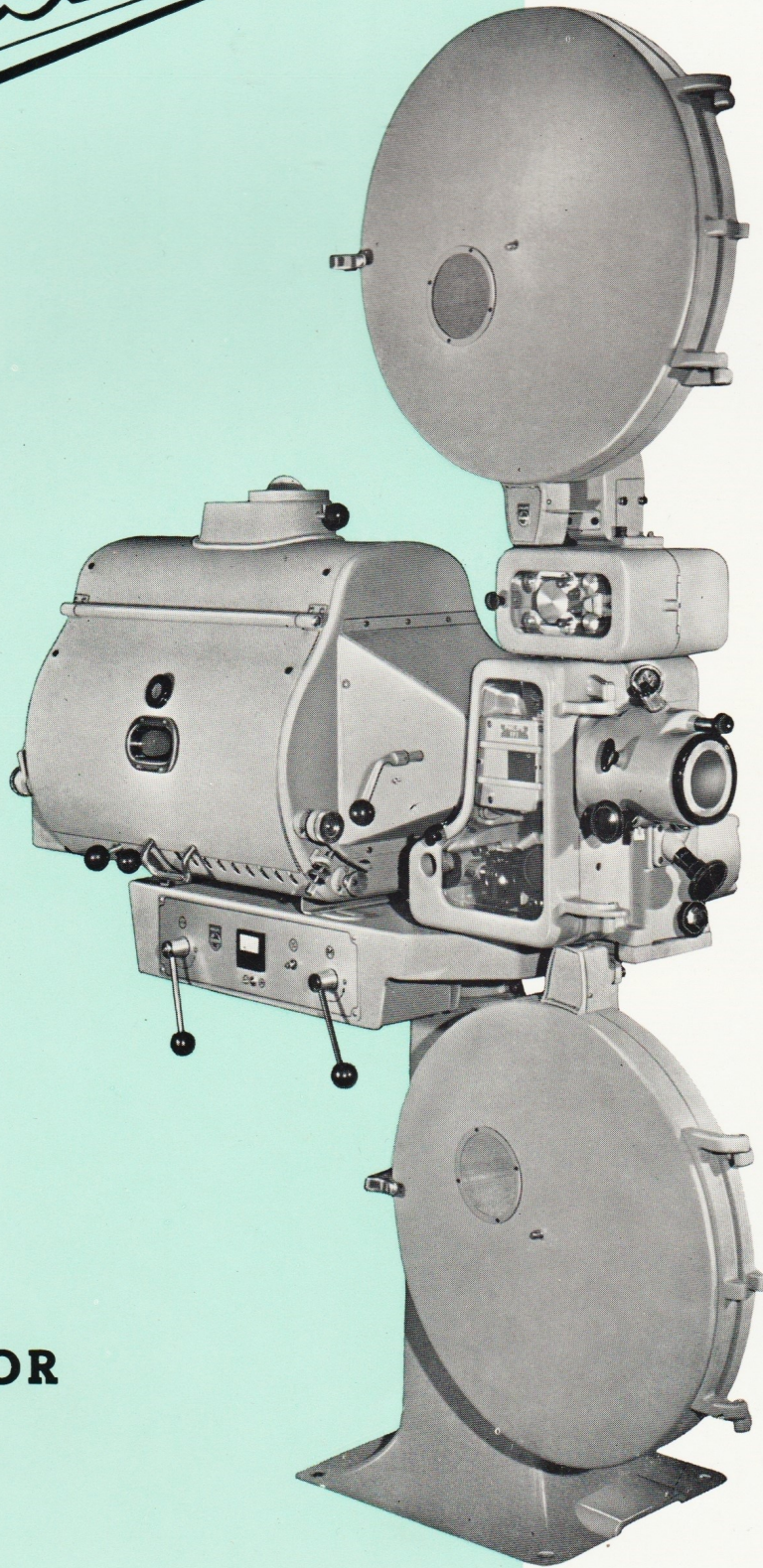


PHILIPS

Cinema

A-II-6-E



PROJECTOR

FP 7

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Fully enclosed one-unit construction

Maximum reliability

As will be seen from the photograph on the cover, the projector and the optical soundhead of the FP 7 form one entity, so that misalignment is impossible; the film path is simple and the number of sprockets, hence also the wear of the film, is reduced to a minimum.

The film path is completely enclosed. A door with glass window not only dampens the noise of the running projector but also fully protects the film path against dust.

The projector housing is likewise oil and dust tight.

The reliability of a projector depends largely on the driving system, the intermittent movement and the lubrication. Full attention was therefore paid to these three points.

Driving system

The driving system is simple and very sturdy. A split-phase asynchronous flange motor drives the vertical main shaft by means of gear wheels. The shaft has a diameter of $\frac{13}{16}$ " (21 mm) and its speed amounts to only 360 r.p.m.; troublesome vibrations are consequently precluded.

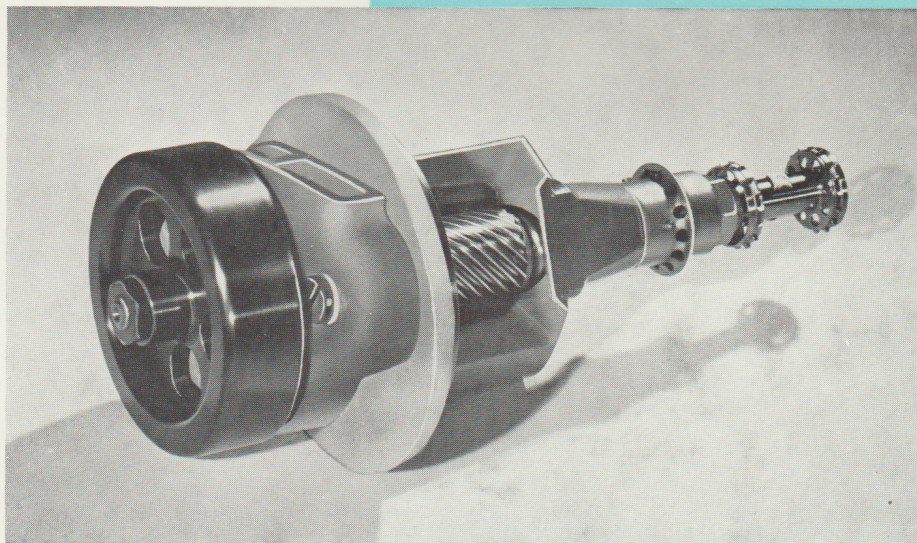
The main shaft in turn drives:
the intermittent mechanism,
the upper and the lower sprocket,
the drum shutter,
the high-pressure spur-gear oil pump,
the lower film spool.

A safety clutch located between motor and main shaft prevents the gear wheels from being damaged in the event of a breakdown.

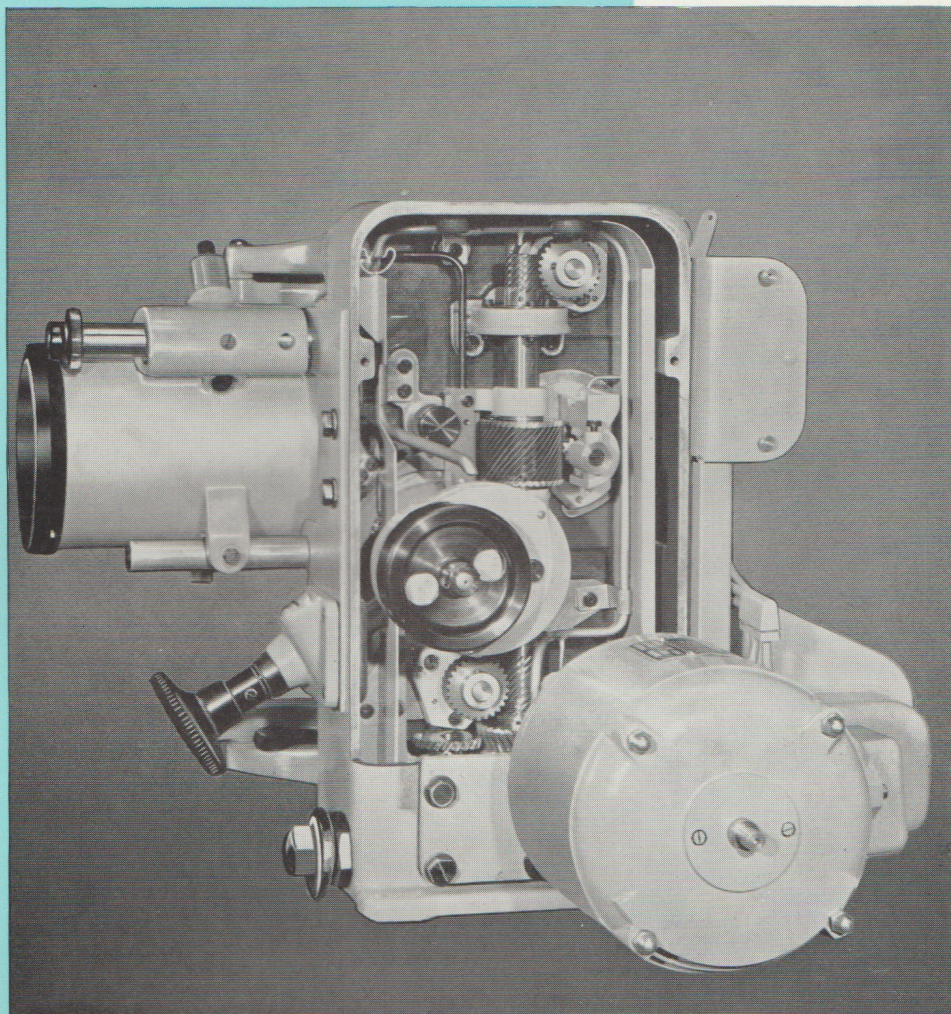
Intermittent mechanism

The intermittent mechanism satisfies the highest demands, owing to the use of high-grade materials, high-precision finish and an excellent lubricating system. Thus, for instance, the cam, the striking pin and the Maltese cross are made of steel of the very best quality and ground to a tolerance of 1 micron.

Holes have been drilled in the flanges of the intermittent sprocket, thereby reducing its weight to only 9 drams (16 grams), and subsequently minimizing the moment of inertia of this sprocket as well as the wear of the Maltese cross.



Intermittent mechanism.



Driving mechanism and lubricating system.

Continuous lubrication

The whole driving system is lubricated continuously by means of a very robust high-pressure spur-gear oil pump, which is always below the oil level. The oil circuit contains two magnetic filters, one combined with the normal gauze filter of the pump, the other being suspended in the oil flow to the intermittent mechanism. These filters remove all steel and iron particles from the oil and thus reduce the wear of the driving system and minimize acidification of the oil.

The whole intermittent mechanism is contained in a closed casing, which serves at the same time as an oil bath. The oil circuit is such that the intermittent mechanism is continuously supplied with pure oil which has been filtered three times.

The rear cover of the projector can be removed together with the oil screen merely by loosening two screws. As no packing material is required between the projector casing and the rear cover, the latter is refitted by simply tightening up the two screws.

Oil throwers prevent the oil from leaking along the shafts.

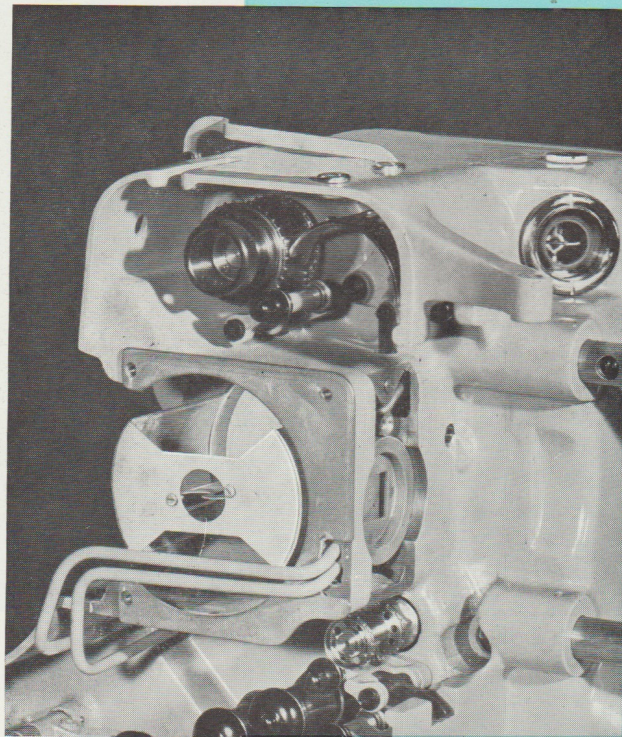
This lubricating system ensures excellent working and minimum wear of the projector mechanism, even in the case of very high or low temperatures.

Efficient cooling

To guarantee perfect projection, it is necessary to protect the film against drying out through heat radiation by the arc lamp. The following cooling precautions have therefore been incorporated: automatic cooling by means of the shutter, water cooling and the possibility of using an air-compressor.

The shutter and air-compressor cool above all the picture area of the film, whilst the water cooling ensures that the guiding edges of the film, which often get extremely hot, remain cold.

Efficient cooling is of primary importance, especially for Wide-Screen performances, where arc-lamps of very high intensity are used.



Water-cooled protective mask.

Ventilating shutter

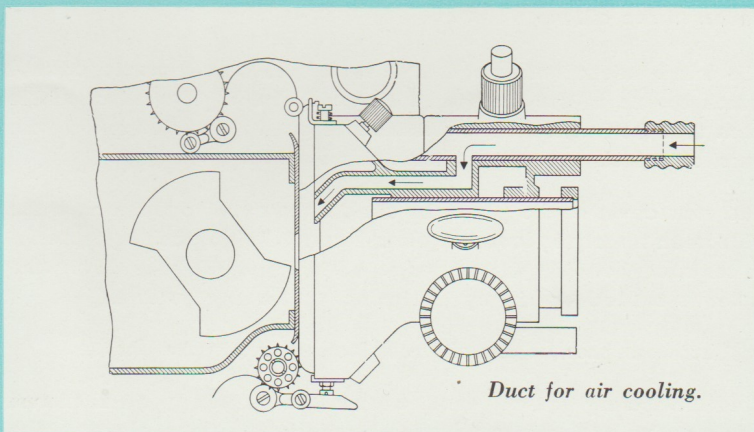
The drum shutter is provided with ventilating blades, so that the film is automatically cooled in the picture gate, even when no air-compressor is used.

Water cooling

For water cooling, the projector is equipped with a hollow protective mask through which cooling water flows; thus the projector mechanism, the runner plate and hence also the guiding edges of the film, all remain cold; the oil, moreover, retains its full lubricating properties.

Air cooling

Additional air cooling may be provided when H.I. light sources with great heat radiation are used. The FP 7 projector is equipped with the necessary air duct to be connected to the air-compressor; since this duct ends above the mask plate in front of the film, the latter is efficiently cooled.



Duct for air cooling.

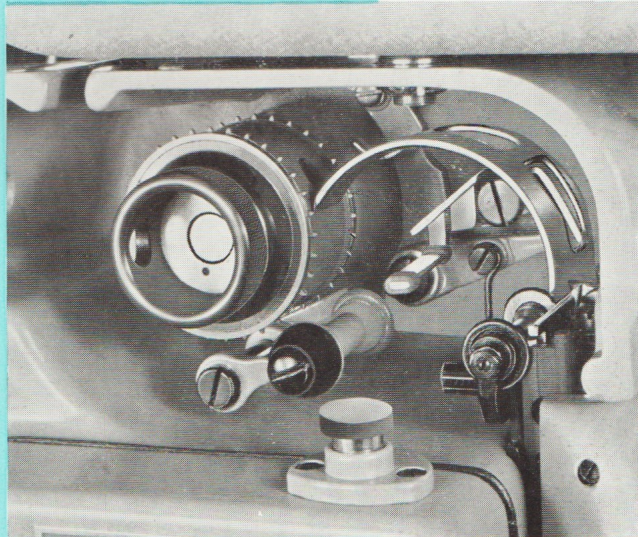
Perfect safety

In addition to the perfect film protection ensured by water and air cooling, the projector is equipped with a double-acting, automatic film-rupture device. The upper film loop passes between the two levers of this device which is operated as soon as the loop becomes too large (due to film rupture in the gate) or too small, which may occur when the film perforations are so badly damaged that the take-off sprocket cannot transport the film. In both cases, the light beam is intercepted and both the motor and the exciter lamp are switched off immediately.

The upper and the lower spool box are both provided with solid fire traps which prevent any film fire from spreading into the spool boxes.

Finally, the spool boxes have metal-gauze windows with 900 meshes per sq.in. (144 meshes per sq.cm) which ensure a supply of fresh air sufficient to eliminate any risk of explosion.

*Fire trap and
double-acting
automatic
film-rupture device.*



In order to ensure maximum film protection four important measures have been taken:

- central adjustment of the skate pressure;
- splices enter and leave the runner plate at the lowest speed;
- the oil for lubricating the pad rollers cannot grease the film;
- all parts of the film path—also the pad and guide rollers—are so profiled that the picture and sound-track areas of the film are never in contact with any part of the projector.

Central adjustment of the skate pressure

The central adjustment of the skate pressure offers the great advantage that the pressure is evenly distributed over the whole length of the runner plate, so that neither the film nor the teeth of the intermittent sprocket are unnecessarily strained.

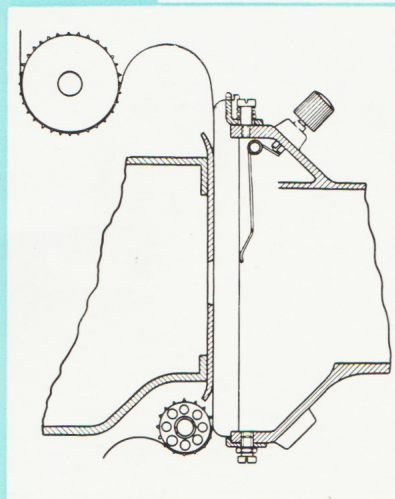
Carefully calculated gate assembly

The lengths of the runner plate and the pressure skates are such that film splices will be exactly at the beginning or at the end of the runner plate when the intermittent sprocket is at rest. Hence the velocity at which the splices enter or leave the film gate is practically zero, thus greatly reducing the danger of weak splices coming unstuck. The splices, moreover, pass through noiselessly.

No oil on the film

The oil for the pad rollers cannot grease the film because their bearings are oiled from within.

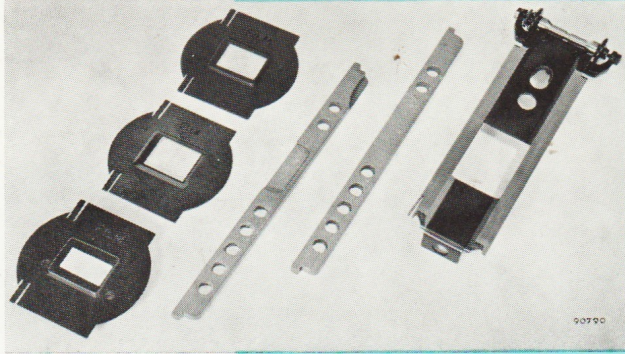
Central adjustment of skate pressure.



Excellent film protection

Steady picture

Steadiness in a vertical direction is ensured by the fact that the intermittent shaft is supported almost entirely by a long bearing. This results in a very good centring of this shaft and the avoidance of any irregularity in the rotation of the intermittent sprocket. The maximum wobbling of this sprocket is 0.16 mil (4 microns); owing to the special way in which this sprocket is fixed to its shaft, the wobbling does not increase when the sprocket is taken off to be cleaned and subsequently replaced.



Masks for the various projection systems, pressure skates and runner plate.

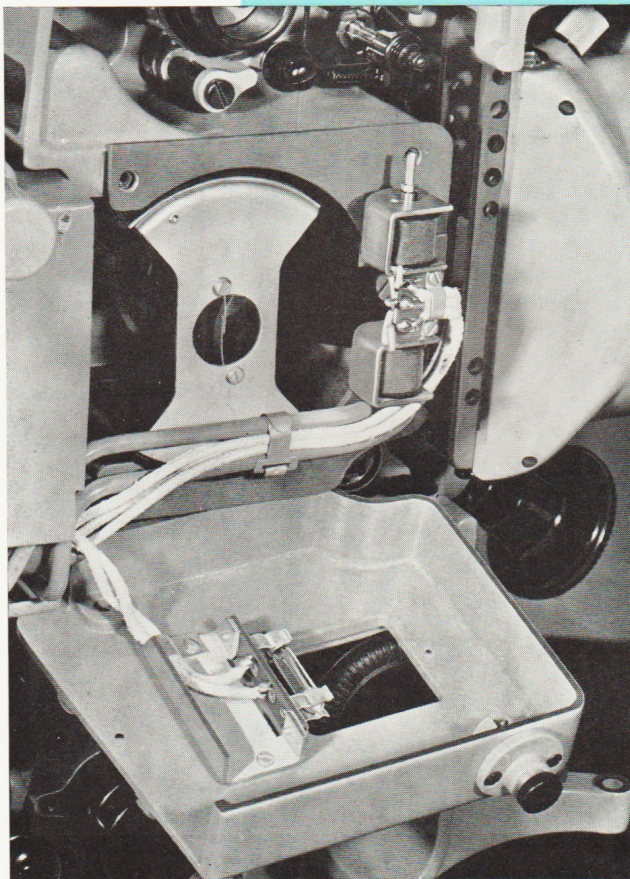
To ensure that the film lies absolutely flat against the running surfaces between the teeth of the intermittent sprocket, there is a groove at the base of the teeth.

The plastic pressure skates are very light in weight; as they react rapidly, the passage of splices remains unnoticed.

Steadiness of the picture in a horizontal direction is obtained by lateral guide rollers over the runner plate.

Smooth change-over

To ensure that the performance is not interrupted when changing over from one projector to the other it is essential that both picture and sound be switched over simultaneously. To achieve this the projector is equipped with an electro-magnetically controlled flap, which can very easily be coupled electrically to the sound change-over switch. In this way picture and sound can be switched over in one movement simultaneously.

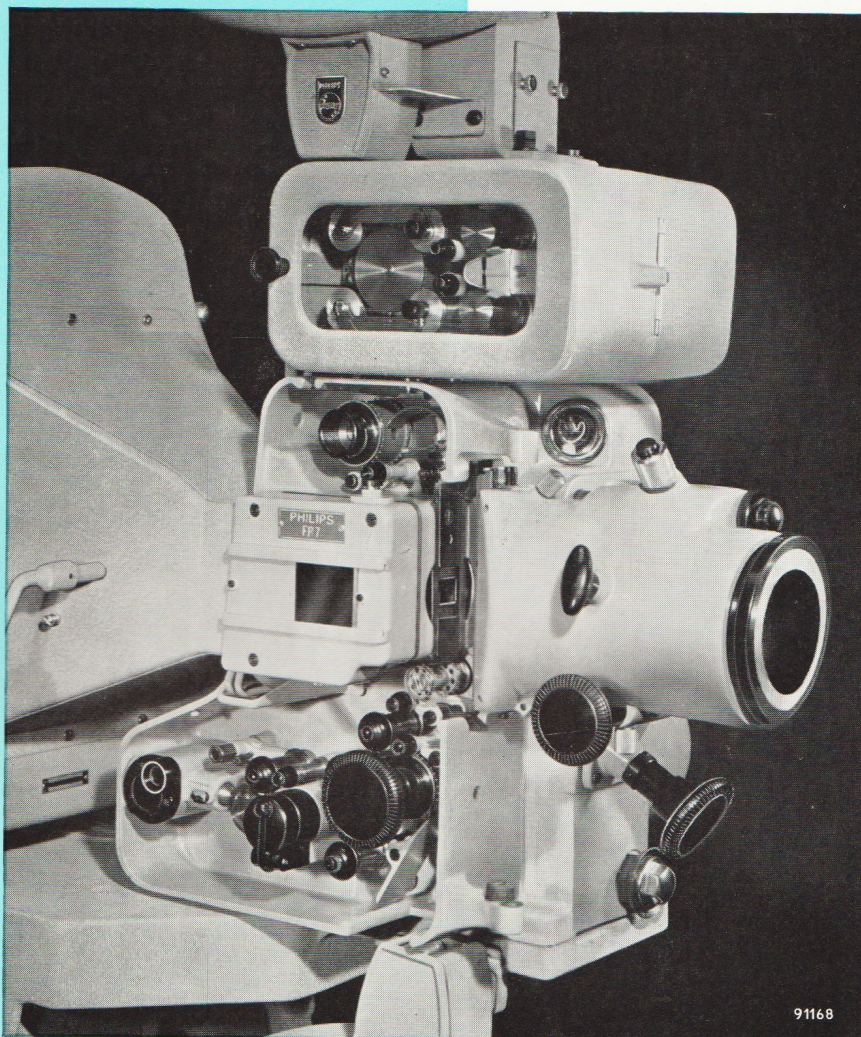


This flap is situated close behind the gate, i.e. at the point where the light beam is narrowest. Consequently, the picture is covered and exposed very quickly, thus giving the impression that the film goes on without interruption.

A full description of the picture change-over relay with light cut-off, type 3850, is given on sheet A-II-11-E.

Picture change-over device.

Projector head with built-in optical soundhead and with four-channel magnetic soundhead.



91168

It is of primary importance that the highest light efficiency be obtained, especially for the reproduction of Wide-Screen films. As an additional optical system has to be used in the projection of certain panoramic films, the diameter of the lens holder has to be large enough to allow for the mounting of this optical system in front of the normal projection lens.

Maximum light efficiency is ensured in the FP 7 projector owing to the fact that it is equipped with a drum shutter and fitted with a large-diameter lens holder which permits a lens with high F-value to be used.

Efficient drum shutter

The use of a drum shutter increases the light efficiency because it cuts off the light beam from two directions, thus making the period of light interruption as short as possible.

Large-diameter lens holder

Normally the projector is equipped with a 4" (104 mm) lens holder. Adapter tubes can be supplied for fitting lenses of smaller diameter.

Condenser lenses

When lenses with a very short focal length are used, a condenser lens placed behind the gate greatly improves both the light output and the light distribution. For fitting the condenser lens it is only necessary to replace the normal mask by a mask with attached lens holder, type 8663.

***Highest
light efficiency***

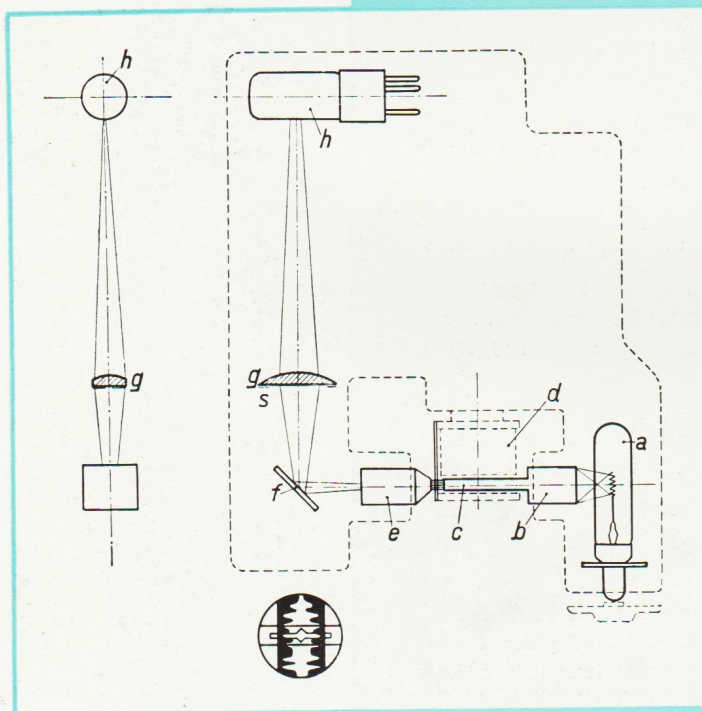
High-fidelity sound reproduction

The scanning part for optical sound is provided with a rotary sound drum which is driven by the film. As both the shaft of this drum and its resilient pressure roller run in ball bearings, the starting time is only about 3 seconds and a very small pull is sufficient to keep the drum rotating at its rated velocity. The film is therefore not stretched between the sound drum and the take-up sprocket, but forms a slack loop which acts as a very light and hence practically inertia-free resilient element, thus eliminating all the small shocks caused by the teeth engaging the film perforations. For this reason, there is no hoarseness due to the 96 c/s sprocket modulation.

Ingenious sound-scanning system

The path of the light rays for optical sound reproduction is shown in the illustration below. The light of the exciter lamp (a) is projected on to the end of a glass rod (c) by means of a condenser system (b). The glass rod conducts the light by total reflection through the sound drum (d) towards the film. Thus, a small and very intense light spot is thrown on to the sound track. This light spot is enlarged 13.5 times by a carefully calculated micro lens (e) and the light is concentrated on to a very sensitive photocell (h) via a mirror (f), a screen (s) having a slit of 0.011" x 1.0625" (0.27 mm x 27 mm) and a condenser (g).

The mirror deflects the path of the light rays by 90°, thus making it possible to place the photocell at the rear of the sound-scanning system; this reduces the dimensions of this system and makes cell-changing easy.



Advantages of the system

- Very uniform slit illumination.
- Accurate adjustment and visual checking facility of the position of the sound track with respect to the slit.
- Easy adaptation to dual-track reproduction.

*Path of the light rays for
optical sound reproduction.*

Very uniform slit illumination

Because the glass rod produces a diffused light on the film the variation in output measured over the entire length of the slit is less than 0.5 dB.

Accurate adjustment of the sound track

Since in practice the sound track is not always printed at the correct place on the film, it must be possible to shift the latter with respect to the scanning line. In the FP 7 projector this can be done by simply turning a milled knob which displaces the pressure roller of the sound drum, thus causing the film to be shifted in a lateral direction.

The position of the sound track with respect to the scanning light-beam can be checked on the slotted screen (s), visible through the window on the left of the sound-scanning part. The middle of the sound track should coincide with the centre of the slit, which is distinctly indicated on the screen.

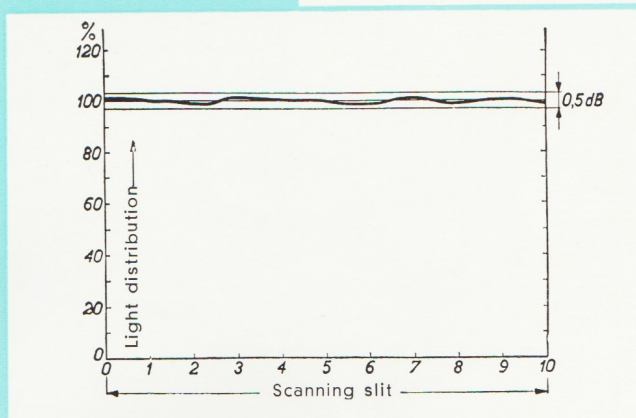
Only with such a checking system is dual-track reproduction possible.

Magnetic soundhead

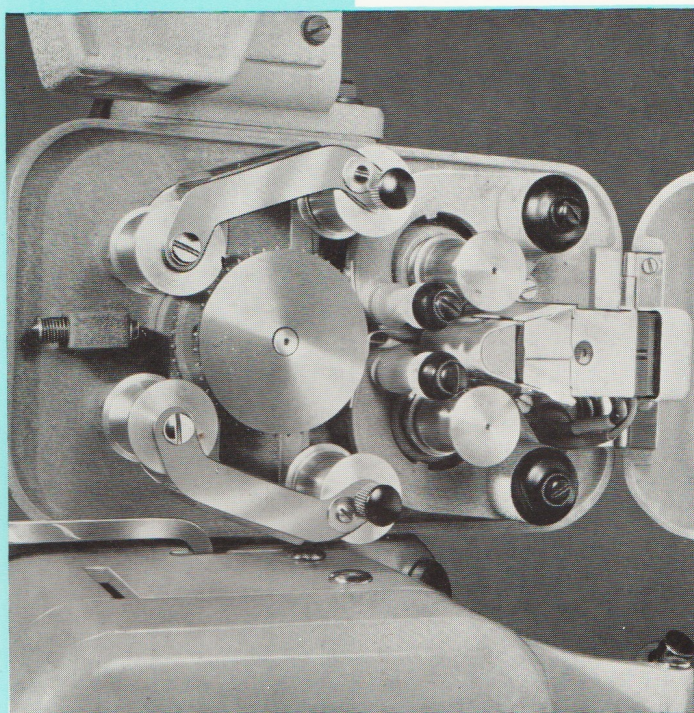
The magnetic soundhead, type EL 5860/01, is mounted between the upper spool box and the projector housing. It is equipped with a quadruple magnetic head for four-channel reproduction.

The length of film running through the soundhead is kept constant, independently of the regularity with which the film is taken from the upper spool, owing to the fact that one large sprocket is used both for feeding the film into the soundhead and for taking it off.

Rigorously constant film speed at the scanning spot—and hence undistorted sound reproduction—is ensured by two rotating sound drums of anti-magnetic material, running in ball-bearings and provided with brass flywheels, and by two resilient nylon rollers.



Slit-illumination curve.



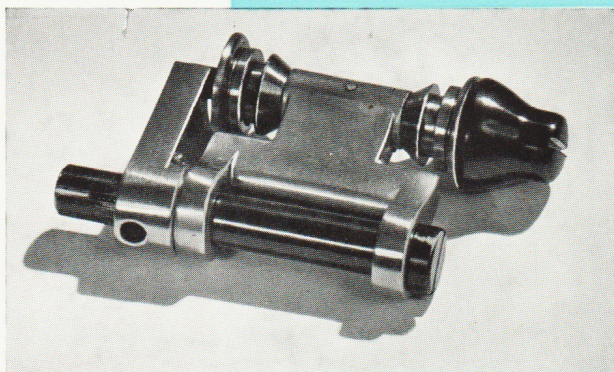
*Magnetic soundhead,
type EL 5860/01.*

Simple operation

Easy threading

The film is very easy to thread. The knobs of all guide and pad rollers are streamlined, so that the film slides easily between them. The pad rollers have a disengaged position.

A framing lamp behind the picture gate simplifies the threading of the film.



Complete pad roller.

The pad roller of the intermittent sprocket can be closed independently of the lens holder when the film has been threaded in the gate. If one forgets to close this roller, it will be closed automatically when the lens holder is pushed back.

The pressure roller of the sound-head, being spring-loaded, returns automatically to its working position; flutter in sound reproduction, which is apt to occur in other constructions if one accidentally forgets to close this roller, is thus completely avoided.

Sliding lens holder

The very robust lens holder and skate holder form one unit. By pressing a button, the unit slides on two rods, and thus considerably simplifies the threading of the film.

Owing to the closed construction, stray-light reflections from the projection lens are avoided without having to make use of a separate movable screen.

Instantaneous focusing

The lens is focused without any backlash by means of a large button. For cleaning, it can be taken out of the holder together with its sleeve.

Easy film-loop adjustment

The lengths of the film loops can be adjusted either before or during the performance by means of the manual loop correctors of the upper and lower sprockets respectively.

Central framing device

The framing knob is at the front of the projector and can be operated from both sides. The position of the framing device is indicated by a pointer fitted behind the upper oil-observation glass.

Framing is done by turning the whole of the intermittent mechanism round the axis of the intermittent sprocket. During framing the sizes of the upper and lower film loops are automatically kept constant.

Steel and velvet-covered runner plate

The projector is equipped with a steel runner plate which can easily be removed and refitted. For running new film prints, a strip of velvet can be applied in a very simple manner to the normal runner plate, thus making it unnecessary to wax these films.

The FP 7 projector can be installed in any projection room, used for any size of hall, and can be connected to practically all existing mains.

Wide tilting angle

Owing to the narrow width of the pedestal, the tilting angle can be adjusted between 30° downwards and 15° upwards. In both extreme positions, the lubrication is still amply sufficient.

Horizontal and vertical adjustment

As the mounting table can be turned in a horizontal plane and the height of the optical axis can be adjusted between 46 $\frac{7}{8}$ " (119 cm) and 54" (137 cm), the FP 7 can always be lined up with the existing projection-room windows.

Two types of spool boxes

Two types of spool boxes can be used on this projector: either for 2000 and 3000 ft (600 and 900 m) spools, or for 4000 ft and 6000 ft (1200 and 1800 m).

The upper spool box is provided with a friction coupling and a 6-V pilot lamp, the lower spool box with a take-up device and a friction coupling.

Large-capacity spool boxes are of great advantage for 3-D performances, where both projectors are running simultaneously, and for cinemas with only one projector.

The spool boxes have the following important advantages:

- the upper spool box can be inclined backwards by inserting a wedge of 10° or 20° (type 8644 or 8645) between projector and spool arm, thus allowing the projector to be placed close to the front wall of the projection room;
- the spools can easily be taken out, since the spool boxes consist of two similar halves;
- the spindles of the spool boxes and the driving shaft of the lower friction coupling are mounted in ball-bearings;
- the 3000 ft upper spool boxes are provided with a time scale.

Suitable for all mains

The projector can be used on practically all mains.

Normally it is supplied for use on 110 and 220 V, 50 c/s. It can, however, also be supplied for use on 110 and 220 V, 60 c/s. In both cases the projector is driven by an asynchronous flange motor.

For A.C. mains of another frequency and for D.C. mains, a pulley motor for use on 110 V or 220 V is supplied.

For D.C. mains the speed is checked by means of a speedometer.

Also available with synchronous or interlock motors

For use in film studios the projector can be supplied with either a synchronous motor or an interlock motor; the latter is indispensable for isochronous running of two projectors when showing 3-D films.

Adjustable picture-sound distance

In very long halls the sound is sometimes heard at the back of the auditorium after the corresponding picture is projected, thus spoiling the "talking" impression. To avoid this, the distance between picture and sound in the FP 7 projector can be adjusted between 17.5 and 20 frames by simply shifting one guide roller.

Easy maintenance

Visible oil circulation

Oil level and oil circulation can be observed through the oil-level gauge at the bottom and through the illuminated observation glass at the top, both of which are on the operating side of the projector.

Easy cleaning and servicing

All parts are readily accessible for cleaning.

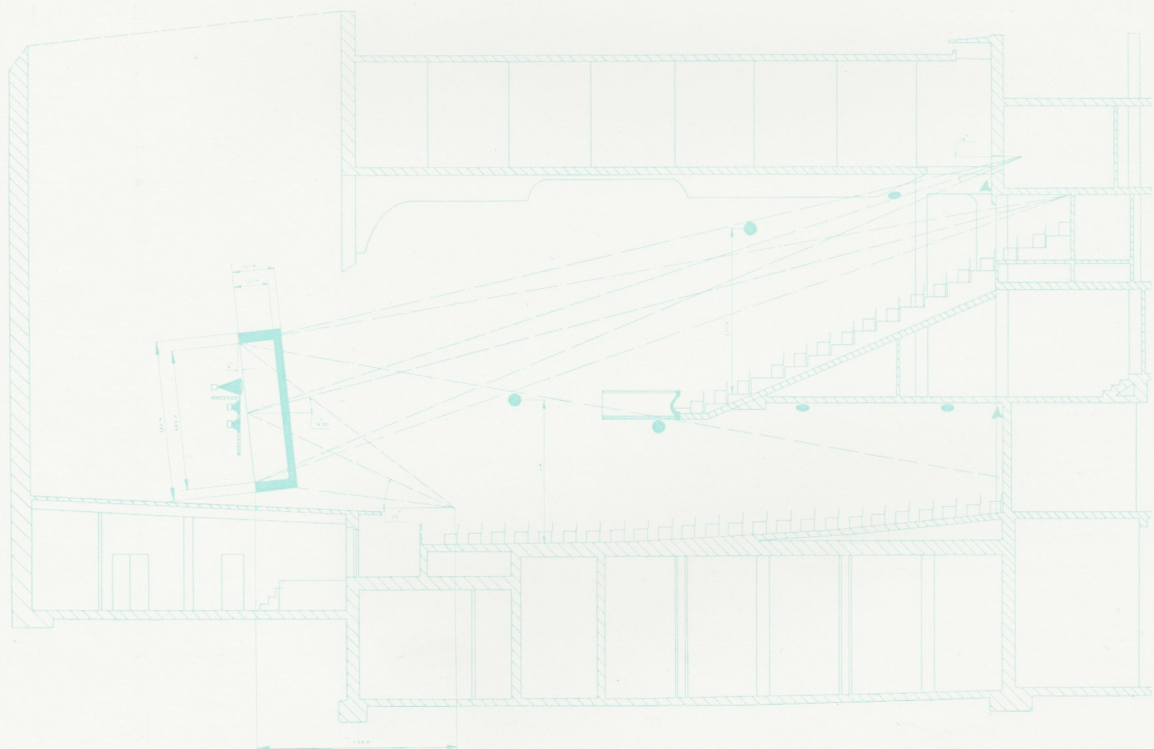
Special attention has been paid to easy replacement of the vital parts, such as the magnetic oil filters and the gauze filter, the projection lens, the pad rollers, the sprockets and the intermittent mechanism. This greatly facilitates maintenance and servicing.

Instantaneous replacement of exciter lamp and photocell

The replacement of the exciter lamp is very easy and takes only a few seconds; the lamp is equipped with a slotted centring flange which makes it impossible to insert this lamp wrongly.

The photocell can be replaced after removing the cap at the rear, which is fixed with only one milled nut.

Pre-sale service



*Apply to Philips for advice about:
lay-out, acoustics and lighting of your theatre.*

Type numbers

Types	Description	Weight			
		Net		Gross	
		lbs	kg	lbs	kg
<i>FP 7 projector mechanism</i>					
8670/01	FP 7 with built-in optical soundhead and asynchronous flange motor for 110 and 220 V, 50 c/s	170	77	253	115
8676/01	Same as type 8670/01 but for 60 c/s	170	77	253	115
8671/01	Same as type 8670/01 but with pulley, without motor ..	145	66	209	95
<i>Projector stands</i>					
EL 4050/00	Stand of variable height with mounting table, suitable for 220 V, 50 and 60 c/s A.C. mains, provided with complete wiring, motor switch and 100-A arc-lamp switch	264	120	382	173.5
EL 4050/01	Same as above, but for 110 V and 220 V, 50 and 60 c/s A.C. mains.				
EL 4050/02	Same as above, but for 110 or 220 V D.C. mains.				
EL 4050/03	Same as above, but for 3 x 220/380 V, 50 and 60 c/s A.C. mains.				
<i>Spool boxes</i>					
8640/21	Upper spool box for max. 3000 ft (900 m) of film, with friction device and fire trap	68	31	147.5	67
8641/21	Lower spool box for max. 3000 ft (900 m) of film, with friction device and fire trap				
8642/21	Upper spool box for max. 6000 ft (1800 m) of film, with friction device and fire trap	111	50.5	200	91
8643/21	Lower spool box for max. 6000 ft (1800 m) of film, with friction device and fire trap				
<i>Magnetic soundhead</i>					
EL 5860/01	Soundhead with fully enclosed film path	33	15	64	29

Pulley motors

Types	Description	Weight			
		Net		Gross	
		lbs	kg	lbs	kg
<i>For 110 and 220 V A.C. mains</i>					
8601/00 (40 c/s) 8602/00 (50 c/s) 8603/00 (60 c/s) 8604/00 (100 c/s)	Motor complete with pulley, protecting cover, belt and bracket for fixing to the mounting table.	31	14	42	19
<i>For D.C.</i>					
8605/00 (220 V) 8606/00 (110 V)	Motor complete with pulley, protecting cover, belt and bracket for fixing to the mounting table.	31	14	42	19
<i>Speedometer</i>					
8662/10	Speedometer with pulley and belt.	—	—	—	—

Sleeves and adapter tubes

Types	Description
22 437 95	Sleeve, dia. 4.095" (104 mm).
8685/60	Adapter tube 4.095"/2.461" (104/62.5 mm).
EL 5866/02	Adapter tube for anamorphic lenses 4.095"/2.779" (104/70.6 mm).

Aperture plates

Types	Description
22 416 89 8663/00	For normal films, aspect ratio 1 : 1.37: aperture plate without condenser-lens holder; aperture plate with condenser-lens holder.
C1 311 33	For CinemaScope films with an aspect ratio of 1 : 2.55: aperture plate without condenser-lens holder.
8663/12	For CinemaScope films with an aspect ratio of 1 : 2.34: aperture plate without condenser-lens holder.
8663/11	For Wide-Screen films, aspect ratio 1 : 1.85: aperture plate with condenser-lens holder.
8663/13	For R.K.O.-Scope and SuperScope films, aspect ratio 1 : 2: aperture plate without condenser-lens holder.
8663/10	Blind aperture plate with condenser-lens holder.

Condenser lenses

Types	Focal length of projection lens
8688/00	40 mm
8689/00	45 mm
8690/00	50 mm
8691/00	55, 60 and 65 mm
8692/00	70, 75, 80 and 85 mm
For fitting these lenses, it is necessary to use an aperture plate provided with a condenser-lens holder.	

Wedges and lamps

Types	Description
8644/00	10° wedge for upper spool box.
8645/00	20° wedge for upper spool box.
6844	Framing lamp and spool-box pilot lamp 6 V, 0.5 A.

Asynchronous flange motor

Voltage	110 and 220 V
Frequency	50 or 60 c/s
Power factor	0.9
R.p.m. at 50 c/s	1440
Power	$\frac{1}{6}$ H.P.
Consumption	165 W

For other frequencies it is recommended to use a pulley motor.

Lamps and photocell

Types	Description	Voltage	Intensity
6844	Framing lamp and spool-box pilot lamp	6 V	0.5 A
7251C	Exciter lamp	5 V	4 A
3874C	Exciter lamp	6 V	1.48 A
3533	Photocell	max. 100 V	—

Technical data

Dimensional drawings

