick-up volume control into their zero position.

When two projectors are used equalize their sound volume as follows:

Turn both controls for the photocell voltage at the back of the amplifier (see fig. 11) fully to the right, then turn the control of the projector which gives the strongest sound to the left until the sound volume equals that of the other projector.



### *Operation of the projector*

Check whether the doors of the spool box and of the projector are closed.

- The door of the projector cannot be closed:
  - a. when one of the pad rollers is open,
  - b. when the lid of the exciter lamp compartment is open.

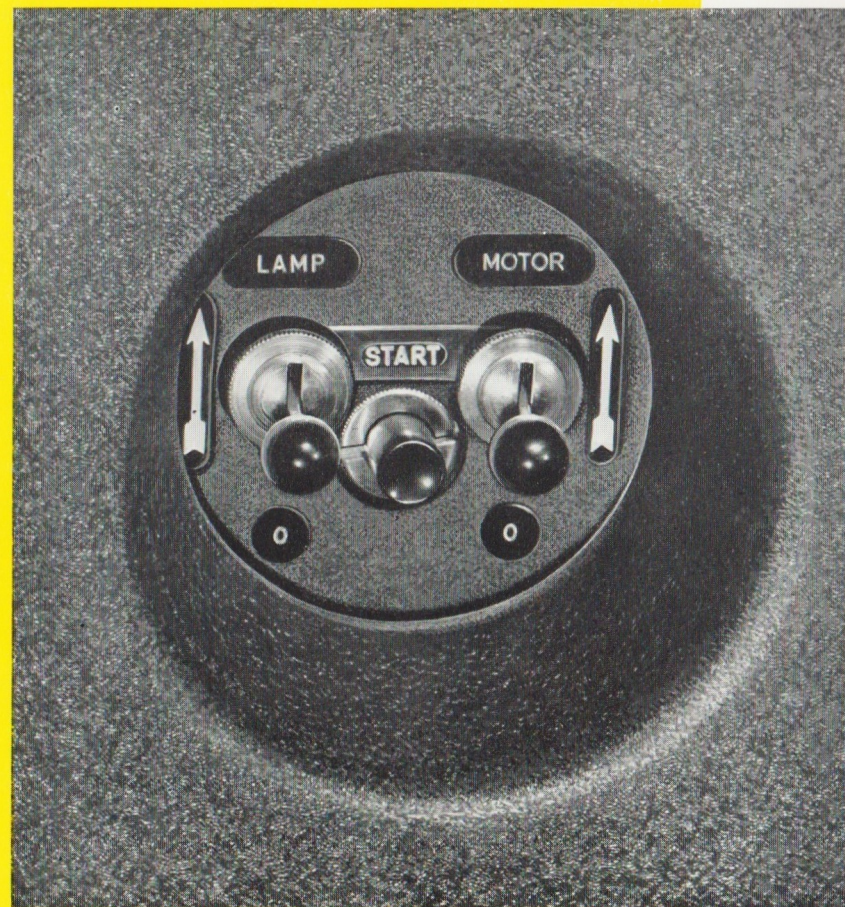
Push the motor switch up.

Depress the button marked "start". Keep this button depressed for a few seconds, until the projector has reached its normal rated speed.

- It is impossible to start the motor:
  - a. when the door of the projector is open,
  - b. when the driving belt of the projector mechanism is not put on,
  - c. when the driving belt of the take-up spool is not put on.

Push the lamp switch up, thereby igniting the projection lamp.

- The projection lamp does not burn:
  - a. when the motor is not running,
  - b. when the projector runs too slowly,
  - c. when the door of the spool box is open.



*Fig. 18*

Focus the mask on the screen by means of the focusing knob at the front of the projector.

If necessary correct the position of the projector with respect to the screen.

First switch off the projection lamp and then the motor.



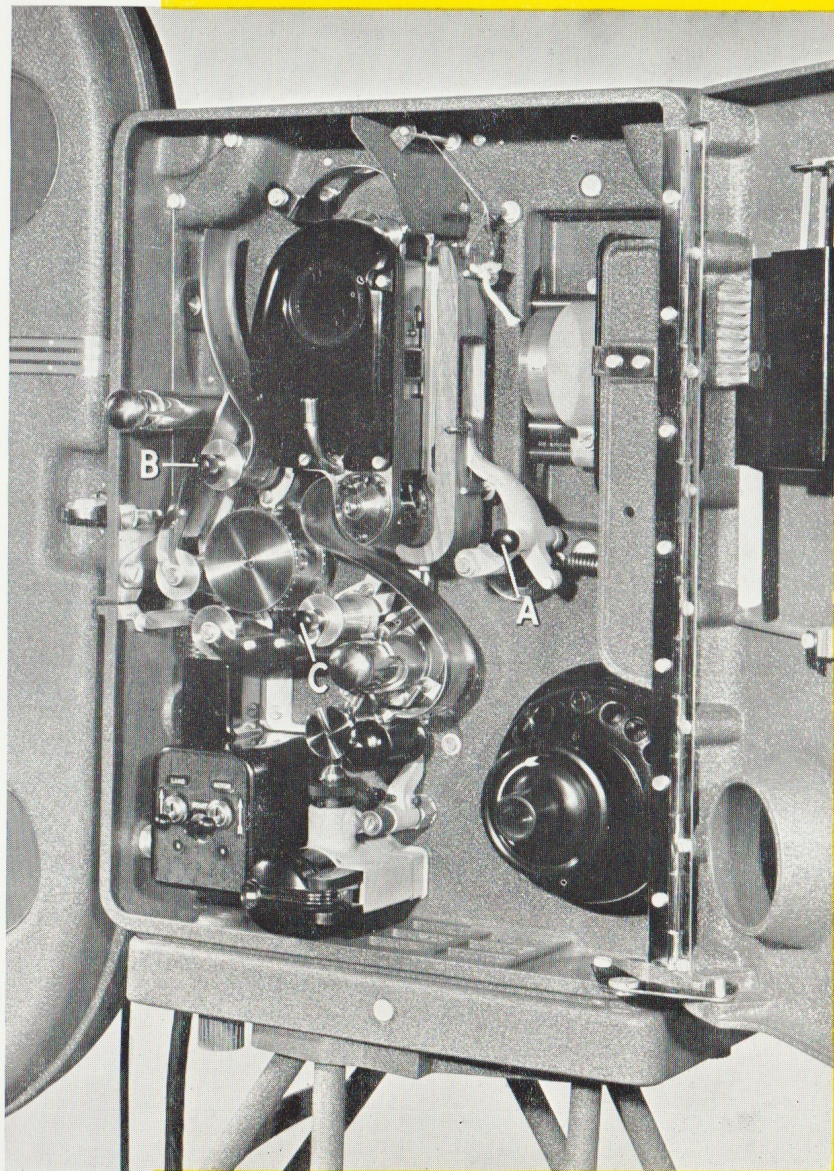


Fig. 19

Threading the film in the projector.

### *Threading the film in the projector*

Put the framing knob at the front of the projector approximately in its centre position.

Open the door of the projector.

Open the film gate by pushing knob "A" to the right.

Open the pad rollers by pulling out knob "B" and then moving it upwards, and by pulling out knob "C" and moving it downwards.



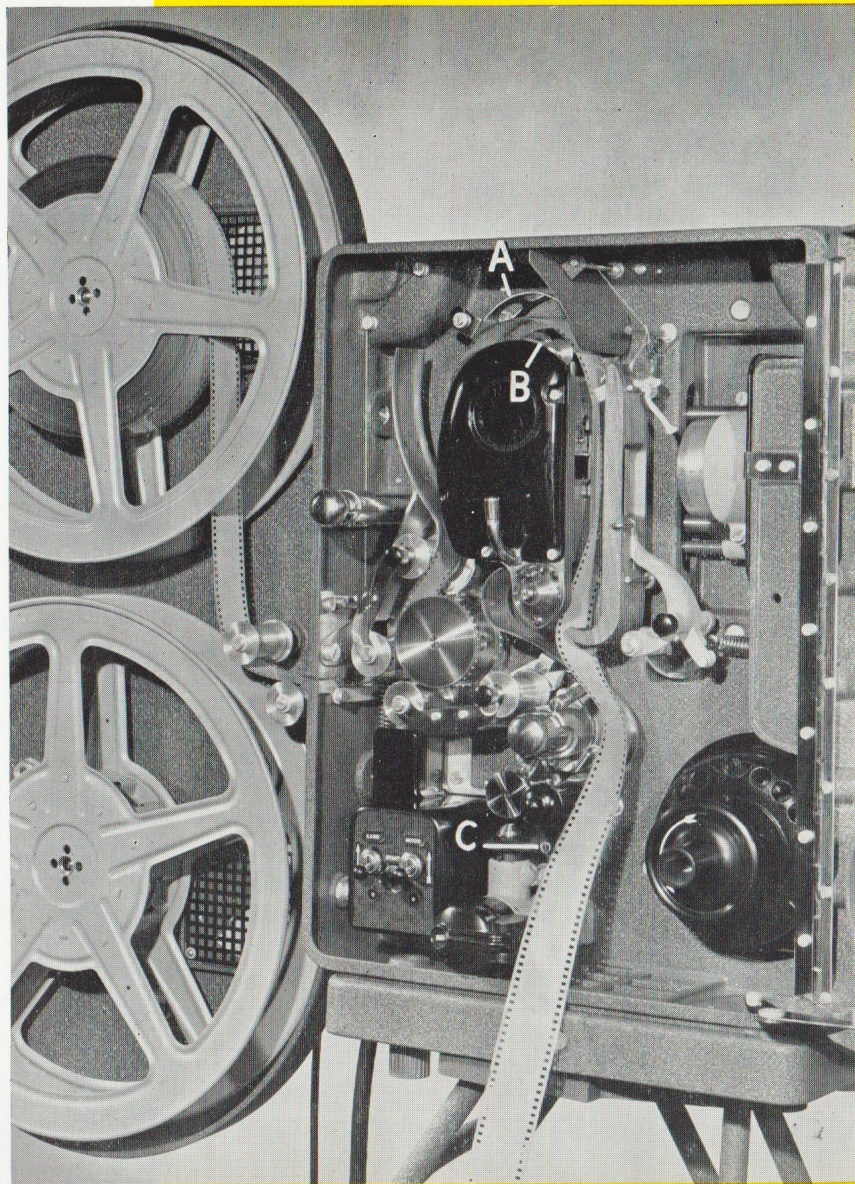


Fig. 20

Threading the film in the projector (cont.)

### *Threading the film in the projector (cont.)*

Open the spool-box door and place the film spool on the top shaft in such a way that it turns clockwise when the film is taken off.

Take off about 6' (2 m) of film and thread it in the apparatus up to and including the intermittent sprocket.

Shut the top pad roller of the 40-tooth sprocket.

Shut the film gate. See that in the top of the film gate a loop is formed which lies half-way between levers "A" and "B" when the gate door is closed.

See that one full picture is in the mask. For this purpose the leaders of the films are provided with framing lines (transparent horizontal lines in the black film). These lines must coincide with the top and bottom of the mask when the intermittent sprocket is in its position of rest.

The position of the film in the gate can be checked by looking through the projection lens. This is facilitated by the framing lamp.



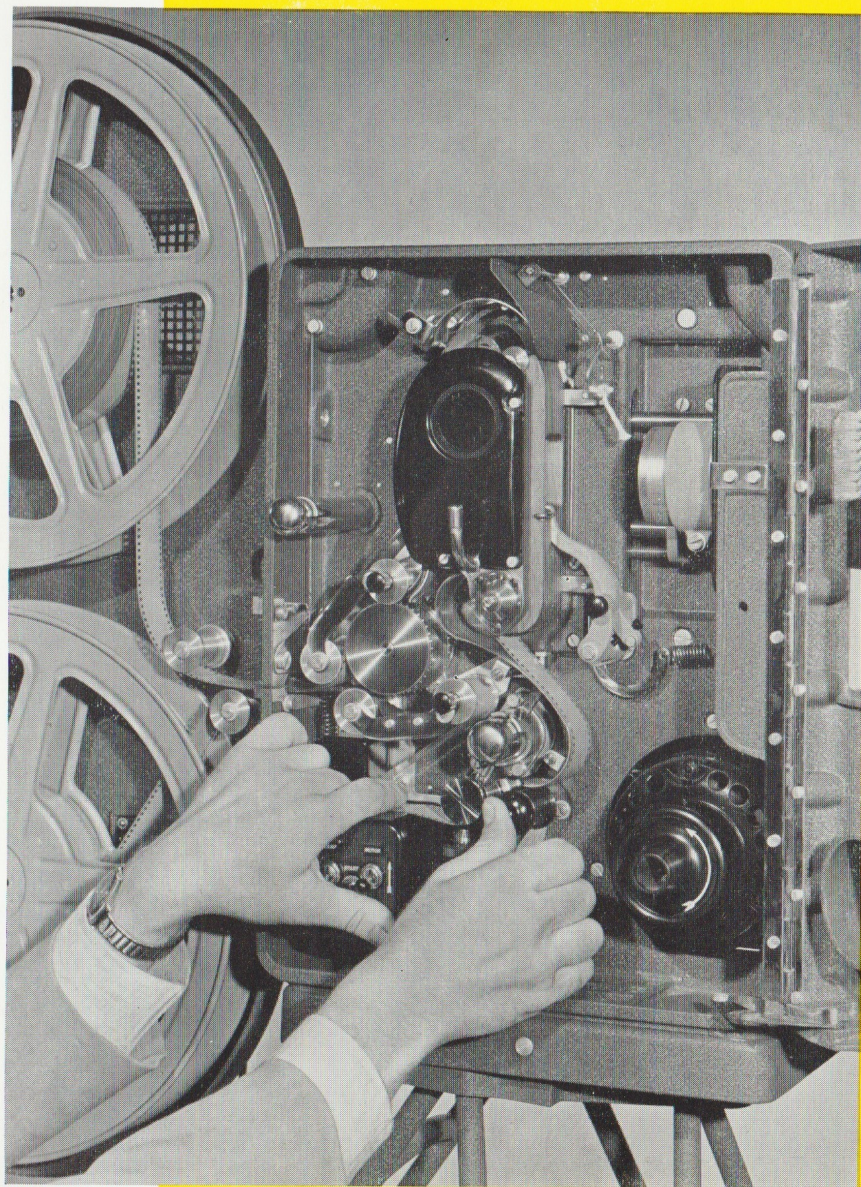


Fig. 21

Threading the film in the projector (cont.).

*Threading the film in the projector (cont.)*

Complete threading the film as indicated in fig. 21.

Form the bottom loop and shut the bottom pad roller of the 40-tooth sprocket.

Fix the beginning of the film leader to the core of the bottom spool and turn the spool a few turns clockwise.

Shut the doors of the projector and of the spool box.

Inch the projector by hand with the aid of the inching knob on the motor shaft, until the first start number (number 11) appears in the mask.



*Performance*



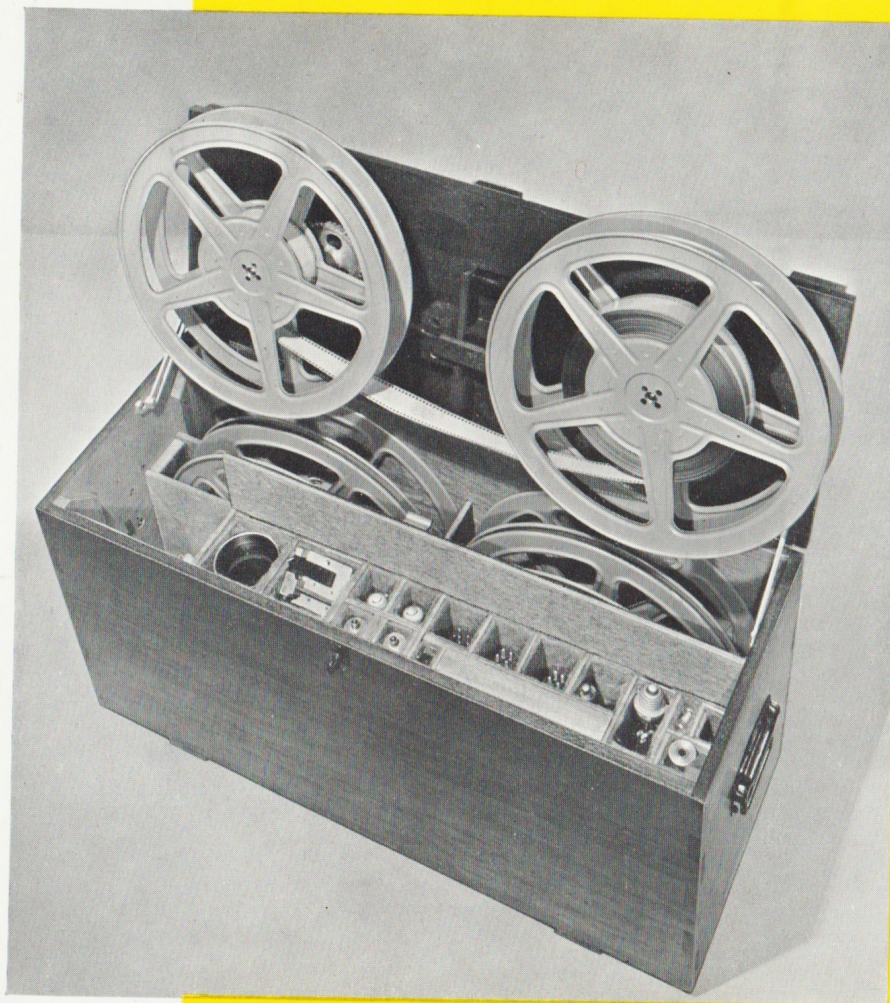


Fig. 22

Programme case.

### *Programme case*

This case, which is supplied to order, comprises:

- 6 fixed 2000 ft (600 m) spools able to take a complete programme of 12,000 ft (3600 m) of film, representing a performance of  $2\frac{1}{4}$  hours,
- or alternatively:
- 3 fixed 4000 ft (1200 m) spools, or
- 3 fixed 6000 ft (1800 m) spools,
- 1 built-in film rewinder with automatic take-off friction device,
- 1 film splicing device,
- 1 bottle of splicing cement,
- 1 pair of scissors,
- 1 complete set of spare valves,
- spare parts and
- tools.

This case also offers room for two spare projection lenses.

The film rewinder is ready for use after the lid of the programme case has been opened and the crank inserted. As the lid of the case, on which the rewinder is mounted, is tilted backwards, it is not necessary to fix the spools on the shafts.



### *Film reproduction with one projector*

Switch on the motor and start the projector by depressing the "start" button.

Turn the film-volume control of the amplifier to the required position. This position depends entirely on the condition of the hall and can only be determined by experience. As long as this position is not known, it is recommended not to turn the volume control farther than position "8" and to adjust the sound volume as soon as the sound on the film is audible.

Look through the projection lens at the start numbers on the film leader. As soon as number "3" appears switch on the projection lamp.

As soon as the first picture is projected on the screen switch off the light of the auditorium and if necessary correct the sharpness of the picture and the framing.

The pressure of the skates is adjusted to the correct value in the factory. If necessary this pressure can be re-adjusted as indicated on the front plate of the projector.

Before the performance turn the tone controls of the amplifier to position "8". Adjust the tone during the performance according to the sound quality of the film and the acoustical conditions of the auditorium.

The position of the sound track on the film with respect to the scanning line can be adjusted by turning the milled screw "C" (fig. 20).

At the end of the film first switch on the light in the auditorium and then switch off the projection lamp. As soon as the sound of the film stops turn the film-volume control to the zero position.

Switch off the motor as soon as the film has passed through the apparatus. In case of a stiff film it may happen that the projector is switched off automatically because of the end of the film striking against the top

lever of the film rupture device, thus putting it into operation. It is sufficient to open and to shut the door of the projector and to push in the "start" button to make the rest of the film pass through the projector.

### *Film reproduction with two projectors*

Thread the first reel of film in the right-hand projector. Depress the right-hand pedal on the change-over box, thus igniting the exciter lamp of the right-hand projector. Start the projector as described above.

While the film is running in the first projector, thread the second reel in the left-hand projector and see that start number "8" of the leader is in the film gate. Switch on the lamp and the motor switch of this projector.

During the last minute of the performance on the first projector observe carefully the right-hand top corner of the picture on the screen, where, about 7 seconds before change-over from one projector to the other has to take place, a black dot will appear for 1/6 second.

As soon as this is seen depress the start button of the left-hand projector with the left hand and when necessary turn the inching knob with the right hand to the left.

Keep looking at the right-hand top corner of the picture. About 7 seconds after the first dot a second black dot will appear during 1/6 second. As soon as this is seen depress with the right-hand foot the left-hand pedal of the change-over box, thereby changing over picture and sound simultaneously from the right-hand projector to the left-hand one.

Switch off only the motor switch of the right-hand projector, thread the next reel of film in this projector and switch on the motor switch again. The projector is then ready for the next change-over.



### *Gramophone reproduction*

Start the gramophone motor by pushing the pick-up as far as possible to the right.

Put the pick-up carefully on the record and turn the left-hand knob "A-D" on the control panel of the amplifier from its centre position to the right until the desired sound volume is obtained.

During gramophone reproduction the bass-note filter is out of operation. The needle noise can be suppressed by means of the treble-note filter.

The gramophone motor is switched off automatically at the end of the record.

- Do not leave a record on the turntable longer than necessary.

### *Microphone reproduction*

Pick up the microphone and push in its incorporated switch.

Turn the left-hand knob "A-D" on the control panel of the amplifier from its centre position to the left as far as position "4".

Speak into the microphone at a short distance and while speaking adjust the sound volume to the desired level by means of the above-mentioned knob.

During microphone reproduction the bass-note filter is out of operation. The timbre can be controlled by means of the treble-note filter.

When announcements are to be made while the film is running, it is recommended to turn down the volume control for film reproduction.

## *Replacement of Valves and Lamps*



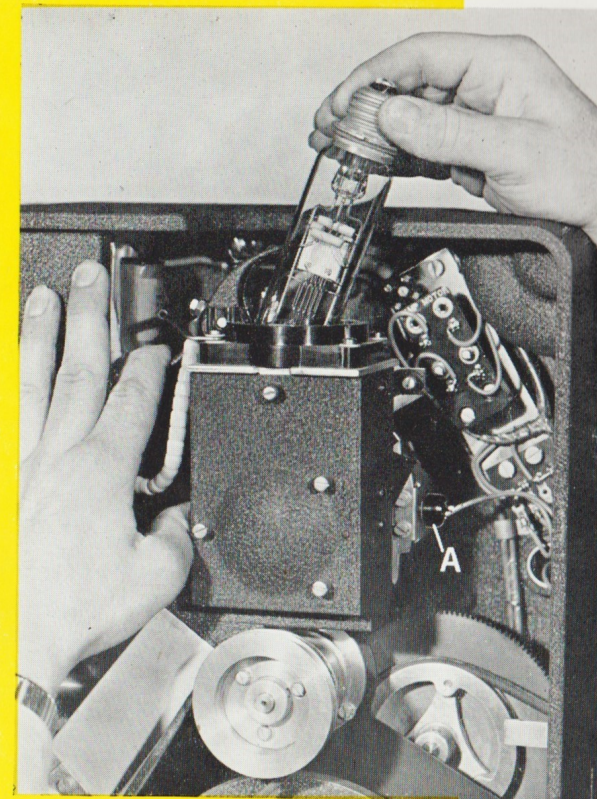


Fig. 23

### *Replacement of the projection lamp*

Pull the 8-pole plug out of the projector, then open the rear door of the projector.

The replacement itself is shown in the photo.

Use a cloth for taking out the lamp when it has just been burning.

The projection lamps are provided with a centering flange so that a new lamp is automatically focused.

- Never replace the 8-pole plug before the door is closed!

### *Replacement of the framing lamp*

Turn holder "A" anti-clockwise and pull it out, after which the lamp can be replaced.



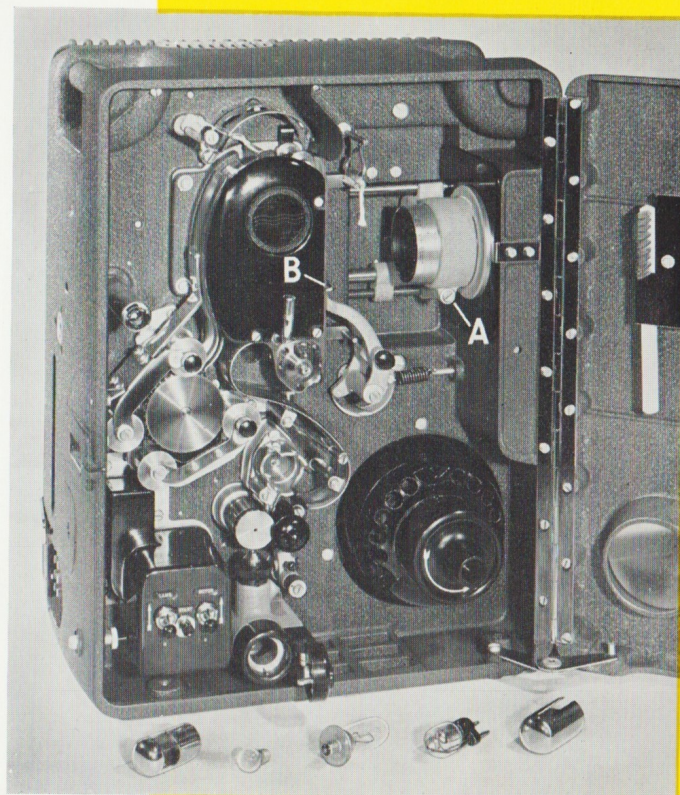


Fig. 24

### *Replacement of the exciter lamp, the photocell and the illumination lamp of the film path*

These parts can readily be replaced. The exciter lamp is provided with a centering flange, so that it is automatically focused.

### *Replacement of the projection lens*

Loosen screw "A". Then the projection lens can be pulled out of its holder.

### *Replacement of the pressure skate*

Open the film gate. Pull out pin "B" as far as possible, after which the pressure skate can be removed for cleaning or for replacement.

### *Replacement of the runners of the film gate*

With every projector one steel and two velvet-covered runners are supplied for the film gate.

The steel runners are in the film gate, the velvet-covered ones are in the container on the inside of the door on the operating side of the projector.

Use the steel runners for the projection of dry prints and the velvet-covered runners for the projection of new films.

To replace the runners push them upwards, after which they can be taken out in the direction of the projection lens.

### *Replacement of the amplifier valves*

Loosen the ornamental screw "A" (fig. 11) at the back of the amplifier and remove the perforated rear panel.



*Maintenance*



### *Lubrication*

See the instructions on the front plate of the projector.

### *Cleaning*

#### a. The film path.

A toothbrush is fitted on the inside of the projector door.

Clean the film gate with this brush after each film reel.

Brush the velvet-covered runners always in the downward direction.

Brush the guide plates and the sprockets after every performance.

Any agglomerated film dirt that does not come off with the brush can be removed with a piece of wood.

- Never use a steel object, for instance a knife or a screwdriver.

#### b. The sound-optical system.

Remove all the dust and finger prints from the exciter lamp and from the photocell by means of a lens tissue.

Polish regularly the lens of the sound-optical system located directly underneath the sound drum. This is done with a clean chamois leather folded over a match.



## *Diagrams*

c. The projection lens.

The surfaces of the lens are specially coated, so that its reflectivity is considerably reduced and a great light gain is obtained.

To take the utmost advantage of this light gain it is necessary to observe the following instructions when cleaning the lens:

1. Never touch the glass surface with your fingers.
2. To clean the lens, first invert the surface and brush lightly with a soft camel hair (or marten hair) brush to remove dust.
3. The surface can then be lightly polished with a piece of soft clean linen, such as an old cambric handkerchief, breathing on it if necessary.
4. If the surface is too greasy, wipe it with a cloth slightly dampened with pure alcohol and then lightly polish with clean, dry, soft linen.



Specification of the parts indicated in fig. 25

Switches:

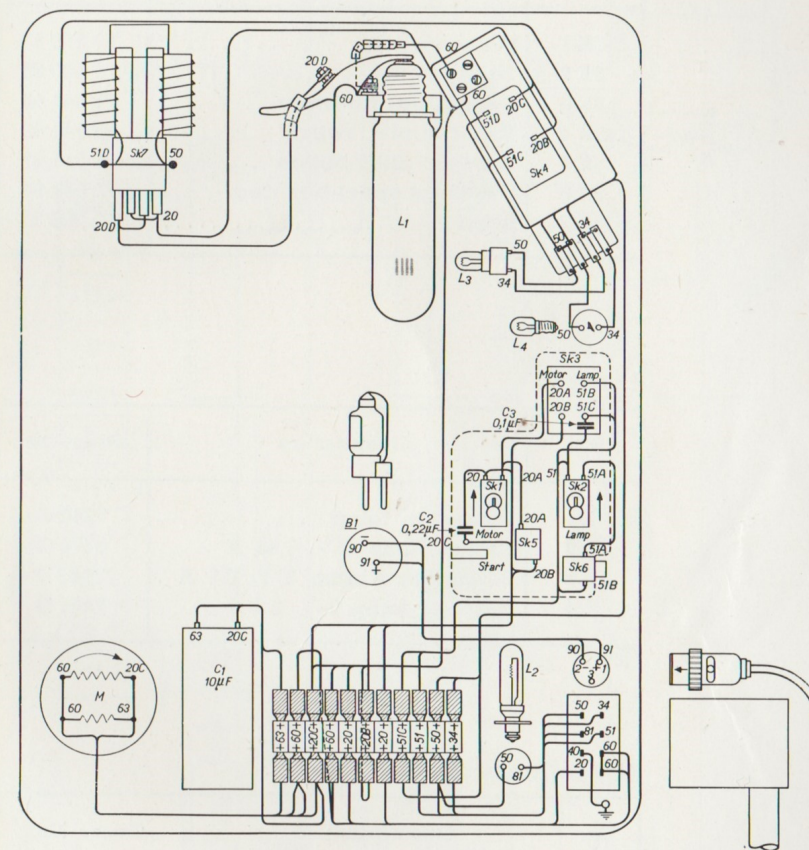
No.	Description	Order No.
SK 1	Motor switch .....	C 1 500 83
SK 2	Lamp switch .....	C 1 500 33
SK 3	Centrifugal governor .....	22 541 48
SK 4	Film-rupture switch .....	22 541 48
SK 5	Starting push-button .....	22 541 97
SK 6	Switch of spool-box door .....	22 541 97
SK 7	Relay .....	ND 396 38

Lamps:

No.	Description	Order No.
L 1	Projection lamp .....	7240 C
L 2	Exciter lamp 6 V, 1.48 A .....	3874 C
L 3	Illumination lamp 6 V, 0.5 A .....	7142 D
L 4	Framing lamp 6 V, 0.5 A .....	7142 D

Miscellaneous:

No.	Description	Order No.
C 1	Motor-starting capacitor 10 $\mu$ F .....	49 179 49
C 2	Anti-interference capacitor, 0.22 $\mu$ F, 400 V .....	48 751 10/220 K
C 3	Anti-interference capacitor, 0.1 $\mu$ F, 125 V .....	48 750 10/100 K
M 1	Motor .....	22 541 27
B 1	Photo-electric cell .....	0533



Wiring diagram of the type 8710 portable 35 mm sound-film projector.

Fig. 25



Specification of the parts indicated in fig. 26

### Switches:

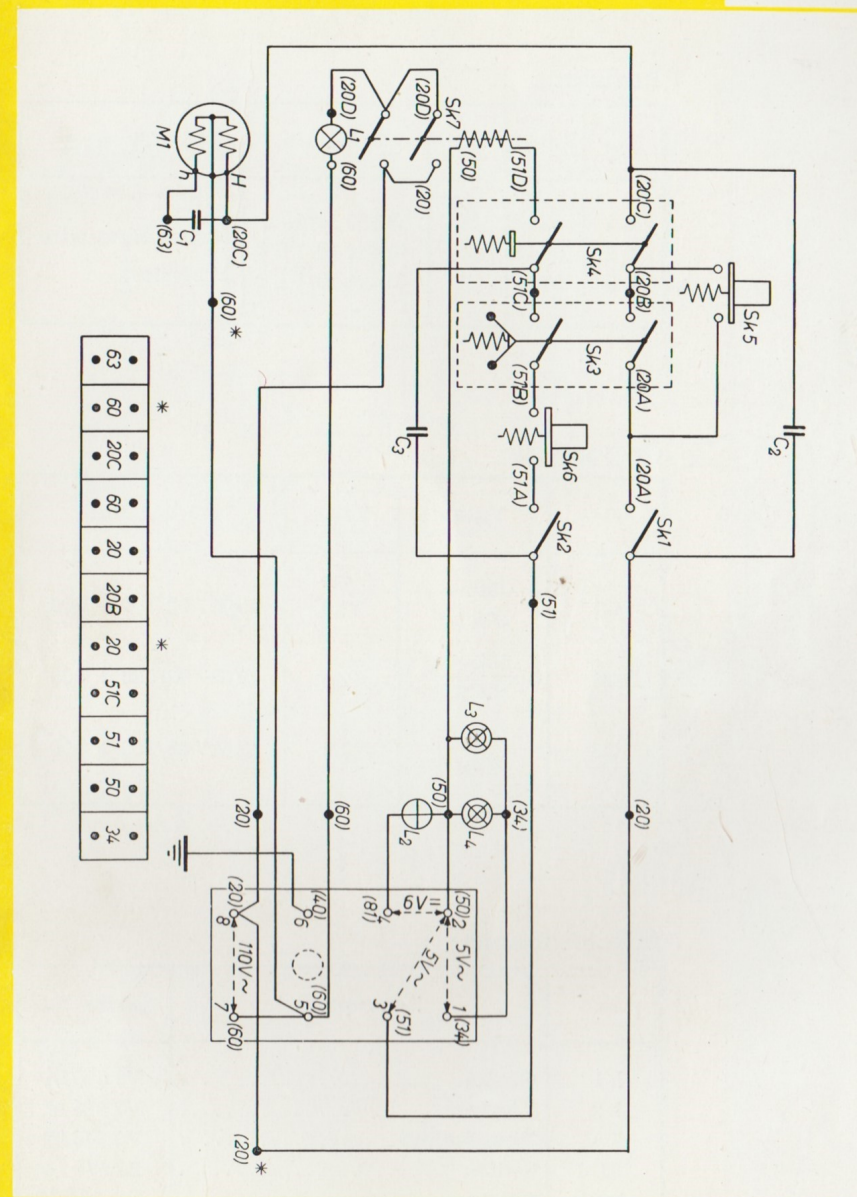
No.	Description	Order No.
SK 1	Motor switch .....	C 1 500 33
SK 2	Lamp switch .....	C 1 500 83
SK 3	Centrifugal governor .....	22 541 48
SK 4	Film-rupture switch .....	22 541 48
SK 5	Starting push-button .....	22 541 97
SK 6	Switch of spool-box door .....	22 541 97
SK 7	Relay .....	ND 396 38

### Lamps:

No.	Description	Order No.
L 1	Projection lamp .....	7240 C
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L 3	Illumination lamp 6 V, 0.5 A .....	7142 D
L 4	Framing lamp 6 V, 0.5 A .....	7142 D

### Miscellaneous:

No.	Description	Order No.
C 1	Motor-starting capacitor 10 $\mu$ F .....	49 179 49
C 2	Anti-interference capacitor, 0.22 $\mu$ F, 400 V .....	48 751 10/220 K
C 3	Anti-interference capacitor, 0.1 $\mu$ F, 125 V .....	48 750 10/100 K
M 1	Motor .....	22 541 27



Electrical diagram of the type 8710 portable 35 mm sound-film projector.

Fig. 26



Specification of the parts indicated in fig. 27

Resistors:

No.	Value	Watts	Order No.	Type
R 1	22 $\Omega$	10	48 495 10/22 E	enamelled-wire resistors
R 2	1.6 $\Omega$	6	48 494 10/1 E 6	
R 3	1.6 $\Omega$	6	48 494 10/1 E 6	

Capacitors:

No.	Value	Volts	Order No.
C1	500 + 500 $\mu$ F	12.5	49 317 02/500 + 500
C2	500 + 500 $\mu$ F	12.5	49 317 02/500 + 500
C3	500 + 500 $\mu$ F	12.5	49 317 02/500 + 500

Miscellaneous:

No.	Description	Order No.
L 1	Choke .....	V3 595 01
L 2	Choke .....	V3 595 02
T 1	Transformer .....	V3 616 02
SK 1	Switch .....	E2 570 14
Re 1	Relay .....	ND 362 79
VI 1	Thermal fuse .....	V3 750 04
B 1	Rectifying valve .....	451

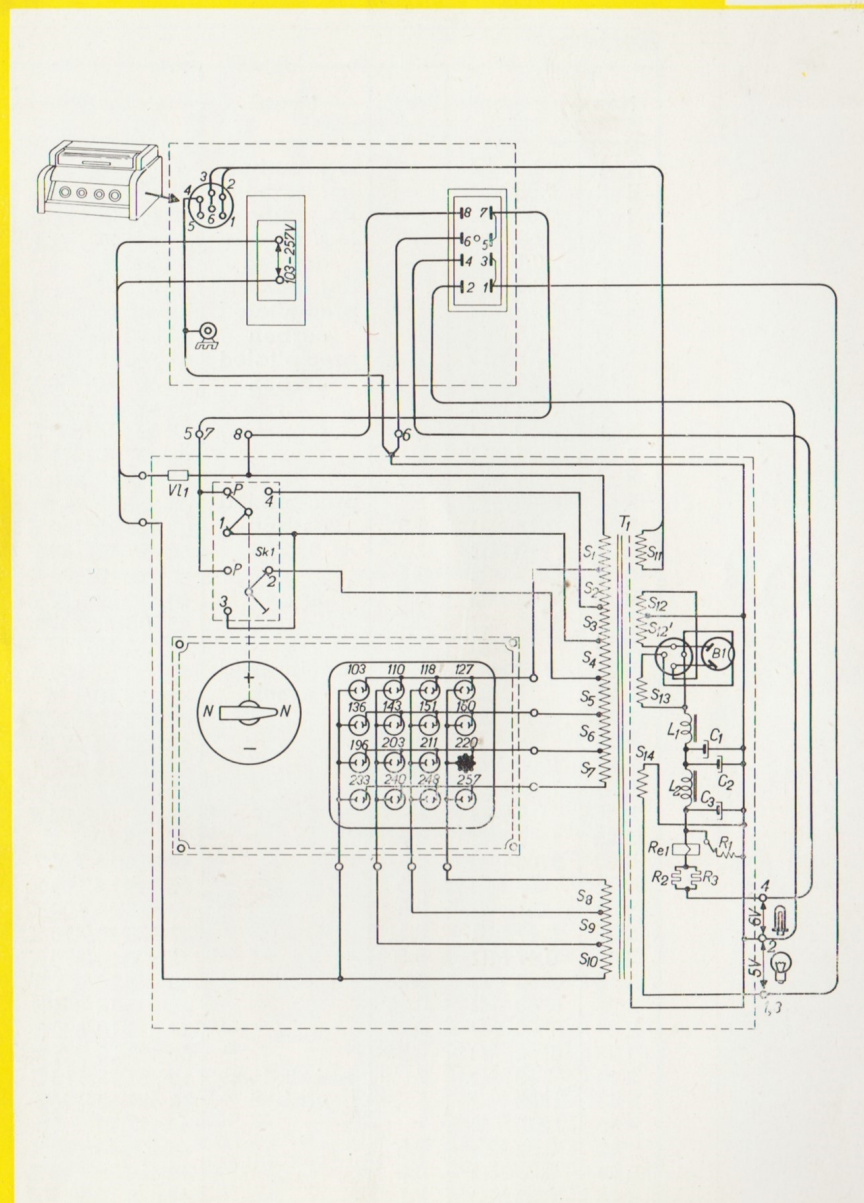


Fig. 27

Electrical diagram of the type 2778 feed unit.



## Specification of the parts indicated in fig. 28

## Resistors:

No.	Value	Watts	Type	Order No.
R 1	2x0.5 MΩ	—	log. carbon	49 501 43
R 2	0.35 MΩ	—	lin. carbon	49 501 21
R 3	0.35 MΩ	—	lin. carbon	49 501 21
R 4	2.5 MΩ	—	log. carbon	49 501 22
R 5	0.1 MΩ	—	stepped	V3 635 01
R 6	2.5 MΩ	—	log. carbon	49 501 22
R 7	0.15 MΩ	1	precipitated	48 553 10/150 K
R 8	0.15 MΩ	1	carbon	48 427 10/150 K
R 9	0.15 MΩ	1	precipitated	48 553 10/150 K
R 10	0.15 MΩ	1	carbon	48 427 10/150 K
R 11	0.22 MΩ	1	"	48 427 10/220 K
R 12	820 Ω	0.5	"	48 426 10/820 E
R 13	0.27 MΩ	1	"	48 427 10/270 K
R 14	0.39 MΩ	0.5	"	48 426 10/390 K
R 15	82000 Ω	1	precipitated	48 553 05/82 K
R 16	0.15 MΩ	0.5	carbon	48 426 10/150 K
R 17	10 MΩ	1	"	48 427 10/10 M
R 18	0.18 MΩ	0.5	"	48 426 10/180 K
R 19	0.22 MΩ	0.5	"	48 426 10/220 K
R 20	2200 Ω	0.5	"	48 426 10/2 K 2
R 21	1 MΩ	0.5	"	48 426 10/1 M
R 22	0.18 MΩ	1	precipitated	48 553 10/180 K
R 23	1 MΩ	0.5	carbon	48 426 10/1 M
R 24	1500 Ω	0.5	"	48 426 10/1 K 5
R 25	47 Ω	0.5	"	48 426 10/47 E
R 26	1200 Ω	0.5	"	48 426 10/1 K 2
R 27	0.33 MΩ	0.5	"	48 426 10/330 K
R 28	0.1 MΩ	1	"	48 427 10/100 K
R 29	1 MΩ	0.5	"	48 426 10/1 M
R 30	2700 Ω	0.5	"	48 426 10/2 K 7
R 31	0.1 MΩ	0.5	"	48 426 10/100 K
R 32	0.1 MΩ	0.5	"	48 426 10/100 K
R 33	0.47 MΩ	0.5	"	48 426 10/470 K
R 34	0.47 MΩ	0.5	"	48 426 10/470 K
R 35	8200 Ω	0.25	"	48 425 10/8 K 2
R 36	8200 Ω	0.25	"	48 425 10/8 K 2
R 37	8200 Ω	0.25	"	48 425 10/8 K 2
R 38	8200 Ω	0.25	"	48 425 10/8 K 2
R 39	110 Ω	7	enamelled wire	48 767 05/110 E
R 40	1200 Ω	1	carbon	48 427 10/1 K 2
R 41	1200 Ω	1	"	48 427 10/1 K 2
R 42	0.82 MΩ	0.5	"	48 426 10/820 K
R 43	0.82 MΩ	0.5	"	48 426 10/820 K
R 44	0.33 MΩ	0.5	"	48 426 10/330 K
R 45	0.68 MΩ	0.5	"	48 426 10/680 K
R 46	3900 Ω	1	"	48 427 10/3 K 9
R 47	3900 Ω	1	"	48 427 10/3 K 9
R 48	200 Ω	6	enamelled wire	48 494 05/200 E

## Specification of the parts indicated in fig. 28 (cont.)

No.	Value	Watts	Type	Order No.
R 49	200 Ω	6	enamelled wire	48 494 05/200 E
R 50	200 Ω	6	"	48 494 05/200 E
R 51	200 Ω	6	"	48 494 05/200 E
R 52	900 Ω	16	"	48 496 05/900 E
R 53	900 Ω	16	"	48 496 05/900 E
R 54	560 Ω	6	"	48 494 10/560 E
R 56	33000 Ω	0.5	carbon	48 426 10/33 K
R 57	0.22 MΩ	0.5	"	48 426 10/220 K
R 58	0.39 MΩ	0.5	"	48 426 10/390 K
R 59	0.22 MΩ	0.5	"	48 426 10/220 K
R 60	50 Ω	6	enamelled wire	48 494 10/50 E
R 61	50 Ω	6	"	48 494 10/50 E
R 62	3300 Ω	0.25	carbon	48 425 10/3 K 3
R 63	3300 Ω	0.25	"	48 425 10/3 K 3
R 64	1 Ω	6	enamelled wire	48 494 10/1 E
R 65	10 Ω	0.25	carbon	48 425 10/10 E
R 66	10 Ω	0.25	"	48 425 10/10 E
R 67	10 Ω	0.25	"	48 425 10/10 E
R 68	10 Ω	0.25	"	48 425 10/10 E

## Capacitors:

No.	Capacity	Volts	Order No.
C 1	0.1 μF	400	48 791 10/100 K
C 2	0.1 μF	400	48 791 10/100 K
C 3	10,000 pF	400	48 751 20/10 K
C 4	10,000 pF	400	48 751 20/10 K
C 5	0.47 μF	400	48 791 10/470 K
C 6	0.47 μF	400	48 791 10/470 K
C 7	100 μF	12.5	48 313 22/100
C 8	120 pF	600	48 406 10/120 E
C 9	0.33 μF	400	43 751 20/330 K
C 10	560 pF	600	48 406 10/560 E
C 11	0.22 μF	400	48 791 10/220 K
C 12	1500 pF	400	48 751 20/1 K 5
C 13	0.22 μF	125	48 750 20/220 K
C 14	100 μF	12.5	48 313 22/100
C 15	0.33 μF	400	48 751 20/330 K
C 16	22,000 pF	400	48 791 10/22 K
C 17	1000 pF	600	48 407 10/1 K
C 18	1500 pF	400	43 751 20/1 K 5
C 19	100 μF	12.5	48 313 22/100
C 20	0.22 μF	400	48 751 20/220 K
C 21	100 pF	600	43 406 10/100 E
C 22	4700 pF	1000	48 798 20/4 K 7
C 23	0.1 μF	400	48 791 10/100 K
C 24	0.1 μF	400	48 791 10/100 K



*Specification of the parts indicated in fig. 28 (cont.)*

No.	Capacity	Volts	Order No.
C 25 ) C 26 )	250 + 250 $\mu$ F	50	48 317 04/250 + 250
C 27 ) C 28 )	0.47 $\mu$ F	400	48 751 20/470 K
C 29 ) C 30 )	50 + 50 $\mu$ F	355	48 317 09/50 + 50
C 31 ) C 32 )	50 + 50 $\mu$ F	355	48 317 09/50 + 50
C 33 ) C 34 )	47,000 pF	800	48 757 20/47 K
	47,000 pF	125	48 750 20/47 K
	680 pF	600	48 406 10/680 E

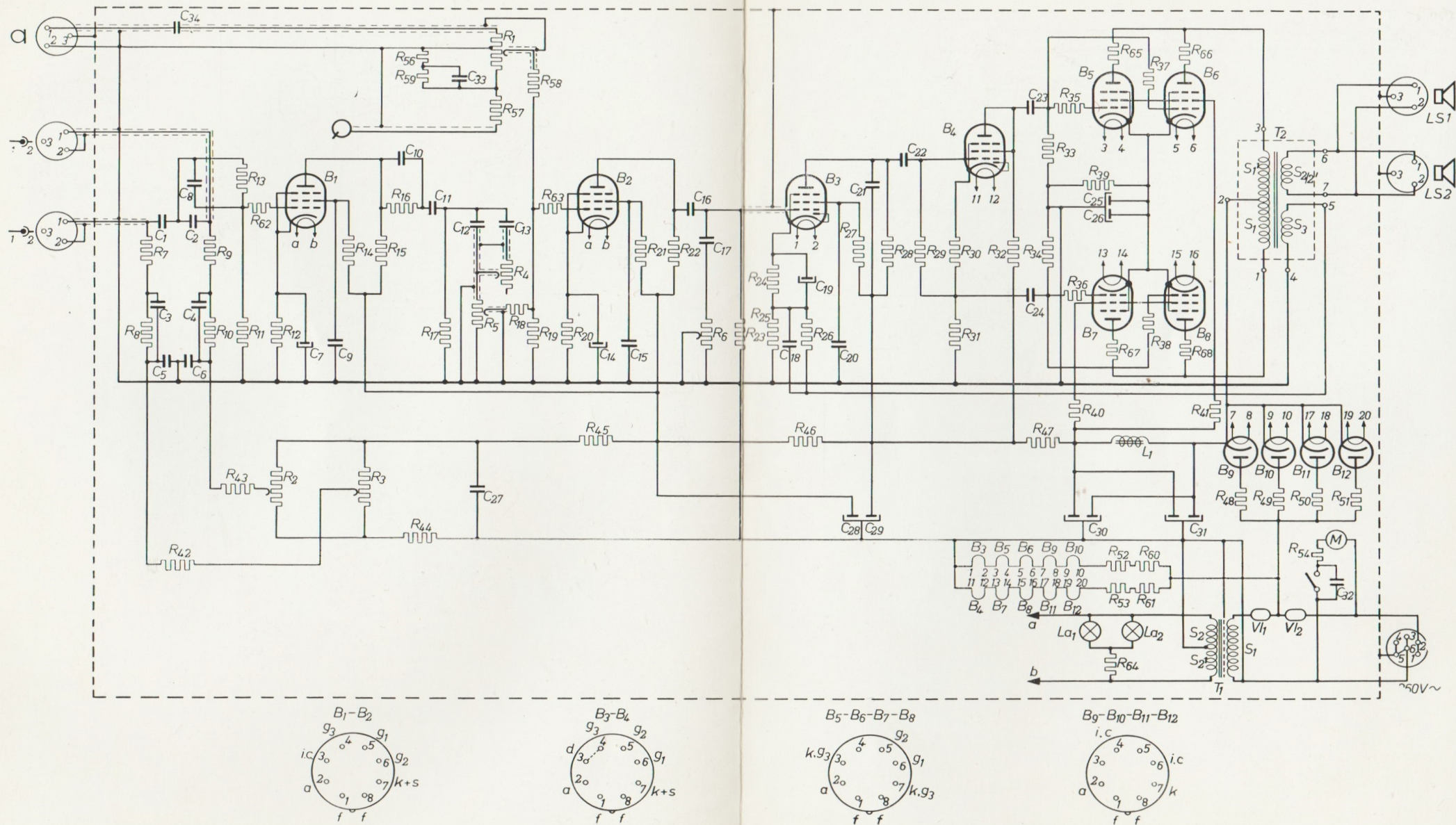
**Valves:**

No.	Type	Order No.
B 1	Pre-amplifier .....	EF 40
B 2	Pre-amplifier .....	EF 40
B 3	Amplifier .....	UAF 42
B 4	Phase inverter .....	UAF 42
B 5	Power valve .....	UL 41
B 6	Power valve .....	UL 41
B 7	Power valve .....	UL 41
B 8	Power valve .....	UL 41
B 9	Rectifier .....	UY 41
B 10	Rectifier .....	UY 41
B 11	Rectifier .....	UY 41
B 12	Rectifier .....	UY 41

**Miscellaneous:**

No.	Type	Order No.
La 1	Pilot lamp 6 V, 0.5 A .....	6843
La 2	Pilot lamp 6 V, 0.5 A .....	6843
Vl 1	Thermal fuse .....	V3 750 01
Vl 2	Fuse 800 mA .....	08 140 47
T 1	Heating transformer for valves B 1 and B 2 .....	V3 616 01
T 2	Output transformer .....	V3 620 01
L 1	Choke .....	V3 595 00
LS 1	Hall loudspeakers .....	9886
LS 2	Monitor loudspeaker .....	9886
M	Gramophone unit .....	V3 625 28 (E/AC 6)





Electrical diagram of the type 2720 amplifier.



