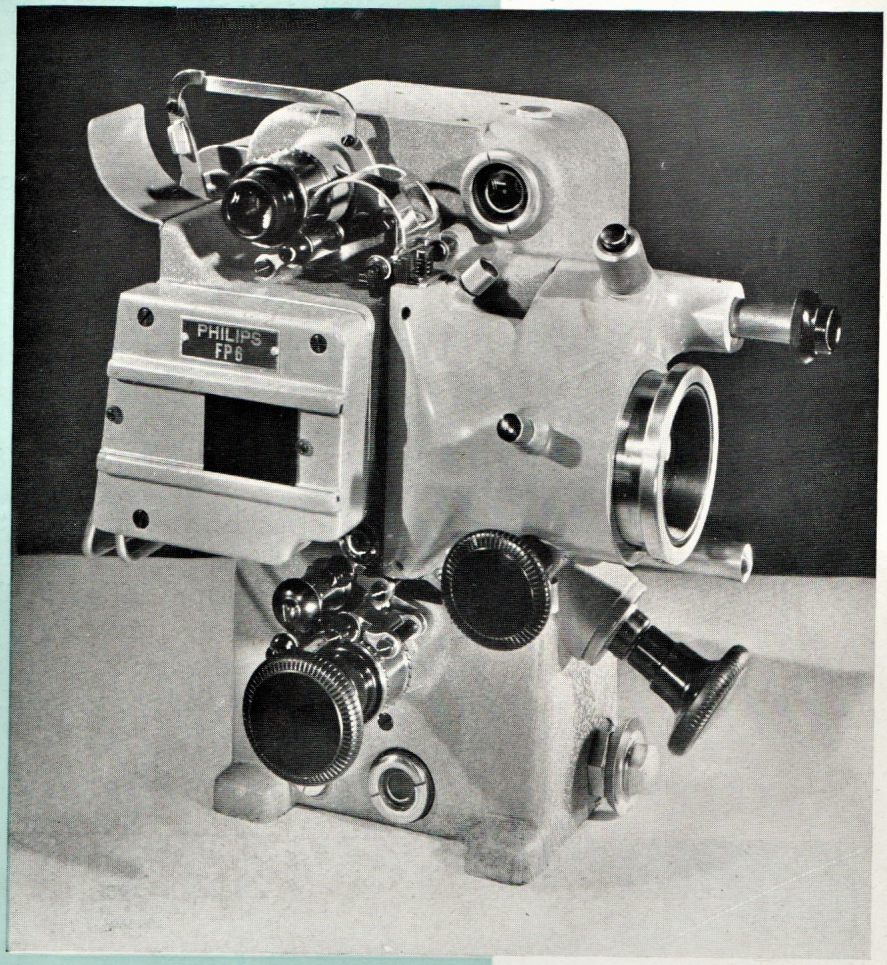
PHILIPS Cinema

A-II-5-E

PROJECTORS
FP 5
and
FP 6



The basic construction of these two projectors, FP 5 and FP 6, is exactly the same. Together with the FP 7 they form a range of projectors suitable for any class of cinemas.

Both are equally reliable and sturdy. They have quite a number of features in common, as for instance:

- high light output,
- accurate intermittent movement,
- powerful magnetic oil-filters,
- rotary drum-shutter with centrifugal flaps and ventilating blades.

Besides these, the FP 6 has some additional features:

- water-cooled film mask,
- manual film-loop correctors,
- 82.5-mm lens-holder with calibrated scale (the FP 5 has a 62.5-mm lens-holder without scale),
- pointer indication of the framing-device position.

The following description applies for both the FP 5 and the FP 6.

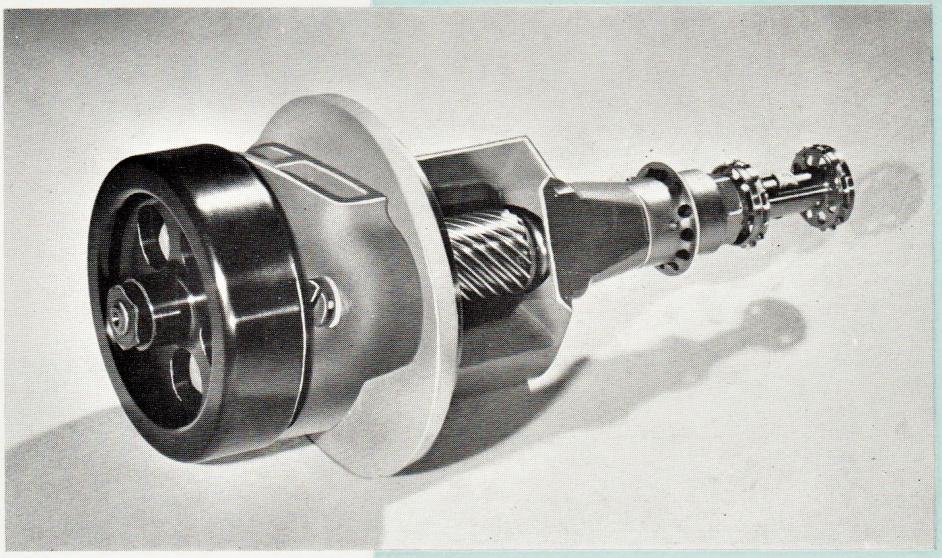
PHILIPS

MAXIMUM RELIABILITY

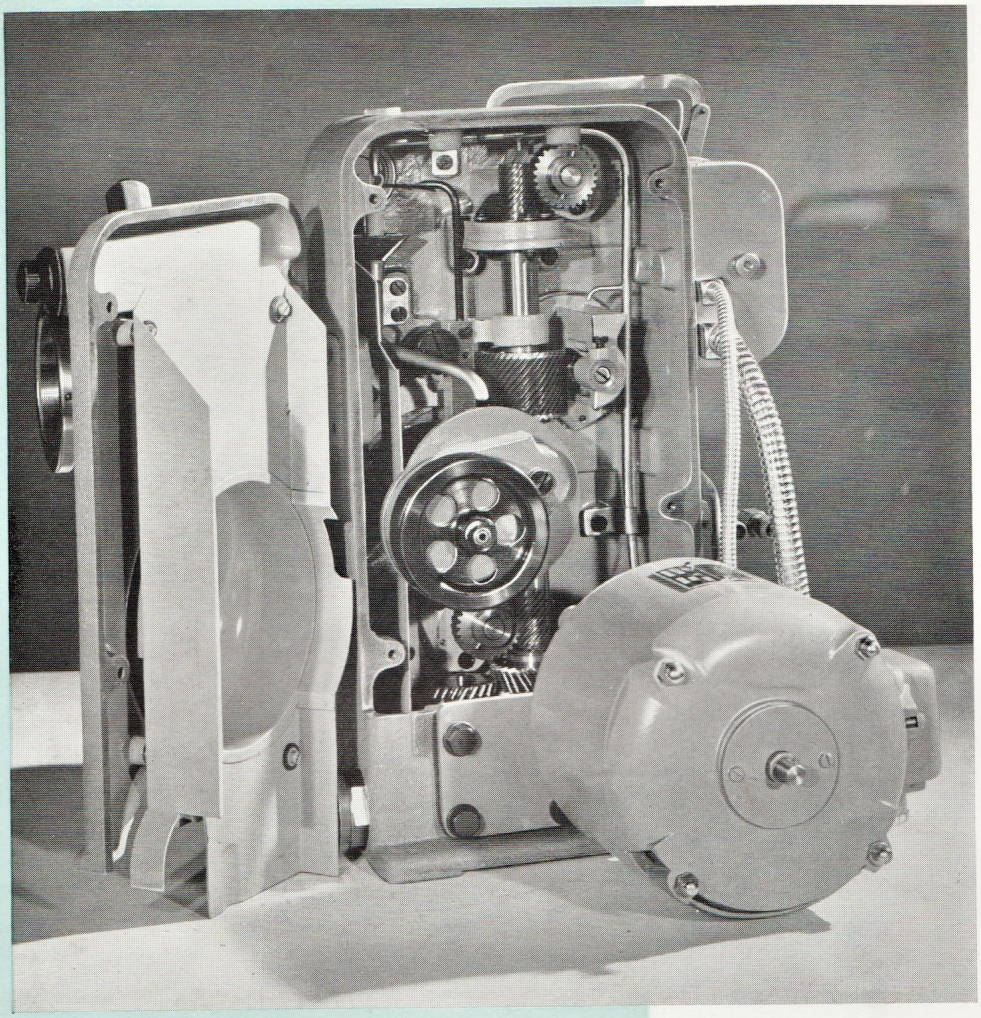
The reliability of a projector depends largely on the driving system, the intermittent movement and the lubrication. Therefore, when designing the projectors full attention was paid to these three points.

The d r i v i n g s y s t e m is constructed in a very sturdy and simple manner. The flange motor drives the vertical main shaft by means of gear wheels. This main shaft with a diameter of 21 mm is very massive and its number of revolutions amounts to only 360 per minute, thus avoiding troublesome vibrations.
The vertical main shaft in turn drives:
the intermittent mechanism,
the top and bottom sprockets,
the shutter,
the high-pressure spur-gear oil pump,
the lower film spool.
Between motor and main shaft is a safety clutch which in case of breakdown prevents the gear-wheels from being damaged.

The i n t e r m i t t e n t m e c h a n i s m satisfies the highest demands, owing to the use of high-grade materials and an excellent lubricating system. For instance, the locking cam and its shaft are made of the best high-grade quality steel and are finished to the utmost precision. The cam, the striking pin and the Maltese cross are made of steel of the very best quality and ground with a tolerance of only 1 micron.
Holes have been drilled in the flanges of the intermittent sprocket, thus reducing its weight to only 16 grams. In this way the moment of inertia of this sprocket is reduced as much as possible and the wear of the Maltese cross is minimized.



Intermittent mechanism of Projectors FP 5 and FP 6.



Driving mechanism and lubricating system of Projector FP 6.

There is continuous l u b r i c a t i o n of the whole driving system 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 oil filters, one combined with the normal gauze filter of the pump, the other being suspended in the oil flow to the intermittent mechanism. The magnetic oil filters hold back all steel and iron particles from the oil and thus reduce wear of the driving system and acidification of the oil.

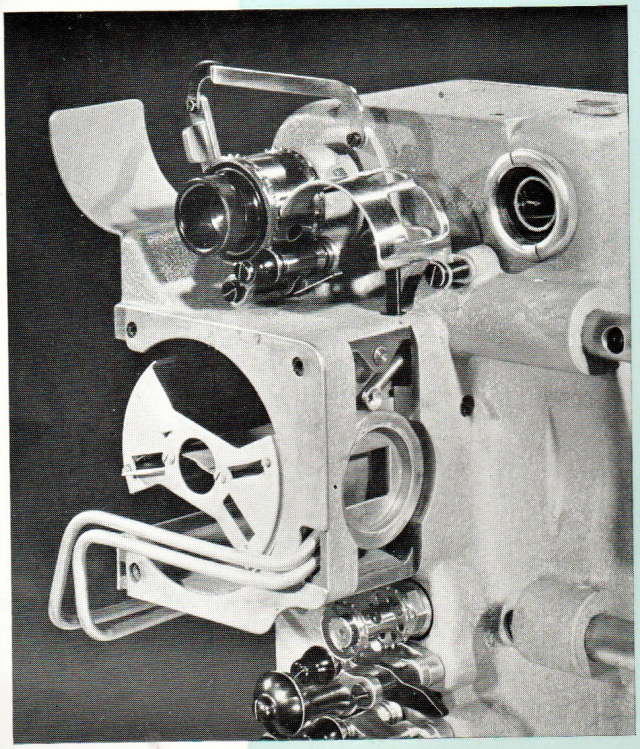
The whole intermittent mechanism is contained in a closed casing serving at the same time as oil bath. The oil circuit is such that the intermittent mechanism is continuously supplied with pure oil which has been filtered three times.

Merely by loosening four screws the rear cover of the projector can be removed, together with the oil screen. As packing material between rear plate and projector casing is superfluous, the former can very easily be reset in its original position.

Oil retainers prevent the oil from leaking along the shafts.

EFFICIENT COOLING

To protect the film against drying through radiation of heat by the arc lamp, effective cooling measures have been taken: automatic cooling by means of the shutter, possibility of using an air blower and, with type FP 6 only, additional cooling by water. The shutter and air blower mainly cool the picture and sound-track of the film, whilst the water cooling ensures that the guiding edges of the film, which often get extremely hot, remain absolutely cold.

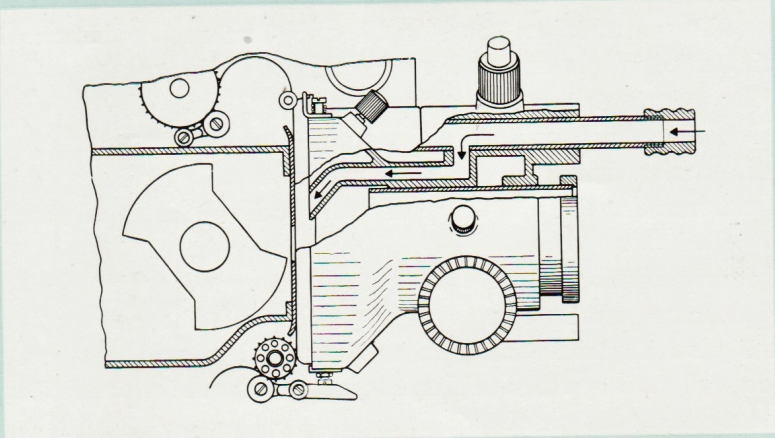


Water-cooled protective mask of Projector FP 6.

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

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

For water cooling a hollow protective mask has been provided, through which cooling water flows; thus the projector mechanism, and especially the runner plate and hence the guiding edges of the film, remain cold; moreover, the oil retains its full lubricating power.



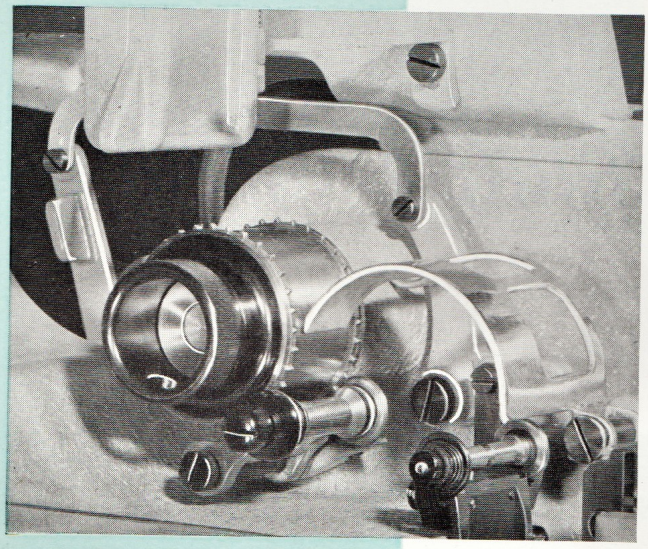
Duct for air-cooling of Projectors FP 5 and FP 6.

FIRE-PROOF DESIGN

The above-mentioned air and water cooling are of primary importance with a view to reducing the risk of fire. In addition, an automatic film-rupture device can be supplied on demand which immediately comes into operation in the event of the film stopping in the gate; the light-beam is then interrupted and both motor and exciter lamp are switched off automatically.

Moreover, top and bottom spool boxes are provided with solid fire-traps which, even if no film-rupture device is used, prevent any fire from the film in the gate spreading into the spool boxes.

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



Film-rupture device.

EXCELLENT FILM PROTECTION

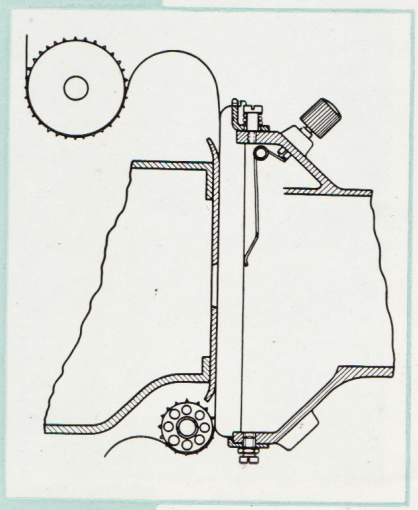
In order to ensure maximum film protection three important measures have been taken:

- 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.

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.

The length of the runner plate and that of the pressure skates have been chosen in such a way that a joint is exactly at the end or beginning of the runner plate at the moment 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 film rupture; moreover, splices pass absolutely noiselessly.

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



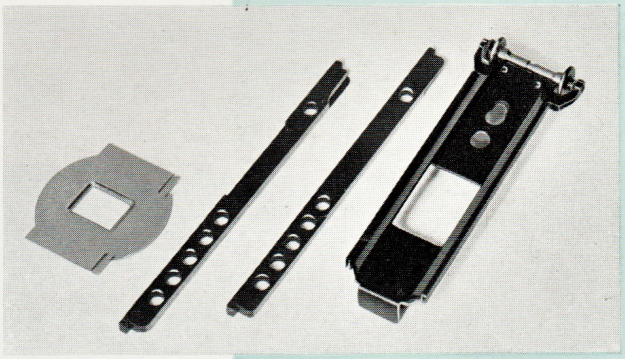
Central adjustment of skate-pressure.

STABLE PICTURE

Stability in a vertical direction is due mainly to the fact that the Maltese cross shaft is supported almost entirely by a long bearing. This results in a very good centering of the shaft to which the intermittent sprocket is fixed, thus avoiding the least deviation of this sprocket.

The bases of the teeth of the intermittent sprocket are provided with grooves causing the film to lie absolutely flat against the flanges between the teeth.

The runners and the guiding flanges of the runner plate are perpendicular to each other without rounding, so that the film lies absolutely flat on the runners and is kept in a straight line by the flanges of the plate.

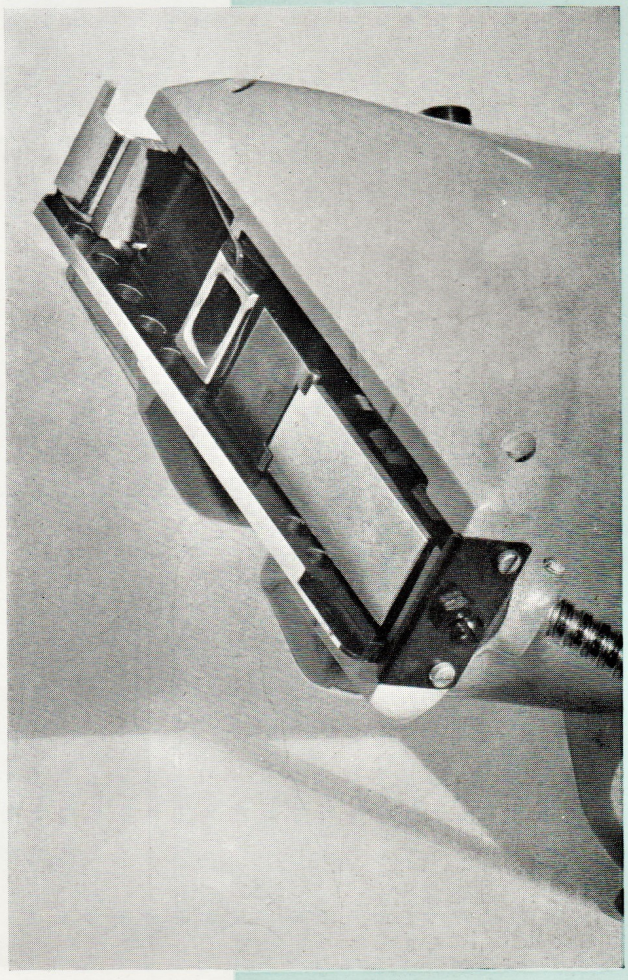


Mask, pressure skates and runner plate of FP 5 and FP 6 projectors.

Stabilizing the picture in a horizontal direction is obtained by a lateral-pressure roller over the runner plate.

CHANGE-OVER OF PICTURE AND SOUND

To achieve absolutely uninterrupted change-over from one projector to the other it is essential that picture and sound are switched over simultaneously. To this end the lens-holder of the projector can be equipped with an electro-magnetically controlled flap, which can very easily be coupled electrically to the sound change-over switch.



This flap is situated close behind the film, i.e. at the point where the light beam is at its narrowest. Consequently the picture is covered and exposed very quickly, so as to give the impression that the film goes on without interruption.

In this way change-over of picture and sound can be effected simultaneously in one movement.

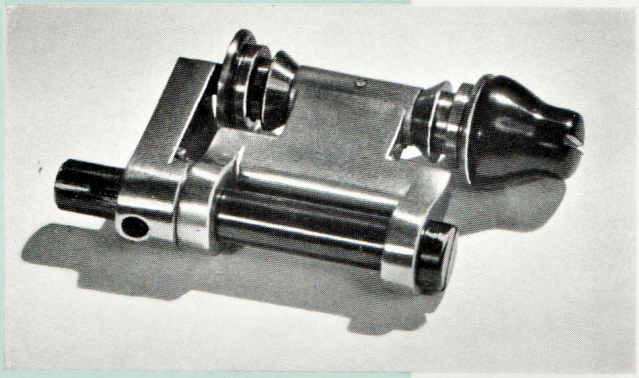
A full description of the picture change-over device type 8679 is given in sheet A-II-11-E.

Picture change-over device mounted in a lens-holder.

SIMPLE OPERATION

Threading the film is very simple. The knobs of 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.

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 it should be forgotten to close this roller, this will be done automatically when closing the lens-holder.



Complete pad roller.

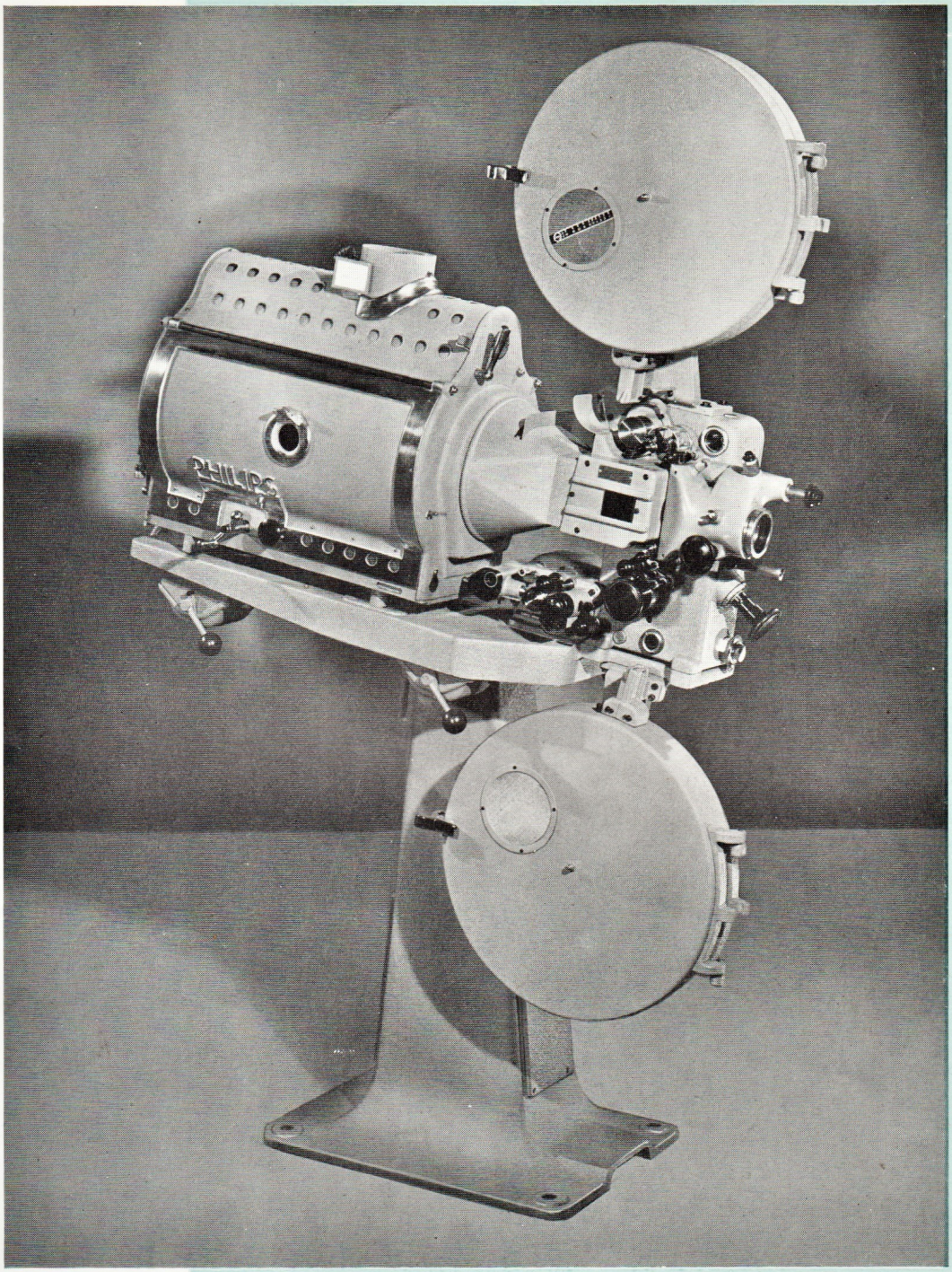
The very robust lens-holder and skate-holders form one unit. Owing to the closed construction stray light reflections from the projection lens are avoided without making use of a separate movable screen. By pressing the button the whole unit slides on two rods, considerably simplifying the threading of the film.

The lens is focused without any backlash by means of a large button. For cleaning the lens, this can be taken out of the holder together with its tube. On the FP 6 projector this tube is provided with an engraved scale, so that when fitting it in again after cleaning the tube with the lens can be adjusted to its correct focal position without having to check the focus on the screen.

In the FP 6 projector the lengths of the film loops can be adjusted either before or during the performance by means of the two manual film-loop correctors with which top and bottom sprockets are provided. These loop correctors are not fitted to the FP 5 projector.

The picture-framing knob is at the front of the projector and can be operated from both sides. The knob is marked with a red dot indicating the middle position of the framing device.
In addition, in the FP 6 projector a pointer fitted behind the upper oil observation glass indicates the position of the framing device.
Framing is done by turning the whole of the intermittent mechanism round the axis of the intermittent sprocket.

The FP 5 and FP 6 projectors are supplied with a steel runner plate. For running new film prints a strip of velvet can be supplied which is applied in a very simple manner, thus making it unnecessary to wax the film.



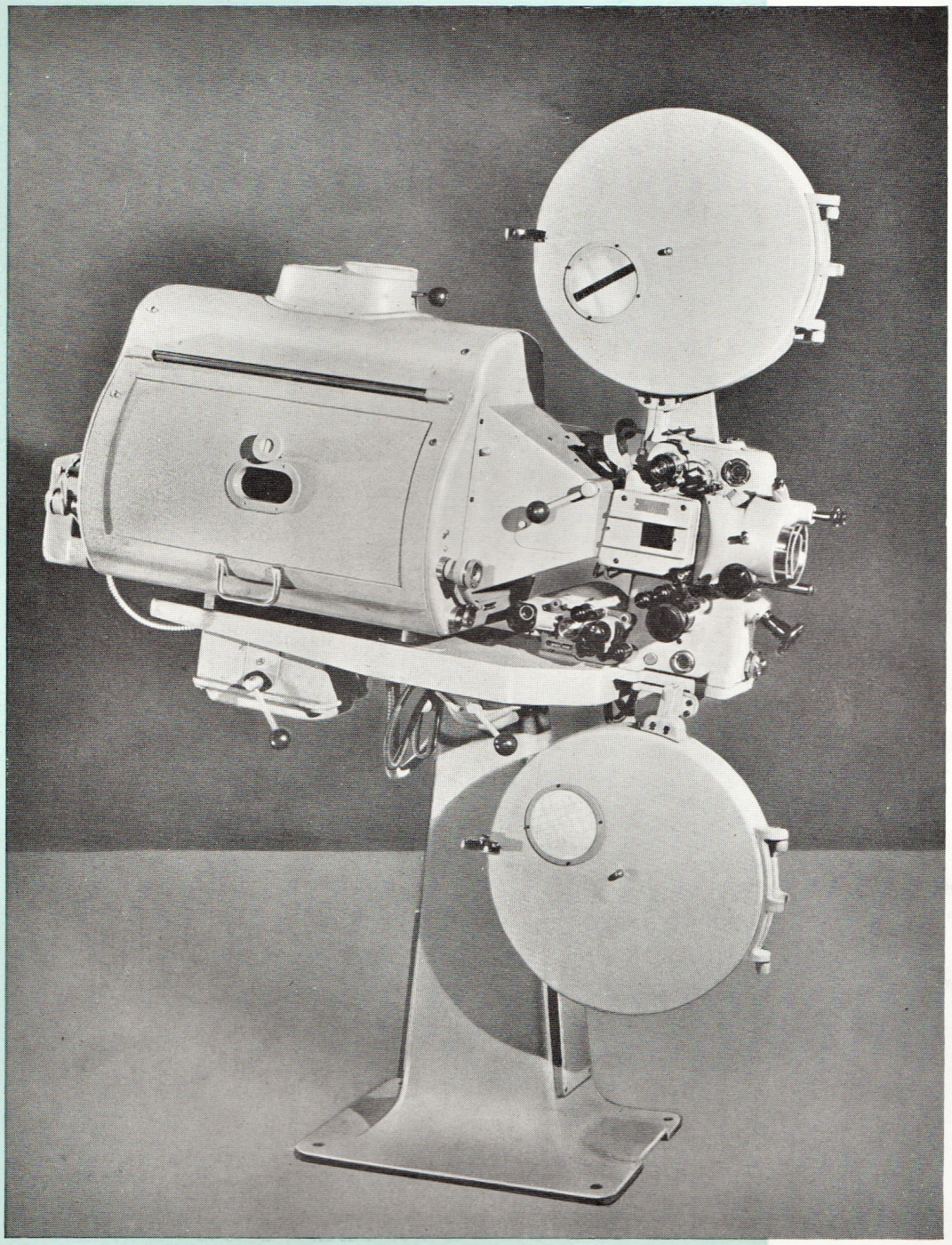
FP 5 projector with type 3837 soundhead and type 3620 H.I. arc lamp.

HIGHEST LIGHT EFFICIENCY

Maximum light efficiency is obtained owing to the drum shutter and by the possibility of using a lens with high F-value; moreover, when lenses with a very small focal length are used, a condenser lens can be placed behind the gate.

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.

The FP 6 projector is normally equipped with a lens-holder suitable for lenses with a maximum diameter of 82.5 mm, the FP 5 with a holder for lenses of maximum 62.5 mm diameter.

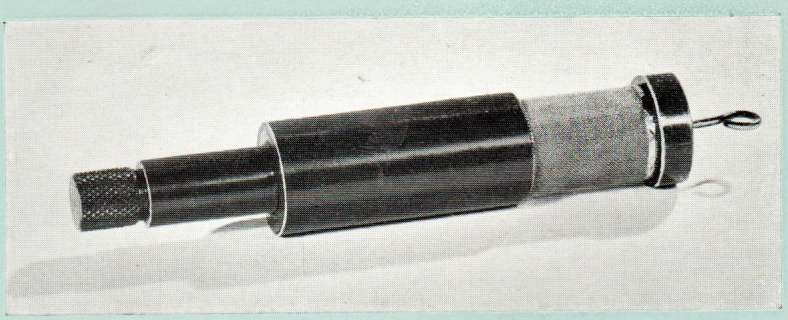


FP 6 projector with type 3837 soundhead and type 8580 H.I. arc lamp.

If a lens with a different diameter should be required, a corresponding lens-holder or an adapter tube can be supplied to order (see tables II and III).
When using lenses with focal lengths of 2⅝" or less the 62.5 mm lens-holder of the FP 5 has to be replaced by one of 82.5 mm. Of course in this case an adapter tube type 8696 must be supplied for lenses with a diameter of 42.5 mm (see table III).
When using lenses with very small focal lengths the light efficiency may be increased by applying a condenser lens behind the picture gate (see table IV). In this case the normal mask has to be replaced by a special mask with attached lens-holder, type 8663.

SIMPLE MAINTENANCE

Oil level and oil circulation can be seen through the oil level gauge at the bottom and the observation glass at the top, both on the operating side of the projector.



Combined magnetic oil filter and gauze filter.

Special attention has been paid to easy cleaning and replacing of the various parts, such as the magnetic oil filters and the gauze filter, the projection lens, the pad rollers, the sprockets and the intermittent mechanism.

In this way maintenance has been simplified considerably.

UNIVERSAL APPLICATION

The projectors are suitable for any projection room, hall and mains.

The angle of inclination amounts to max. 30° downwards and 15° upwards. Even in these extreme positions the lubrication is ample.

A wedge can be inserted between top spool arm and projector; in this way the projector can always be installed close to the wall, even at large tilting angles.
Two types are available:
type 8644 with an angle of 10° and
type 8645 with an angle of 20°.

The projectors are suitable for practically all kinds of mains: A.C. or D.C. 220 or 110 V, 40, 50 or 60 c/s (see table V).
Normally the projector is driven by a flange motor, suitable for connection to 220 or 110 V, 50 c/s.
For different A.C. mains a pulley motor for 220 or 110 V, 40—100 c/s must be used.
For D.C. mains a special 110 or 220 V motor with pulley is used. The speed is checked by a tachometer, which is supplied in this case.

Rear projection is also possible with these projectors. For this purpose mostly lenses with short focal lengths are required, so that the auxiliary condenser lens already mentioned must be used.
Furthermore, in this case the film must be reversed in the gate, and so must the mask.
A lensholder of 82.5 mm diameter with an eccentric adapter tube 82.5/42.5 mm should be used (see tables II, III and IV).

PROJECTOR STANDS

The stands and inclinable mounting tables can be supplied in two types:

type 8630: normal stand with inclinable mounting table (height of the optical axis $46^{7}/_{8}$");

type 8620: de luxe stand with inclinable mounting table. This type has the following features in addition to those of the normal construction:

- the table can be turned in a horizontal plane;
- the height of the optical axis can be adjusted between $46^{7}/_{8}$" and 54".

In the stands a number of terminal plates are provided for electrical connections. They are easily accessible through large apertures both at the front and the rear of the stands. The apertures are closed by metal lids.

The following accessories can be supplied to order:

a. Starting device for the motor (type see table V).

b. A 6-V transformer with wiring for the picture-framing lamp and the pilot lamp of the top spool box, type 8626.

c. A switch with cable for the arc lamp:
type 8627 up to 50 A and
type 8629 up to 75 A.

SPOOL BOXES

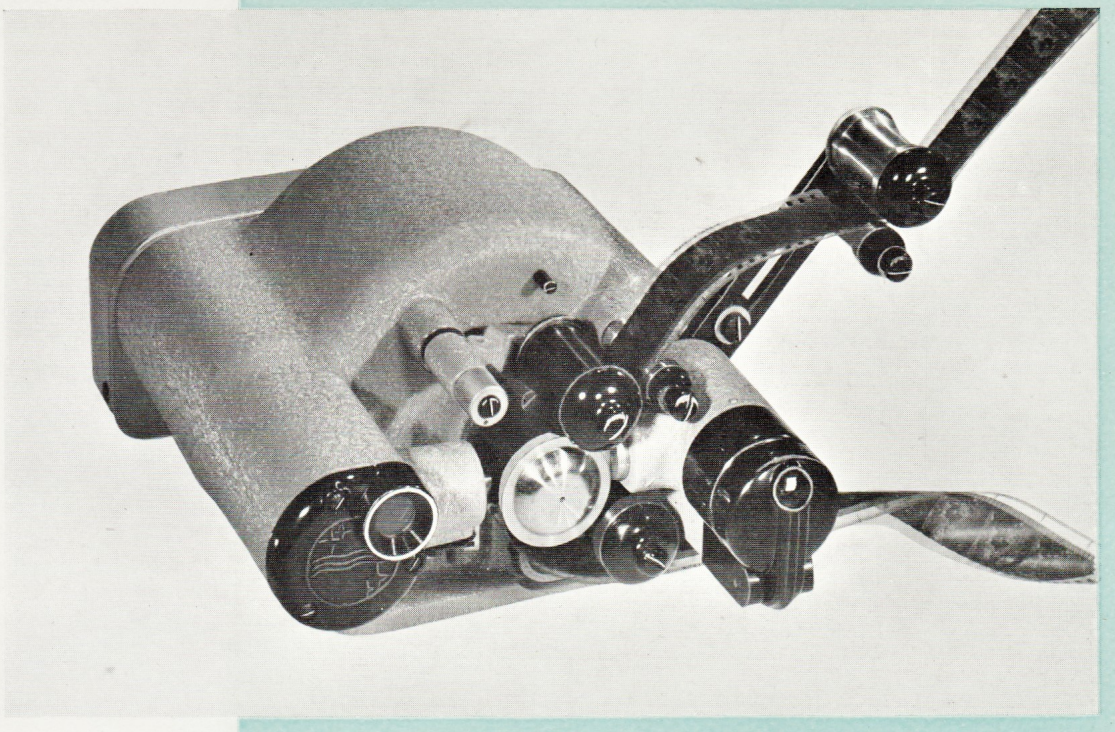
Two types of spool boxes can be supplied:

a. For 2000 and 3000-ft spools:
type 8640: top spool box with arm, friction coupling and 6-V pilot lamp No. 6914 with cable;
type 8641: bottom spool box with arm, take-up device and friction coupling.

b. For 4000 and 6000-ft spools:
type 8642: top spool box with arm, friction coupling and 6-V pilot lamp No. 6914, with cable;
type 8643: bottom spool box with arm, take-up device and friction coupling .

Important advantages are:

- The top spool box can be inclined backwards by inserting a wedge between projector and spool arm.
- The spools can easily be removed from the boxes, since the latter consist of two similar halves.
- The spindles of the spool boxes and of the lower friction coupling are mounted in ball bearings.
- Behind the window at the back of the top spool box is a pilot lamp, whilst the 3000-ft spool boxes are also provided with a time scale.



SOUNDHEAD

For sound reproduction the Philips type 3837 soundhead is to be used. It ensures excellent quality of sound owing to the rotating sound drum driven by the film. The film is pressed onto the sound drum by means of a resilient pad roller. Though the drum is coupled to the flywheel, its starting time is only about 2.5 seconds, without the strain on the film being too great.
The special optical system can easily be adapted to dual-track reproduction.

Besides the above-mentioned features this soundhead offers many advantages, among which are to be mentioned:

- Threading of the film is very simple since the knobs of the guide-rollers are in streamline, so that the film glides easily between the rollers.

- The sound-track can be accurately adjusted with respect to the scanning beam. For this adjustment, which can also be effected during reproduction of the film, the soundhead is provided with a small milled knob.

- Instantaneous replacement of exciter lamp and photo-cell.
  To take out the exciter lamp it is only necessary to open a hinged cover.

- The exciter lamp is pre-focused; it is provided with a centring flange with a slot, so that it is impossible to insert this lamp in a wrong way.

- The photo-cell can be replaced by removing the cap at the rear, which is fixed only with a knurled nut.

Table I
Type numbers of FP 5 and FP 6 projectors

Type	Description
8555/00	Complete FP 5 installation consisting of: type 8650/00 FP 5 projector mechanism with flange motor type 3837/02 soundhead type 8640/00 top spool box, 3000 ft type 8641/00 bottom spool box, 3000 ft type 8630/00 projector stand type 8623/00 motor-starting device type 8626/00 transformer with leads for framing and spool box pilot lamps
8555/01	Same as type 8555/00 but with: type 8669/00 automatic film-rupture device
8555/10	Same as type 8555/00 but instead of 3000 ft spool boxes: type 8642/00 top spool box, 6000 ft type 8643/00 bottom spool box, 6000 ft
8555/11	Same as type 8555/10 but with: type 8669/00 automatic film-rupture device
8556/00	Complete FP 6 installation consisting of: type 8660/00 FP 6 projector mechanism with flange motor type 3837/02 soundhead type 8640/00 top spool box, 3000 ft type 8641/00 bottom spool box, 3000 ft type 8630/00 projector stand type 8623/00 motor-starting device type 8626/00 transformer with leads for framing and spool box pilot lamps
8556/01	Same as type 8556/00 but with: type 8669/00 automatic film-rupture device
8556/10	Same as type 8556/00 but instead of 3000 ft spool boxes: type 8642/00 top spool box, 6000 ft type 8643/00 bottom spool box, 6000 ft
8556/11	Same as type 8556/10 but with: type 8669/00 automatic film-rupture device

All the above installations are suitable for single-phase mains 110 V or 220 V, 50 c/s.
For other mains frequencies and for D.C. use motor and starting device according to table V.

Table II
Type numbers of lens-holders

Type	Inner diameter
8680/00	62.5 mm
8681/00	82.5 mm, with calibrated scale
8682/00	104 mm, with calibrated scale

Table III
Type numbers of adapter tubes for lenses

Type	Inner diameter
8695/00	62.5/42.5 mm
8683/00	82.5/62.5 mm
8684/00	82.5/42.5 mm eccentric, for rear projection only
8696/00	82.5/42.5 mm centric, for very short focal lengths
8685/00	104 /62.5 mm
8686/00	104 /82.5 mm

Table IV
Type numbers of condenser lenses

Type	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

Table V
Type numbers of pulley motors, starting devices and tachometer

Type	A.C. or D.C.	Voltage in V	Frequency in c/s	Description
8601/00	A.C.	220 110 220/110	40	Motor with pulley, protecting cover, belt and bracket for fixing to the mounting table
8602/00			50	
8603/00			60	
8604/00			100	
8605/00	D.C.	220	—	
8606/00		110		
8621/00	A.C.	220	40-100	Starting device with complete wiring, comprising switch and starting- and anti-interference capacitors
8622/00		110		
8623/00		220/110		
8624/00	D.C.	220	—	Ditto, but without starting capacitor and with variable field resistor
8625/00		110		
8662/00	—	—	—	Tachometer with pulley and belt

Table VI
Flange motor

Voltage	110/220 V
Frequency	40, 50 and 60 c/s
Power factor	0.9
R.p.m. at 50 c/s	1440
Power	1/6 H.P.
Consumption	165 W

For frequencies other than 50 c/s the gearing between motor and projector has to be modified.
For the sake of simplicity it is in these cases recommended to apply a belt drive.

Table VII
Pilot lamps

Type	Description	Voltage	Intensity
6914	Picture framing lamp ..	6 V	0.5 A
6914	Spool box lamp	6 V	0.5 A

Table VIII
Weights of projectors, stands and spool boxes

Type	Description	Weight			
		Nett		Gross	
		lbs	kg	lbs	kg
8650/00	FP 5 with flange motor..	117	53	187	85
8660/00	FP 6 with flange motor..	120	54.5	190	86.5
8651/00	FP 5 with pulley	95	42	143	65
8661/00	FP 6 with pulley	98	43.5	146	66.5
Table V	Motor for belt drive	31	14	42	19
8620/00	De Luxe stand	216	98	286	130
8630/00	Normal stand	163	74	227	103
8640/00	Top 3000-ft spool box ..	33	15	66	30
8641/00	Bottom 3000-ft spool box	35	16	68	31
8642/00	Top 6000-ft spool box ..	49	22	95	42
8643/00	Bottom 6000-ft spool box	51	23	97	44
3837/02	Soundhead	27.5	12.5	38.5	17.5

OVERALL DIMENSIONS OF FP5 AND FP6 PROJECTORS

2045	mm	=	80 3/8"
1915	"	=	75 3/8"
1230	"	=	48 3/8"
1190	"	=	46 7/8"
855	"	=	33 5/8"
600	"	=	23 5/8"
530	"	=	20 7/8"
525	"	=	20 5/8"
520	"	=	20 1/4"
465	"	=	18 1/4"
450	"	=	17 3/4"
415	"	=	16 3/8"
405	"	=	16"
395	"	=	15 1/2"
375	"	=	14 3/4"
370	"	=	14 5/8"
363	"	=	14 1/4"
345	"	=	13 5/8"
255	"	=	10 1/16"
195	"	=	7 11/16"
190	"	=	7 1/2"
170	"	=	6 11/16"
165	"	=	6 1/2"
150	"	=	5 15/16"
68	"	=	2 11/16"
66	"	=	2 5/8"
63	"	=	2 1/2"
25	"	=	1"
17	"	=	11/16"
10	"	=	3/8"
8	"	=	5/16"