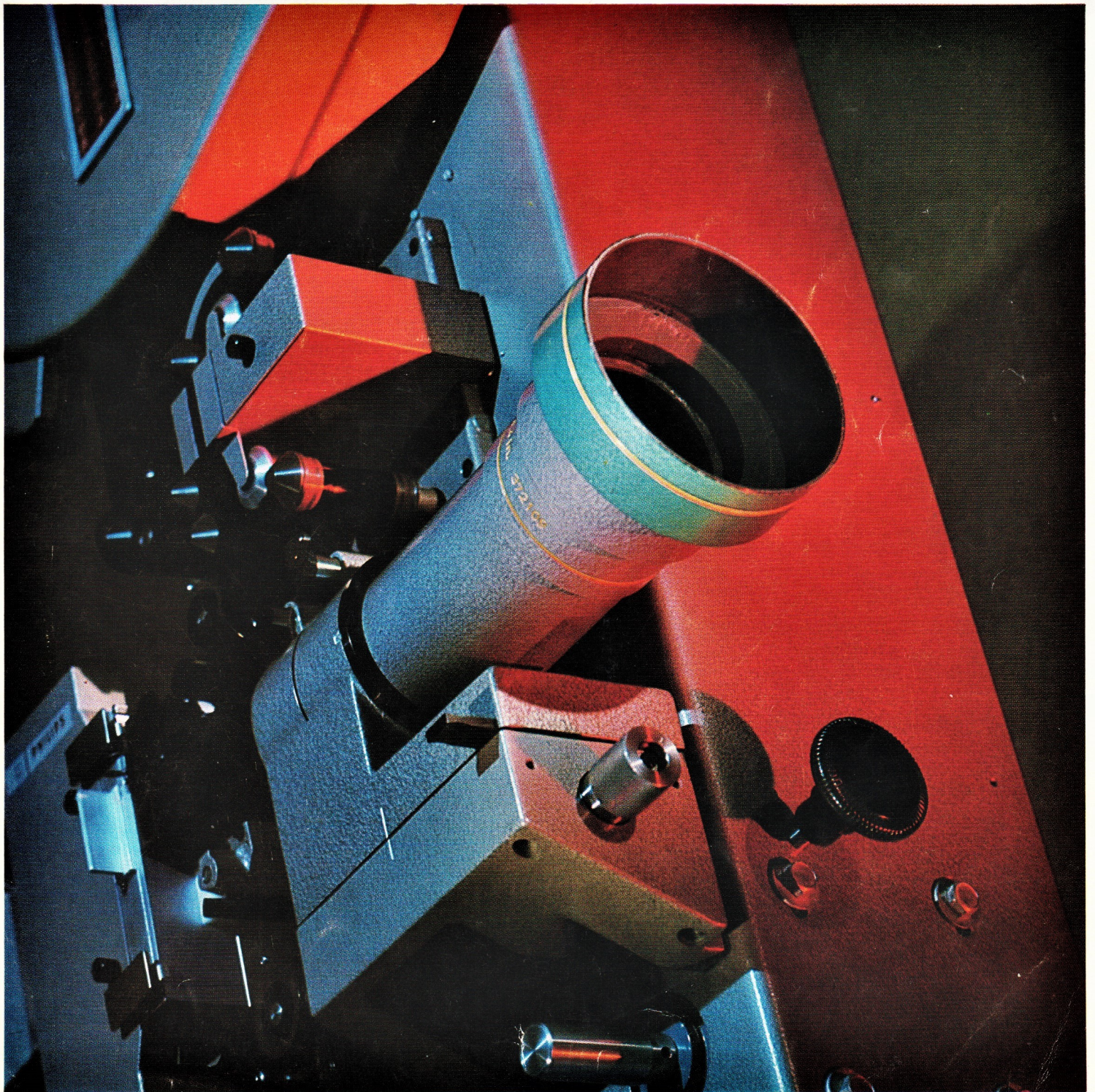


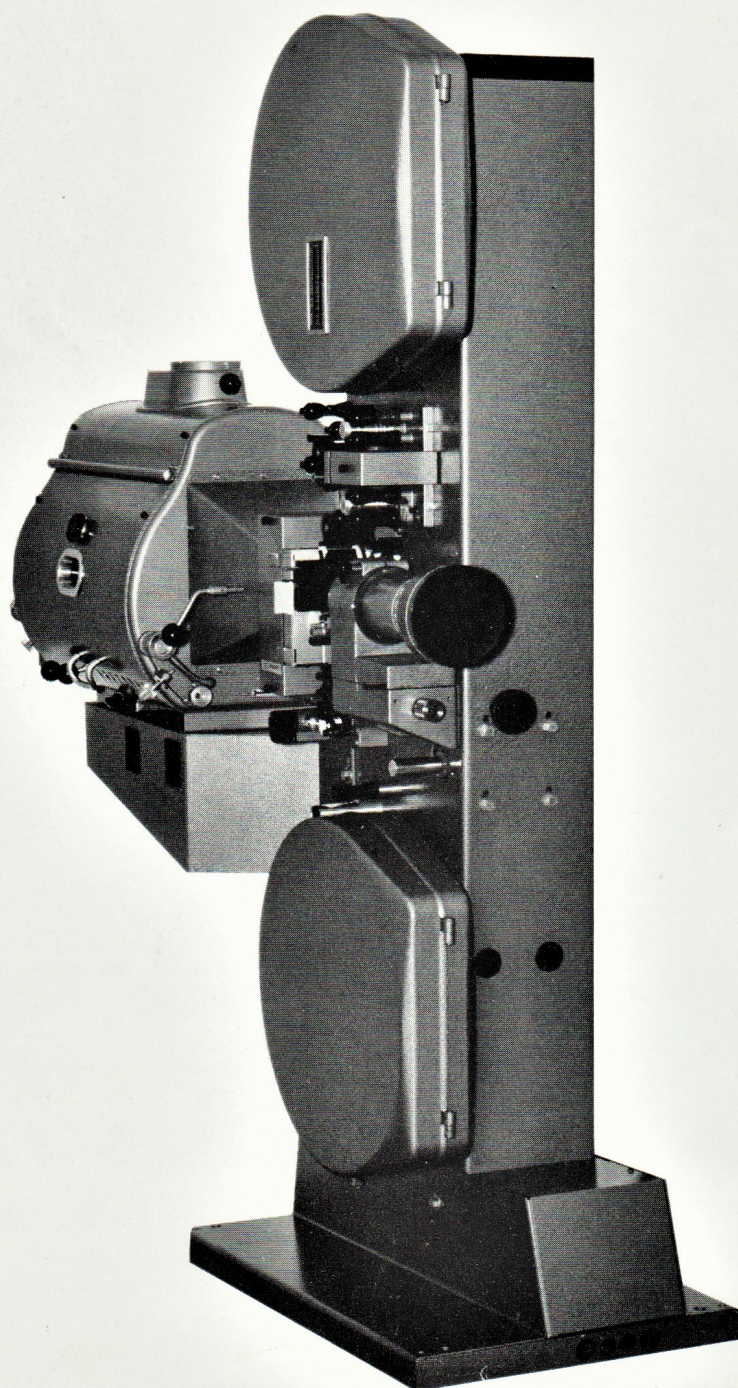
**PHILIPS**

**Universal DP 75  
Sound-Film projector**





# Universal DP 75 projector for 70 mm and 35 mm film





This new Universal DP 75 projector has the following unique features:

- Solid column construction, giving perfect alignment.
- Minimum number of gear wheels.
- Steel gears only, running in closed oil bath.
- Unique gate construction, preventing heat flutter.
- Delrin running surfaces for perfect projection of old and new, waxed and green prints.
- Change-over from 70 to 35-mm in seconds, without tools.
- Servicing of all parts is simple with standard spanners and screwdrivers.
- Suitable for all light sources.

All these features add up to yet further improvements in the already outstanding quality of all Philips projectors, and they ensure:

- Perfect projection.
- Excellent sound reproduction.
- Utmost film protection.
- Even simpler operation.
- Reduced maintenance demands.

### **Solid column construction**

The frame of the projector is a rectangular sheet-steel housing. Its front panel is completely flat, so that components to be subsequently fitted will not require special alignment to ensure smooth running of the film. Projection angle is through an arc of from fifteen degrees elevation to twenty-five degrees depression and is achieved by tilting the entire housing round an axle at its base.

### **Minimum number of gear wheels**

The motor drives the main shaft through a v-belt. On the main shaft is the cam, operating the maltese cross mechanism, and then the main helical

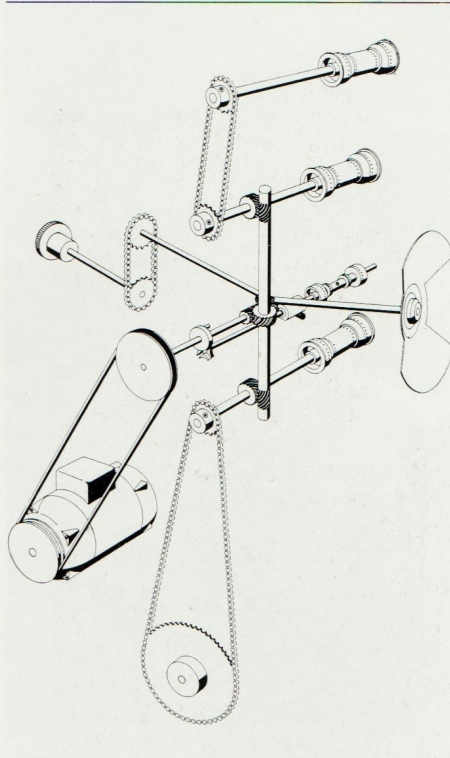


Fig. 2. The projector mechanism.

gear, which drives the distribution shaft.

The main shaft turns at 1,440 revolutions per minute through a helical gear to drive the distribution shaft and the horizontal shutter shaft. The vertical distributor shaft drives the top and bottom sprockets through helical gears.

On the bottom sprocket shaft, at the end opposite to the sprocket, a chain-drive for the lower reel spindle is taken off. This entire gear system uses only seven all-steel, precision-ground gear wheels and constitutes the complete projector mechanism (fig. 2).

### **Steel gear wheels only, running in an oil bath**

The entire drive mechanism is enclosed in a relatively small oil filled casing.

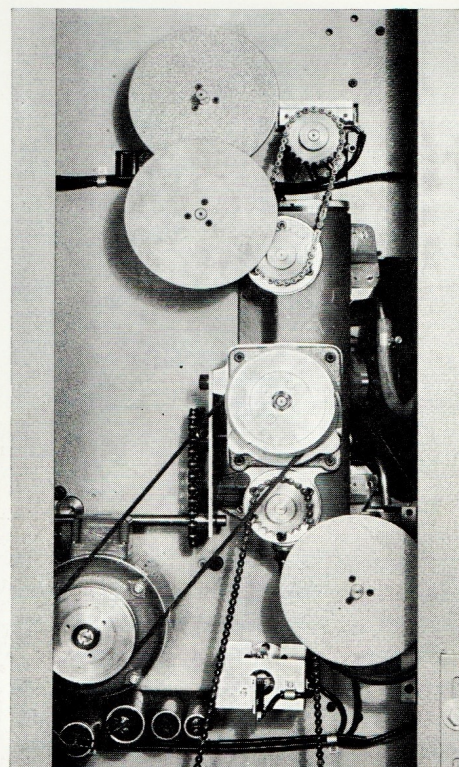


Fig. 3. Location of the relative positions of the motor and drive mechanism.

The helical cut of the gear wheels increases the distribution of the oil to all moving surfaces. All gear wheels are cut from high quality steel to ensure long life and minimum wear (fig. 3 and 4).

Round the drain plug in the bottom of the oil bath is a ring magnet to collect small particles of steel circulating in the oil and to prevent their continued recirculation. This is an additional advantage from using steel for the gear wheels because, where Novotex or bronze is used, this magnetic particle collection is not possible.

### **Film gate**

It is a commonplace that the difference in shrinkage between the emulsion and the carrier in every film



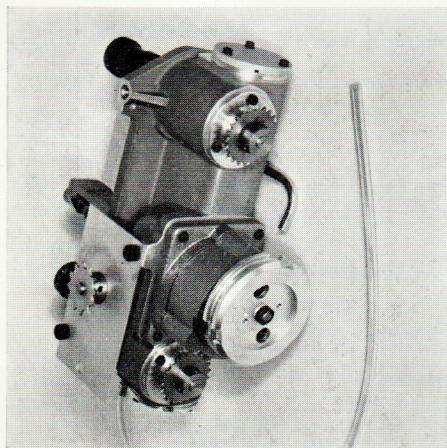


Fig. 4. The entire drive mechanism is enclosed in a relatively small oil filled casing.

tends to cause buckling. The emulsion side has a concave curvature at right angles to the direction of transport. Wherever the luminous flux and associated heat radiation is high, this emulsion tends to expand during illumination in the aperture and the emulsion surface becomes convex.

This well known phenomenon called heat flutter, affects each single frame and therefore the distance between lens and film is continually changed. Even though these changes are slight with each frame, the fluctuations are sufficient to cause constant shift in definition of the projected picture. To overcome this phenomenon was one of the main problems for the designers of the film gate for the DP 75 (fig. 5). It was solved by a new development, for which patents have been sought. The method is to fit a runner plate and pressure skates which push the film edges into one plane at the aperture. Directly above and below the aperture, the gate is curved at a rather sharp angle to the lens. Because film tends to maintain as uniform a curvature as possible while running, the film curves in the centre of the image towards the light. Thus the buckling is avoided

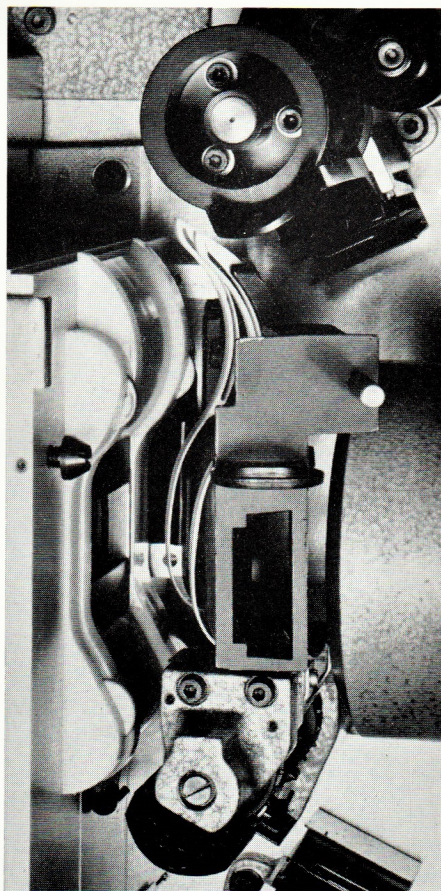


Fig. 5. Film gate.

when the film comes under heat; and the residual curvature is so slight that the picture remains within the depth of focus of the lens.

This new gate construction prevents heat flutter without the necessity for cumbersome air pressure devices or liquid gates usually found when very powerful light sources are used for 70-mm film projection.

#### Perfect lateral film guidance

All guide rollers and sprockets, except the intermittent sprocket, have flanges for both 35 and 70-mm film, so that even badly damaged prints are guided safely through the projector.

Lateral guidance in the film gate is obtained by two pairs of opposed ceramic discs, one pair above and the other below the aperture. These prevent the film weaving in the gate.

#### Delrin running surfaces

Delrin, a new synthetic, was used for the running surfaces of the film gate and pressure skates because emulsion residues do not adhere to it, and new and old prints can therefore be shown without special precautions. Delrin also prevents the need to alter skate pressure during a programme. Velvet pads for new prints are no longer necessary. Worn out Delrin parts are easily replaced. Although complicated in form, these are made by an injection process and are inexpensive. The same material has been used for the pad shoes.

#### Fast change-over from 70 to 35-mm film projection

Change-over from 70 to 35-mm should be fast and simple in any universal projector. On the Universal DP 75, all sprockets are suitable for both types of film. The intermittent sprocket has two rims; one, with 16 teeth, for 35-mm film; and two, each with 20 teeth, for 70-mm film.

All other sprockets have two rims with 24 teeth, and two with 30 teeth for 35 and 70-mm film respectively (fig. 6). All guide rollers and sound drums have a double profile so that they are suitable for either type of film (fig. 7). The only parts to be changed are the pad shoes, the film gate unit, the projection lens, and the spool shafts (fig. 8 and 9).

Pad shoes, instead of pad rollers, to prevent the film disengaging from the





Fig. 6. The sprockets with two rims for 35-mm film and two rims for 70-mm film.



Fig. 7. Guide roller with double profile.

sprocket teeth, have been fitted. These shoes are easily removed and are kept in place by a spring clip (fig. 10).

The pad shoes for different widths of film are distinguishable by their different colours. Those for the top and bottom sprockets and for the magnetic sound head sprocket are identical. They differ from the pad shoe of the intermittent sprocket by the difference in the cut-out notches at the end. The pad shoes are also marked 35-4, 70-4, 35-6, and 70-6. This indicates the film width, and the sprocket circumference in frames; so that in the

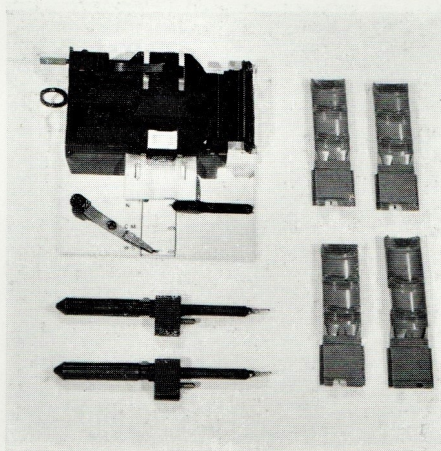


Fig. 8. Conversion parts for 35-mm film.

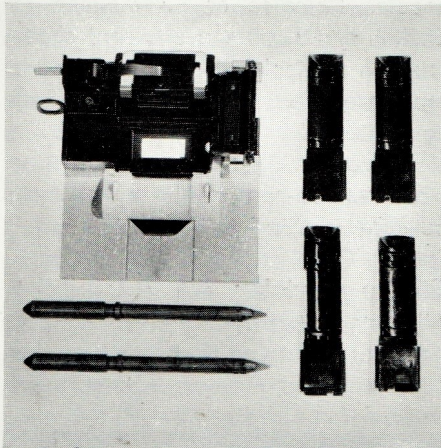


Fig. 9. Conversion parts for 70-mm film.

first group of figures 35 means 35-mm film and 4 means 4 frames per sprocket circumference.

The complete film gate consists of a carrier plate with running surfaces and ceramic edge-guide rollers, the aperture plate and a film door with pressure skates. This unit (fig. 11) is easily removed in its entirety **and this is important**, because different units are needed for 35 and 70-mm film, as is well understood.

The film gate for 70-mm has a single, easily replaced aperture plate, and the

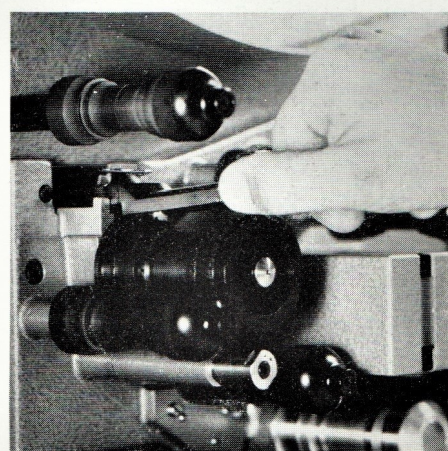


Fig. 10. The pad shoes are easily removed and are kept in place by a spring.

35-mm gate a vertically adjustable plate with three apertures for Normal, Wide-Screen and Cinema-Scope (fig. 12).

The different apertures are locked in place after selection. Normally hand operated, this new plate makes automatic format selection exceedingly simple and fool-proof. Extra film gate lenses, for correcting image illumination and adapting to deeply curved screens, can be added at the light source side, and on the lens side of the film gate.

Four-inch diameter lenses needed for 70-mm projection are mounted directly into the lens holder. Lenses are provided with a check ring, and the centre position of the lens holder is marked with a centre reference mark (fig. 13). This ensures that focus is not inadvertently changed as the lenses are changed.

Smaller diameter lenses are mounted in an adaptor tube which also has a check ring to ensure immediate focus. When a backing lens with an anamorphic lens is used, the check ring has a pin to ensure the correct horizontal position of the anamorphic lens.



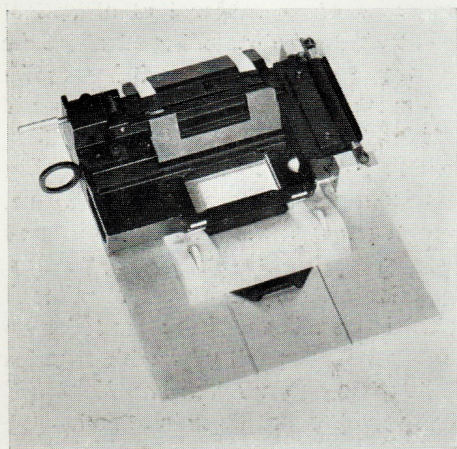


Fig. 11. Film gate for 70-mm film.

Horizontal alignment of the optical axis of the lens with the different image centre line for 35 and 70-mm is achieved by canting the lens holder to produce a central shift of the optical axis by 1.24 mm.

The depth of the spool boxes has been designed for 70-mm film. The spindles can be removed without tools (fig. 14 and 15). A half-inch diameter spindle stump is available for 70-mm spools or one of 9 mm for the standard 35-mm

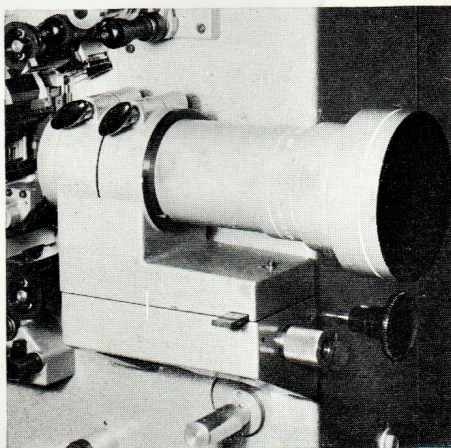


Fig. 13. The centre position of the lens holder is marked with a centre reference mark.

spools. Spindles of 5/16ths-inch for English and American standard spools are also available. Therefore no special reels are needed for 35-mm film, and no additional re-winding involved. No tools are needed to change over from 70 to 35-mm or vice versa. It can be done in thirty seconds.

#### Simple servicing

All parts of the drive mechanism have been manufactured to the highest possible precision. They can be replaced,

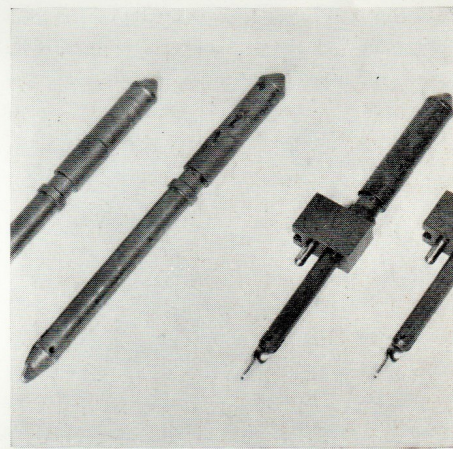


Fig. 15. Spindles for 35 and 70-mm film spools.

therefore, without any refinishing, polishing or adjustment. A screw-driver and standard spanner are the only tools required to remove any part of the drive mechanism, and this greatly simplifies service. A technician or projectionist can easily service this projector, and the interior of the projector column is clearly illuminated, which is very useful when checking or servicing.

#### Suitable for all light sources

Any lamp house can be set up on the arc-lamp bracket. Its height can be varied to allow the correct optical axis to be found and adjusted without auxiliary fittings. A scale on the projector column indicates the exact height for mounting the bracket (fig. 16). The bracket is bored with two rows of elongated holes staggered in such a way that the transverse rails can fitted where required. The track distance between these rails is also adjustable.

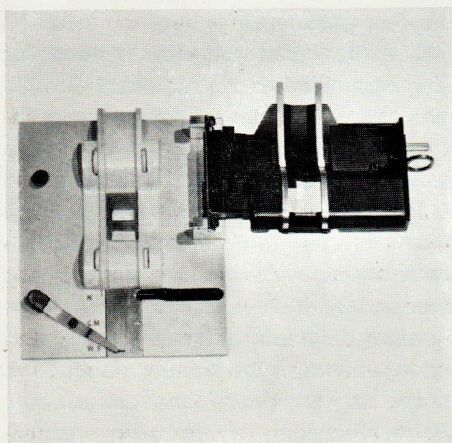


Fig. 12. Film gate for 35-mm film, with the adjustable plate with apertures for Normal, Wide-Screen and Cinema-Scope.

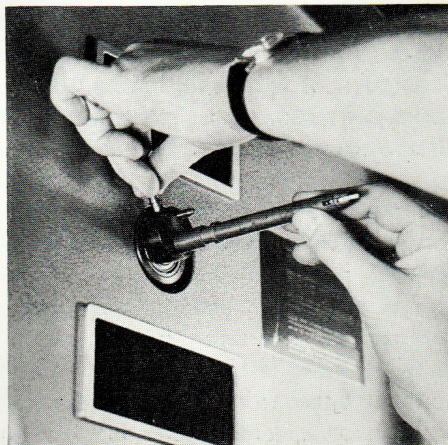


Fig. 14. Spindles can be removed without tools.

The film gate is water cooled. Even with very high-powered arc and Xenon lamps therefore, the gate remains cool.



The flywheel of the intermittent mechanism is slotted for synchronisation with the flashes from pulsed gas-discharge lamps (fig. 17).

### Perfect picture projection

The film gate design and the accuracy of the intermittent mechanism and sprocket ensure a rocksteady picture. The large diameter conical shutter (fig. 18), which intercepts the light immediately behind the aperture plate, has fifty-three per cent efficiency. The projector has been so designed that

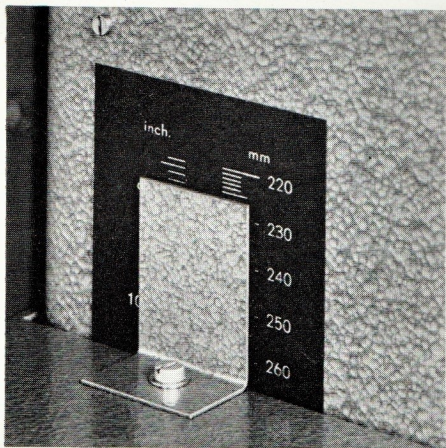


Fig. 16. A scale on the projector column indicates the exact height for mounting the bracket.

at no point the structure itself can interfere with the  $f/1.6$  light beam.

The sturdy lens holder can take lenses with a diameter up to four inches. Therefore the Universal DP 75 projector can cope completely comfortably with all modern light sources and projector lenses, which results in a brilliant picture under even the most difficult circumstances.

### Excellent sound reproduction

5 The optical sound head is the well-

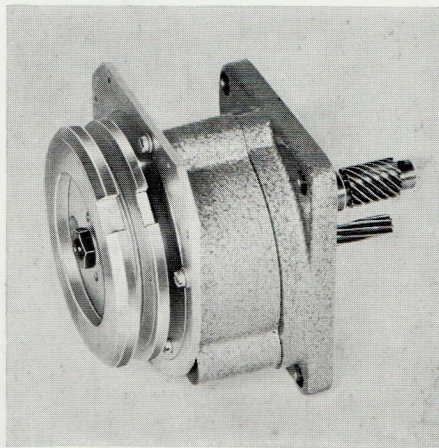


Fig. 17. The flywheel of the intermittent mechanism is slotted for synchronisation with the flashes from pulsed gas-discharge lamps.

tried Philips design with rotating sound drum, pressure roller and slit optical system (fig. 19). A solar cell now replaces the photo-electric cell, because it needs no supply voltage, has a high sensitivity, long life and excellent frequency response with a low noise level. Being small, it can be mounted inside the sound drum. All these advantages decided the designers to abandon the photo-electric cell.

The magnetic sound head is a complete unit (fig. 20) screwed to the housing. It uses the same principles as those applied in the DP 70 — a driven sprocket working between the take-off spool and the first rotating sound drum. With two independent flywheels, a sprung tension roller and carefully designed film path, this type of drive provides wow and flutter free sound reproduction. A combined cluster is used for 35-mm, four-track, and 70-mm, six-track reproduction (fig. 21).

### Utmost film protection

All sprockets, guide rollers and rotating sound drums touch the film, whether 35 or 70-mm, only outside the image and optical sound track. The rollers

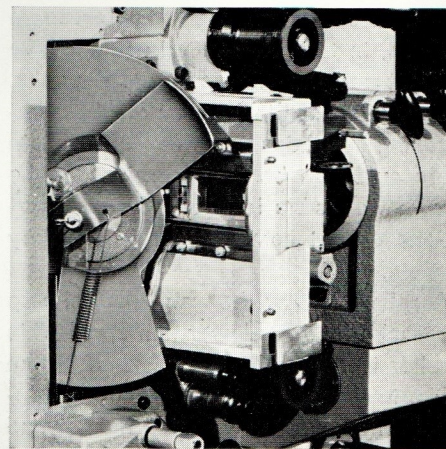


Fig. 18. The conical shutter, with the curved dowser.

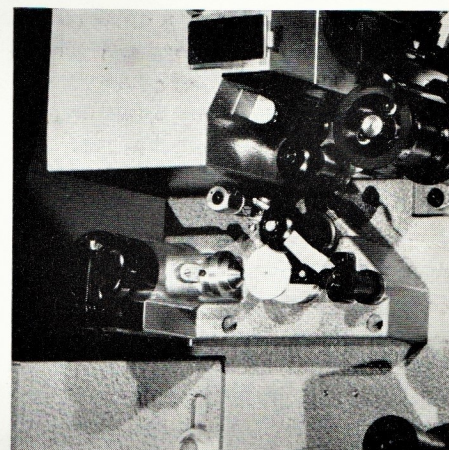


Fig. 19. The optical sound head.

are so deeply profiled that scratches on the image or sound track can never occur.

The film path has been so designed that all changes of film direction follow the minimum possible curvature and each curve has a very gradual transition into the next. This is extremely important for smooth, safe passage of splices in the film.

Because of the Delrin running surfaces, emulsion deposits are prevented. With the older system, emulsion deposit built up on steel surfaces, caused pro-



jectionists to increase skate pressure which, in turn, intensified the abrasive effect and the pile up of the deposits. The use of Delrin, with its emulsion repelling qualities, means that skate pressure can be kept constant at the lowest possible level and film perforations do not come under unnecessary strain.

A roller is fitted between the take-up sprocket and the lower film spool. This roller is driven by the passage of the film itself, and acts through a centrifugal switch to shut off the projector and close the dowsers whenever the film speed falls too low.

The roller was fitted at this point because, in this position, it ensures that the projector is stopped, not simply when the speed falls below an acceptable minimum or when the film breaks, but even when the film has not only properly threaded to the take-up spool. This is very important with semi-automatic equipment.

When the projector is stopped, the film gate is protected from the light source by a curved dowsers. This dowsers should be opened and closed as quickly as possible to get a clean change-over. A tension spring assists its rapid closure, and the shutter is braked at the last moment by a powerful friction lever to prevent bounce.

### Simple operation

Because the projectionist normally watches the screen in the auditorium through the window in the front wall of the projection room, all operating controls should be situated close to this window. A panel carrying the start, stop and change-over buttons has been designed for fitting to the front wall of projection rooms near the house-lights panel and curtain controls (fig. 22). Each projector has its own panel.

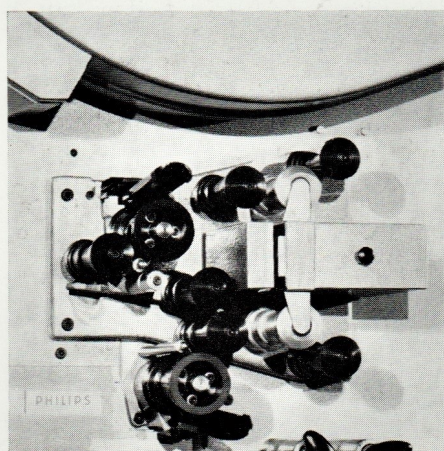


Fig. 20. The magnetic sound head.

Focussing, framing, skate pressure, and horizontal lens displacement controls, and the inching knob, have all been arranged on the projector itself for easiest operation.

The four-inch lens holder rests on a bolted down bed on which it can glide back and forth for fine focus. This focussing mechanism, which can be fitted with a remote control, is counter-sprung to cut out backlash.

Changing lenses is very simple. For automated or remote controlled equipment, "ISCO Optische Werke" in Göttingen developed, in co-operation with the designers of the DP 75, an anamorphic vario lens (fig. 23). This high-speed lens replaces the three lenses and the anamorphic lens which, with associated lens turret, are required for Standard, Wide-Screen, and Cinema-Scope projection.

Even 70-mm film in the projector can be inched easily, when necessary for checking film threading and locating start marks. For this purpose the picture gate is independently lit when the dowsers is closed.

Because the pad shoes are spring loaded they remain in their working

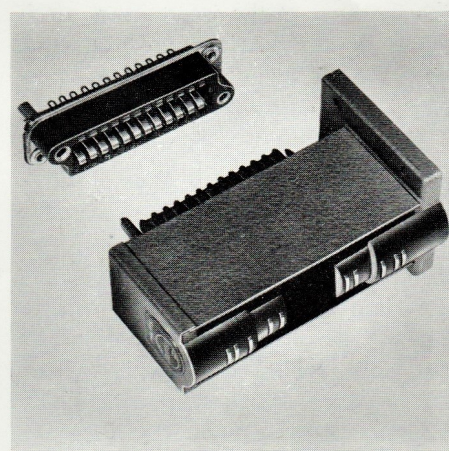


Fig. 21. Combined cluster for 35-mm, four track and 70-mm, six track reproduction.

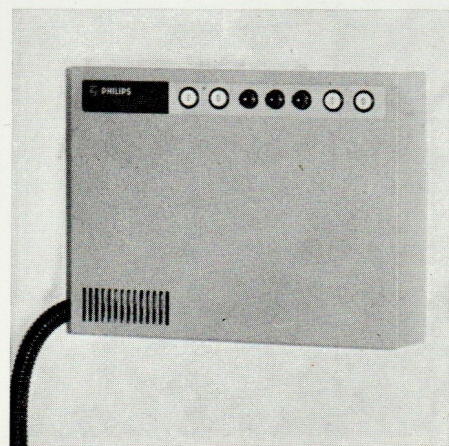


Fig. 22. The panel with start, stop and change-over buttons.

position. This means that when threading film they must be held open. In order to relieve the projectionist of the necessity to hold these pad shoes in the open position, a special designed ledge has been constructed so that, when the pad shoes have been opened, they can be pushed sideways by a slight pressure which will hold them in the open position and enable the projectionist to use both hands for threading. They are released after the film is threaded by a simple touch, which cants them back into position.



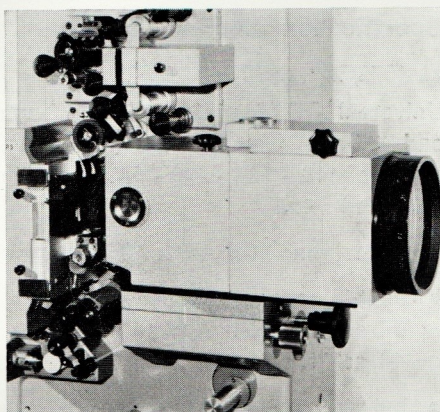
When the projector is used with Philips cinema amplifier racks, (EL 5372 - EL 5373) the automatic sound selector system on the projector will select the correct sound system depending on the type of film threaded into the machine. This is done in the following way. Where an optical sound film is threaded, it does not run through the magnetic sound head. As a result, the sound head's tension roller lies close against its stop, where it presses a micro-switch to release the optical sound for this type of film. When, however, a magnetic sound film is threaded, this tension lever is released from the switch and magnetic sound becomes available.

Where there is a choice of four or six channel sound reproduction, the selection of the system depends on film width. The pad shoes for the different widths of film are used to actuate or release a micro-switch. This switch provides the correct connections in the amplifier for either four or six channel sound reproduction. The projectionist need never concern himself, during the course of a programme, with selecting the appropriate sound system because, as soon as the image is released, the correct sound channel has automatically been selected.

There is a lamp behind the top spool to enable the projectionist to see at a glance how much film remains in the top spool box, still to run.

### **Little maintenance**

The well-spaced lay-out of components, the hard smooth lacquer, the simple detachable pad shoes and film gate make cleaning extremely easy. Oil change once every five hundred hours is adequate.



*Fig. 23. The anamorphic vario lens.*



## Technical data

Filmspeed	: 24 frames/sec.
Capacity of the spools	: 4000' (1200 m)
Solar cell	: type 3922 030 00010
Exciter lamp	: type 7251C, 5 V 4A
Power consumption	: 300 V A
Water consumption	: abt ¼ gallon/min (1 liter/min.)
Nett weight	: approximately 550 lbs (250 kg)
Gross weight	: 940 lbs (425 kg)
Mains voltage	: 110-125-220-245V
Mains frequency	: 50 Hz or 60 Hz

Motor:	Asynchronous		Synchronous	
	50 Hz	60 Hz	50 Hz	60 Hz
Frecuency	50 Hz	60 Hz	50 Hz	60 Hz
Voltage	95 V	115 V	95 V	115 V
R.P.M.	1400	1680	3000	3600
Power	120 W	120 W	120 W	120 W

## Specification of typenumbers

EL 4075/52, 8990 240 75052:

**Universal DP 75 projector for 70-mm and 35-mm films**, suitable for a.c. mains of 110 - 125 - 220 - 245 V, 50 Hz equipped with:

- asynchronous motor for 24 frames/s
- built-in magnetic soundhead 6-track for 70-mm films 4-track for 35-mm films
- built-in optical soundhead with Solar cell and Type 7251C exciter lamp
- picture change-over relay
- film-rupture switch
- lens holder (dia. 4" = 101.6 mm)
- two aperture plates for 70-mm film
- two adjustable aperture plates for 35-mm normal, CinemaScope and wide-screen films
- spool boxes for 70-mm spools (EL 4070) and for 35-mm film (max. 1200 m = 4000 ft) with interchangeable shafts with a dia. of ½" (12.7 mm) for 70 and 35-mm films, and of 9 mm only for 35-mm films
- projector stand
- mounting table
- control box
- set of conversion parts 70 mm/35 mm
- set of tools and lubricants

EL 4075/62 As EL 4075/52 but 8990 240 75062 suitable for 60-Hz mains.

EL 4076/02 As EL 4075/52 but 8990 240 76002 equipped with synchronous motor for 50 Hz and 24 frames/s.

EL 4076/27 As EL 4075/52 but 8990 240 76027 equipped with synchronous motor for 50 Hz and 25 frames/s.

EL 4076/62 As EL 4075/52 but 8990 240 76062 equipped with synchronous motor for 60 Hz and 24 frames/s.

## Accessories

EL 4240/00 lens adapter tube, 4"/2<sup>25</sup>/<sub>32</sub>" (101,4/70,6 mm)

3922 326 00550 lens check ring.

EL 4245/00 box with arc lamp switch and volt/am-meter for max. 100 A.

EL 4241/00 lens holder for ISCO anamorphic vario lens for all 35 mm film systems.

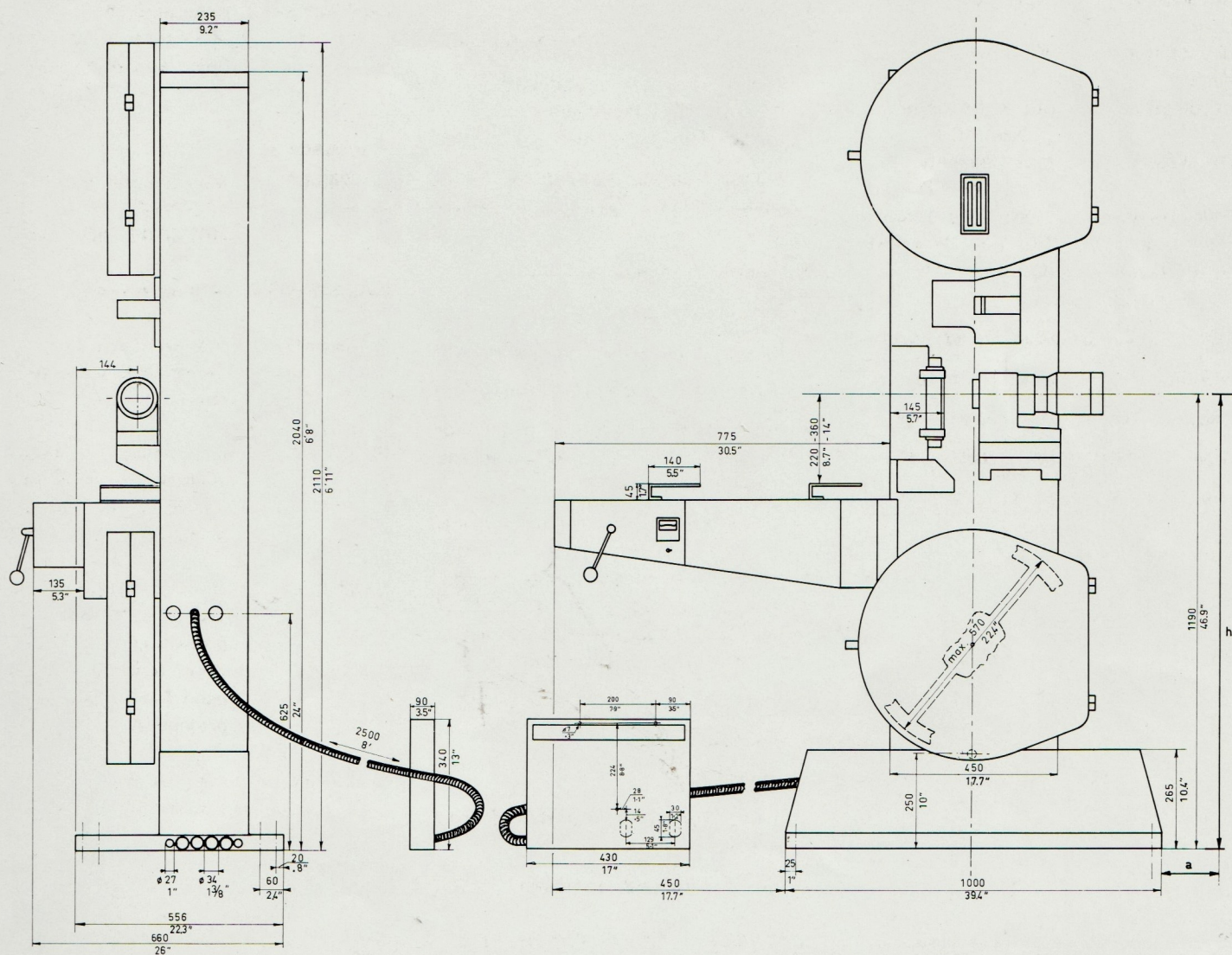
EL 4242/00 4" lens holder to be used for 70 mm projection when type EL 4241 is used for 35 mm projection.

EL 4244/00 Tool for fine adjustment of the projection angle.

All data subject to change without notice.



**Dimensional drawing (mm/inches)**





PHILIPS

