

PHILIPS

Projector FP 20 S **with pulsed discharge lamp SPP 800**

Never before have science and technology made such rapid advances as during these last years and never before have new experiences been applied so rapidly in practice. The new Philips FP 20 S projector is a proof of this. Apart from the obvious characteristics — which may be expected of any good projector — it is pre-eminent because of

- its entirely new construction and
- its pulsed discharge projection lamp, characteristics which, each by itself, result in numerous outstanding features, viz.:

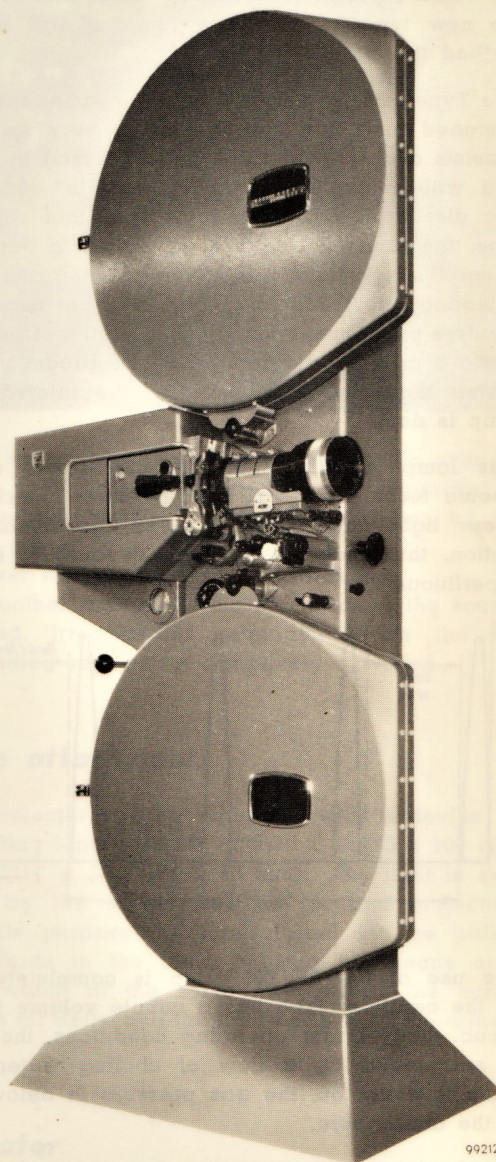
New construction:

- Maximum reliability.
- Suitable for all kinds of 35 mm films.
- Easy operation.
- Simple film threading.
- Faultless running of the film.
- Minimum stress on the film and minimum heating.
- Very little maintenance.
- Automatic change-over to stand-by projection lamp.
- Saving of space in the projection room.
- Facilities for automatic change-over from one projector to the other.
- Facilities for remotely controlled focusing.

Pulsed discharge lamp

- Great economy.
- Flicker-free projection, even at very high screen brilliance.
- Constant light output, irrespective of the number of operating hours.
- Perfectly uniform brightness on the screen.
- No rotary shutter.
- No flue or exhaust system.
- No arc adjustment.

The projector can be supplied with optical sound-head or with both optical and magnetic soundheads.



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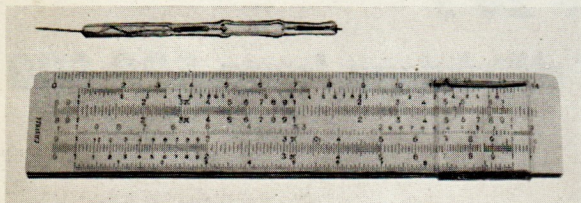
Cinema

Projector FP 20 S



Cat. A-II-18-E

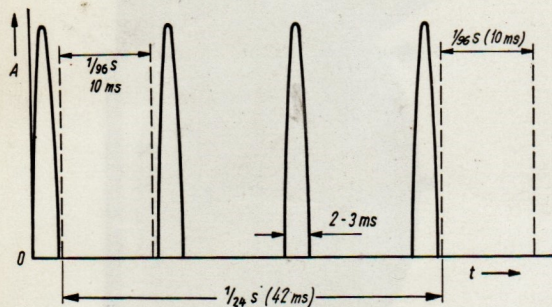
Pulsed discharge lamp SPP 800



As cinema proprietors will be most interested in the new type of projection lamp, it will be described first.

The Type SPP 800 pulsed discharge lamp, specially designed for cinema projection, is very small. It consists of a quartz tube of $3\frac{1}{8}$ " (80 mm) in length and with a maximum diameter of $\frac{7}{32}$ " (5.6 mm). The discharge takes place inside a thin capillary tube, the luminous part of which has a length of about $\frac{11}{16}$ " (17 mm). The lamp is operated by a pulsating direct current of 72 pulses per second or 3 pulses per frame, each with a duration of between 2 and 3 ms (see diagram). Light is produced only during these current pulses; in the intervals the lamp is dark.

This lamp at last fulfils the old dream of the cinema technicians, viz. a light source which produces light only while required for actual projection, thus making the "light-devouring" shutter superfluous.

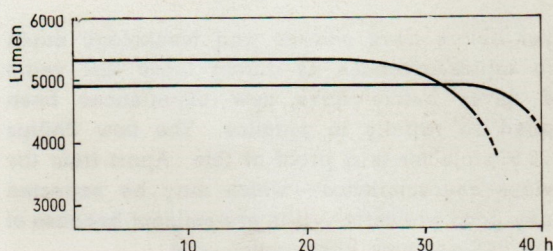


The use of the SPP 800 lamp is completely safe as the capillary tube has a minute volume (about 3 cub. mm). Under operating conditions, the lamp is surrounded by a flow of cooling water, and when it is not on, the gas pressure is below that of the atmosphere.

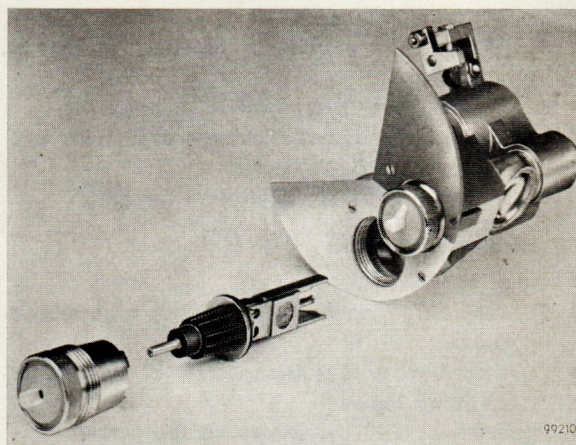
The luminous efficiency remains practically constant throughout the life of the lamp (see diagram). In contrast to incandescent lamps or carbon-arc lamps, the light output decreases no more than proportionally with the load. The extremely high brilliancy during the pulse peaks—during which values of ten times the mean value are reached—

ensures uniform spectral energy distribution and hence excellent rendering of colour films. Moreover, the film is exposed to less heating, ultra-violet radiation being eliminated by an absorption filter contained in the lamp holder while the infra-red is absorbed by the cooling water.

The difference in luminous flux between the various lamps is only a few per cent. Consequently, there is no objection against employing an older lamp in one projector and a new lamp in the other projector.



The projector is equipped with a turret fitted with two lamps. Normally, the lower lamp is in operation. If it breaks down, the turret pivots *automatically* and the upper lamp takes the place of the lower one with practically no delay. The defective lamp can be replaced and the turret turned up again *during the performance*, thus re-establishing the automatic stand-by for the lamp in operation.

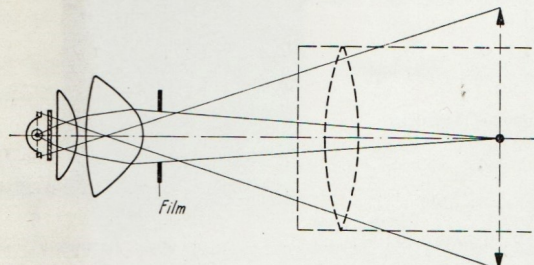


The lamp can operate at any wattage between 600 and 800 W, a continuous control for this purpose being on the projector.

Optical system

Since the lamp is small and may be placed without any risk in the immediate vicinity of the picture gate, the optical system can likewise be small (see sketch).

It consists of a cylindrical reflector of only $7/16'' \times 3/8''$ (11 x 9 mm) and two lenses, which form an image of the lamp directly in the projection lens. This explains the exceptional uniformity of the light distribution, the side-to-centre ratio being about 95 %.



Each film frame receives three flashes whilst stationary. During the pull-down period, the lamp is completely dark. The dark periods are sufficiently long to permit of the use of a normal intermittent system with a 90° Maltese cross. No rotary shutter is required. All the light produced is completely utilised for projection instead of about half of it being lost because of the shutter. The lamp, operated at 800 W, produces the same luminous flux on the screen as a H.I.-arc of 60 A.

Construction of the projector

Rectangular steel housing

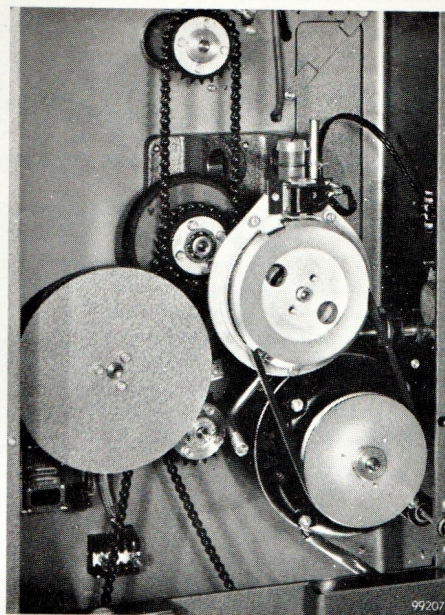
The skeleton of the projector consists of a rectangular sheet-steel housing. Its front panel is completely flat so that components subsequently to be fitted will not require any special alignment to ensure a smooth running of the film. Projection up to 15° upwards or 25° downwards is possible by tilting the whole housing with respect to its base.

Simple driving mechanism

Thanks to the ingenious combination of various transmission systems and a new central framing device, the driving mechanism is extremely simple. Both the upper and the lower spool are driven by a chain. These chains are slow-running on chain-wheels of a synthetic material that is practically indestructible and ensures absolutely silent operation.

The new framing device requires no phase correction and hence no gear transmission for this purpose.

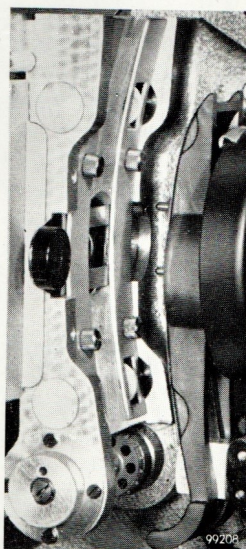
All the spindles and shafts run in sealed ball-bearings, requiring no lubrication, and all the guide rollers are made of self-lubricating material.



The oil bath of the Maltese cross is fully enclosed and easy to refill. The risk of oil splashes on the film is thus eliminated and the driving mechanism does not need to be housed in a sealed compartment; it is therefore readily accessible at all times.

Film path

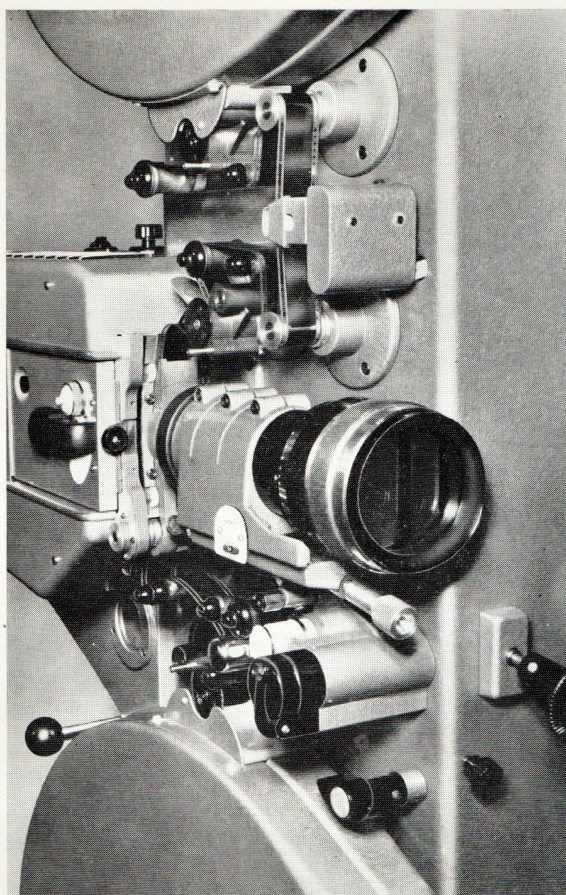
The carefully designed film path is simple and logical. As several functions have been combined, the number of parts is surprisingly small. Thus, the feed and the hold-back sprocket serve also as fire-trap rollers, while the pressure skates and the pad shoe of the intermittent sprocket constitute a single unit. The number of manipulations for threading the film is therefore less than ever before.



Film gate

On account of the excellent experience obtained with the Philips DP 70 projector for 70 mm film, the FP 20 S projector, too, is equipped with a curved film gate which ensures perfect steadiness of the picture both vertically and horizontally.

The runner strips can easily be replaced, without the use of tools. Novotext, steel or velvet-covered strips can be used; the left-hand and the right-hand strips can be interchanged, which doubles



their life. Moreover, the three kinds of strips can be turned over, the velvet-covered ones then being used as plain steel strips.

The length of the film gate and of the pressure skates is such that splices enter and leave the gate at the lowest possible speed of the film. Consequently there is hardly any risk of their breaking.

The film is guided laterally by four ceramic rollers, two at the top and two at the bottom of the film gate, which can easily be replaced if necessary.

The skate pressure is adjusted with one central knob; a scale facilitates checking and re-adjustment.

The aperture plates for different aspect ratios are inserted into a slit directly behind the gate; they snap automatically into their correct position and can readily be interchanged, even during projection.

Intermittent mechanism

The film is moved by means of a normal 90° Maltese cross, made of the same high-quality material and with the same precision as that of

other Philips projectors. Thanks to the light weight of the intermittent sprocket, its wear is reduced to a minimum.

Lens holder

The lens holder is suitable for lenses with a diameter of up to 70.6 mm ($2\frac{25}{32}$ ""). It slides over a sturdy support fixed to the projector. The fine-focusing screw, in conjunction with a pressure spring, makes it possible to shift the lens without any backlash.

The lens holder with lens can be taken from the support in a single manipulation so that, for change-over to another aspect ratio, it can readily be replaced by a holder fitted with the requisite lens. During installation the lenses are so adjusted in their holders that they can be interchanged without any re-focusing apart from a possible correction imposed by the film itself. A scale has been provided for checking the focusing.

On request, the projector can be equipped with an electric remote-control device for adjusting the focus from any part of the theatre.

Automatic film-rupture switch

This is a safety device in the film path. As soon as the upper film loop becomes too large—for example in the event of film rupture—it operates a micro-switch which at the slightest pressure switches off the motor and the projection lamp.

"Start/Change-over/Stop" switch

Starting, changing-over and stopping of the projector is effected with a single switch, which greatly facilitates operation. As soon as—after starting the motor—the film has reached sufficient speed, the lamp is switched on automatically. Motor and lamp are switched off together.

Furthermore, this switch can be used for the rapid finding of the starting frame by pushing it quickly up and down; the film is thereby moved forward a short distance.

Synchronisation device

Instead of the conventional rotary shutter, a very simple device is used for synchronising the action of the Maltese cross and the current pulses for the lamp. For this purpose, slots have been milled in the rim of the flywheel for the Maltese cross. Each slot, when passing a coil mounted on a permanent magnet, produces a voltage pulse which controls the current pulses for the lamp. As the position of the slots with respect to the Maltese cross is fixed, phase-shift is completely precluded.

Spool boxes

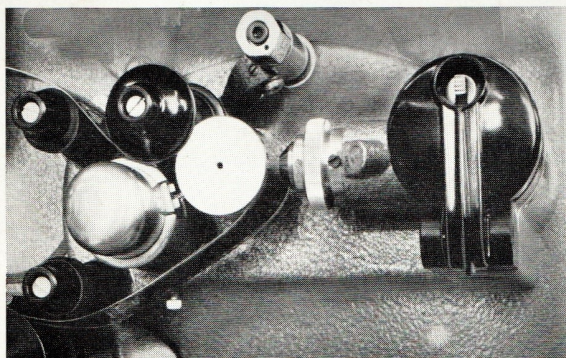
As change-over to the stand-by projection lamp, in case of breakdown of the lamp in operation, takes place automatically, the projector can be operated continuously for an indefinite period. It is therefore generally equipped with spool boxes for 6000 ft (1800 m) of film, which represent a projection time of about one hour.

The upper spool box has a time scale and an inspection lamp.

Soundheads

The projector can be equipped with both a magnetic and an optical soundhead. These form separate units which can easily be fitted and removed. The necessary mounting holes for the soundheads are already provided in the projector cabinet. When they are not used, they are covered by an inconspicuous round plate.

Optical soundhead



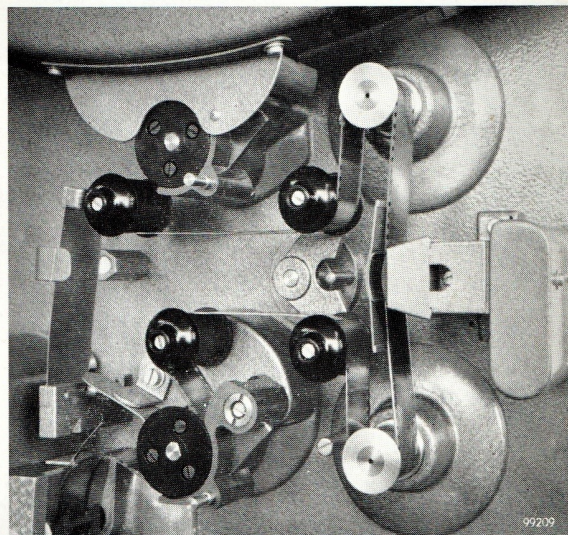
This soundhead is of the same construction as that of the other well-known Philips projectors. The sound drum is driven by the film. The starting time is only about 3 seconds and a very small pull is sufficient to keep the drum rotating at its rated velocity. The film is therefore not stretched between the sound drum and the take-up sprocket but forms a slack loop which absorbs all the small shocks caused by the teeth engaging in the film perforations, thereby precluding any risk of hoarseness on account of the 96 c/s sprocket modulation.

Magnetic soundhead

The magnetic soundhead has two sound drums, running in precision ball-bearings and provided with heavy flywheels, and a head assembly for one-to-four-track reproduction. When a magnetic soundhead is used, the projector is equipped with two feed sprockets, the upper one for pulling the

film from the reel and the lower one for pulling it through the soundhead.

The requisite tension in the piece of film between the two feed sprockets is obtained by means of spring-loaded rollers.



Some important advantages of this design over the usual construction—where the feed sprocket is not coupled to the mechanism but driven by the film—are:

- lower stress on the film perforations;
- smoother running of the film through the soundhead, irregularities originating from the unwinding reel being completely excluded.

Slide attachment

The projector can be equipped with a device for projecting lantern slides of $3\frac{1}{4}'' \times 4''$ (83 x 100 mm) or of $3\frac{1}{4}'' \times 3\frac{1}{4}''$ (83 x 83 mm). The light is supplied by the same lamp as for film projection. For this purpose the lamp turret can be pulled backwards in the lamp housing by means of a lever which at the same time inserts the mirror system for deflecting the light on to the slide attachment.

Pulsator

One pulsator per projector is used for the supply of the projection lamp. Like the customary rectifier, it may be installed in an adjoining room. The consumption of the lamp is adjustable between 600 and 800 W by means of a control on the projector.

Type numbers and weights

Description	Type	Net weight	
		lbs ozs	kg
FP 20 S projector with optical soundhead and 6000 ft (1800 m) spool boxes	EL 4022/12 *)	401 3	182
2000 ft (600 m) spool boxes	EL 4022/10 *)	340 9	154.5
Magnetic soundhead	EL 4028/00	14 8	6.5
Pulsator	EL 5207/00	293 3	133
Lens holder	EL 4029/00	1 5	0.6

*) The above projectors are provided with an asynchronous motor for 220 V, 50 c/s, 24 frames/sec.

On request, they can also be equipped with:

- asynchronous motor 110 V, 50 or 60 c/s, 24 frames/sec;
- synchronous motor 3 x 220/380 V, 50 or 60 c/s, 24 frames/sec;
- synchronous motor 3 x 220/380 V, 50 c/s, 25 frames/sec.

Pulsator

