Gaumont-Kalee

XENON

Lantern

FOR CINEMA PROJECTION

RANK PRECISION INDUSTRIES LTD

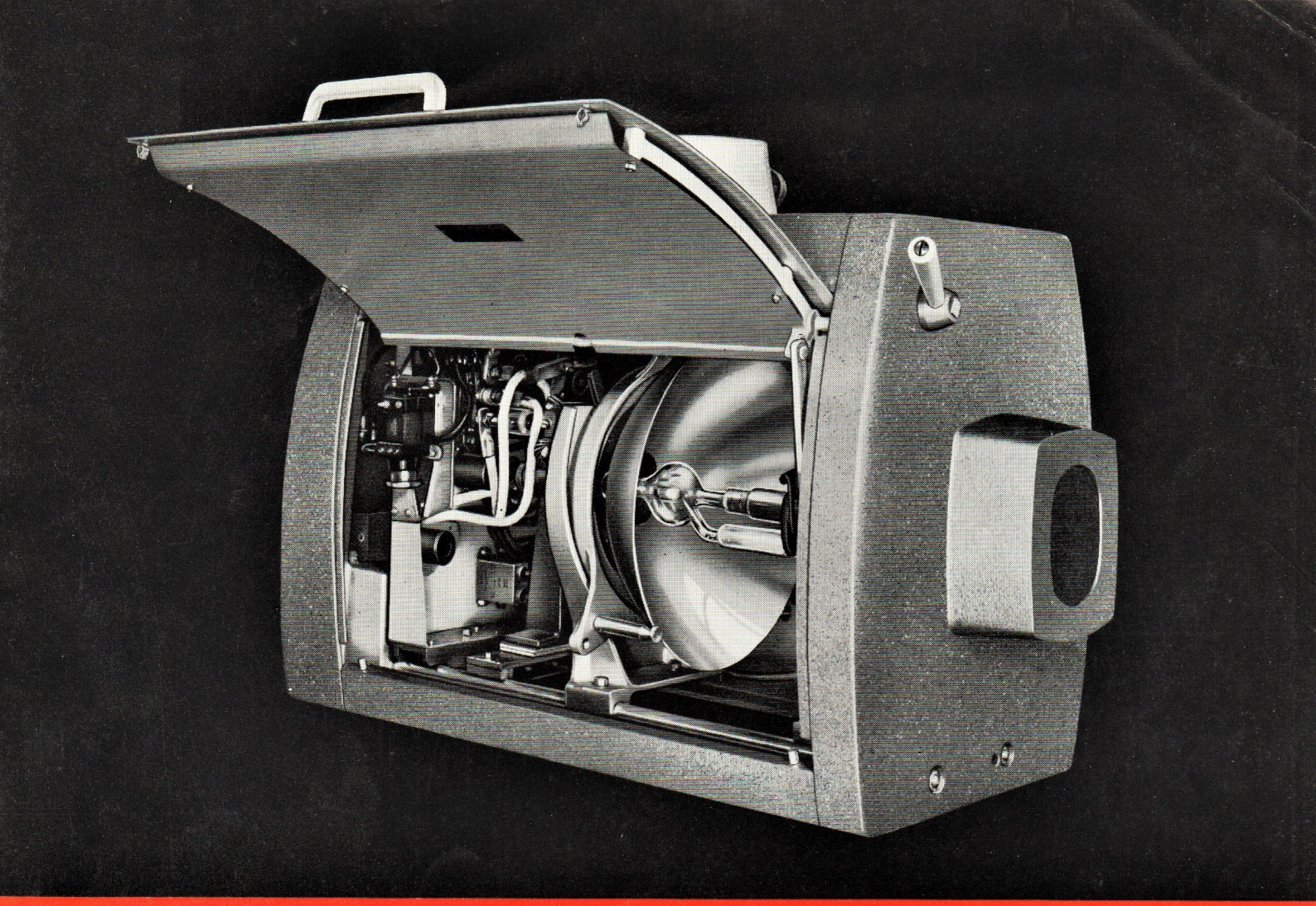


Fig. 1

GAUMONT—KALEE XENON PROJECTION LANTERN

AUTOMATIC AND INSTANTANEOUS STARTING

Push button control—no 'warming-up' period

CONSTANT STEADY LIGHT ON SCREEN

Independent of operator

LIGHT SUITABLE FOR COLOUR AND BLACK & WHITE FILMS

No change in colour with change of operating current

SIMPLICITY OF OPERATION

Once initially focussed, no further adjustments required

NEGLIGIBLE MAINTENANCE

No moving parts or replacement of mirrors

IMPORTANT CONTRIBUTION TO AUTOMATION IN THE PROJECTION ROOM

Automatic operation no adjustments required

The Gaumont-Kalee projector lantern has been specially designed to utilize the Mazda Xenon lamp for 35mm film projection. It is equipped with an optical system of the highest efficiency. Maximum light collection is obtained by the single deep mirror, 12″ (305mm) in diameter, which takes full advantage of the feature of the lamp to operate in a horizontal position. The deep mirror system employed, with the lamp located on the horizontal axis, inherently gives a symmetrical light distribution, better than the British Standard specification of 60 per cent minimum ratio of side-to-centre luminance. The lamp mounting comprises two conical-ended centring spindles which fit into locating holes in the lamp's end caps; these holes are on the exact optical axis. The front spindle is under spring pressure, and the rear one screwed, for final focussing, when installing the lamp. By means of these centring devices the lamp is accurately aligned with the mirror and the optical axis. By removing the spindles and inserting a rod the optical axis can be accurately aligned with the film aperture on installation.

The silvered glass mirror can be centred by controls situated outside the lamphouse. Once these controls have been set, further adjustment is unnecessary until the lamp is changed.

The only maintenance normally required is the periodical dusting of the mirror—usually once a week will suffice.

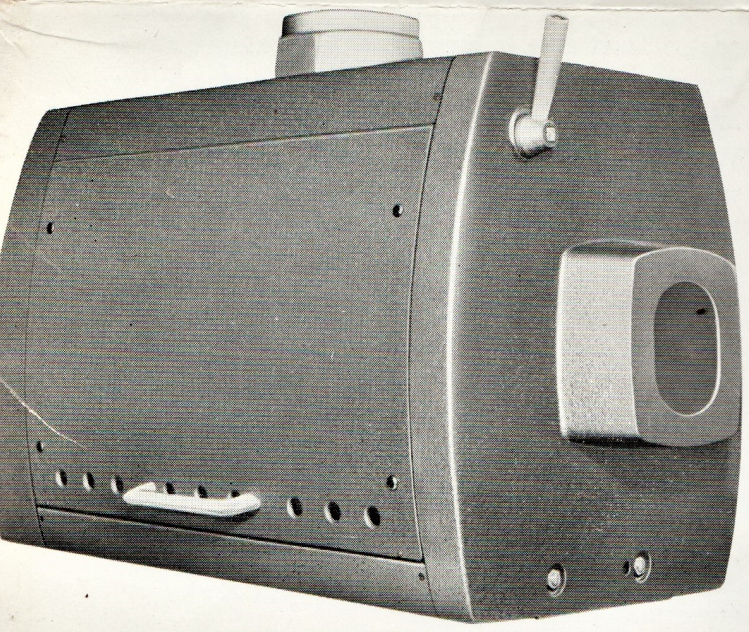
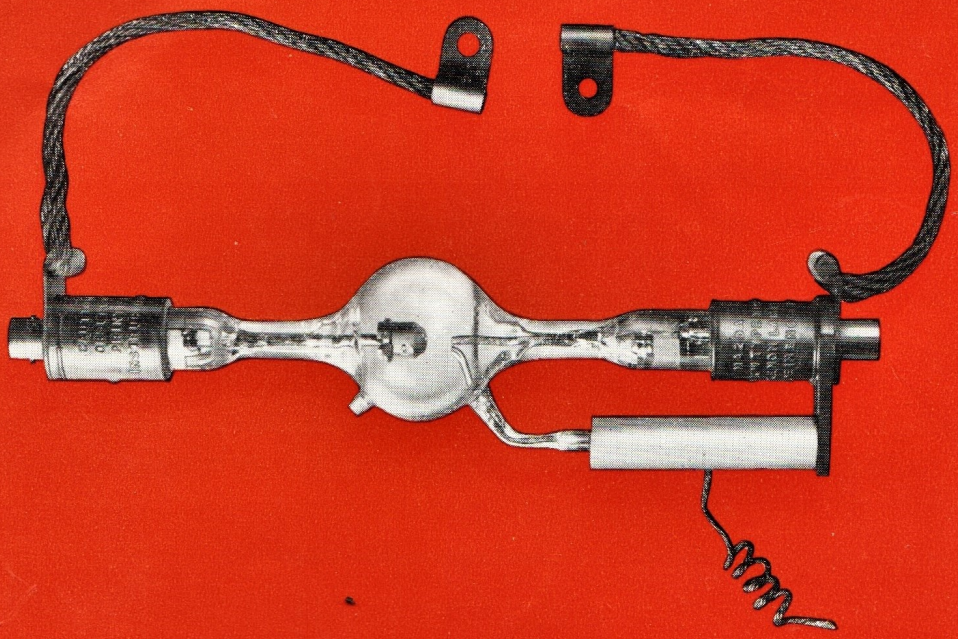


Fig. 2

ARC STRIKING To start the lamp it is only necessary to switch on the D.C. supply and press the 'start' button; the striking sequence is then automatic, and the striking circuit automatically disconnects itself immediately the main arc strikes. Lighting is instantaneous, there is no 'warming-up' period. The arc striking mechanism is fitted inside the lamphouse body, with the 'start' push button and A.C., fuse mounted outside, and at the rear.

AUTOMATION AND THE XENON LAMP

The Gaumont-Kalee Xenon projector lantern being push button controlled, and requiring no adjustments or attention throughout its long life, makes it the ideal equipment for automation in the projection room.



THE XENON LAMP

Fig. 3

The general appearance of the lamp is shown in Fig. 3. The electrodes are mounted in a fused-silica envelope, of good optical quality and spherical in shape to obtain the greatest mechanical strength.

The conductors pass into the envelope through robust molybdenum-foil seal assemblies, which are capped to provide between-centre mounting, with electrical connection through flexible copper leads. These design features prevent undue stresses being transmitted to the lamp body, and the construction ensures that the arc is located on the centre-line of the lamp.

In addition to the massive tungsten anode and a relatively-small split cathode to support the main arc current, there is an auxiliary probe which not only greatly reduces the impulse voltage necessary for arc-ignition but also enables a stable arc to be initiated with the lamp at any angle to the vertical. The initial arc is struck between the probe and the cathode at a current of about 20 amperes, and this arc ionizes the space between the anode and cathode, so that the main arc strikes almost instantly after the auxiliary arc; a relay in the control system disconnects the probe immediately the main arc has struck.

The lamp is filled with xenon gas at a pressure of about four atmospheres, and the pressure increases by a factor of about $2\frac{1}{2}$ when the lamp is hot. For this reason, it must always be operated in an enclosed lamphouse; a microswitch fitted in the Gaumont-Kalee Xenon lamphouse cuts off the power supply to the lamp when the lamphouse door is opened. When handling or changing the lamp, it should always be kept in its canvas covering, shown in Fig. 4, which serves the secondary purpose of keeping the bulb clean; the natural oils of the fingers, unless removed before operation, may impair the transparency of the fused-silica envelope.

Advantages of three-electrode construction

(1) Low ignition voltage—about one-eighth of that required for a two-electrode lamp.

(2) Negligible interference with sound systems on striking. In some two-electrode lamps, the interference is so great that users are recommended to switch them on before the show.

(3) Ability to run the lamp at any angle from the vertical. Two-electrode lamps can only run vertically, making it impossible to use the most efficient form of optical system.

(4) No choke required in main supply lead for the impulse ignition.

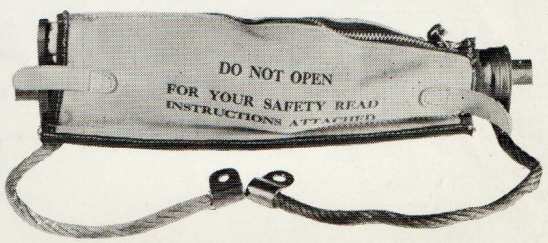


Fig. 4

LIFE AND RECOMMENDATIONS

The average life of the Type XE/U/27 lamp is 1000 hours when used at not more than the full rating of 80 amperes, and on power supplies with not more than 5 per cent r.m.s. current-ripple.

The eventual failure of the Xenon lamp is normally due to internal blackening of the bulb, the light output being thus progressively reduced. The life is regarded as ending when the light falls to 70 per cent of its initial value.

To obtain a reasonably-constant light output over the working life of the lamp, it is recommended that the lamp should initially be under-run, and that at subsequent periods the current should be increased in 5-ampere steps to the maximum rating of 80 amperes. This will generally mean running a new lamp at about 70 amperes. Under-running the lamp will lengthen its effective life.

When the lamp is nearing the end of its life it may fail to strike on the first pressing of the 'start' button, but it will invariably strike if it is pressed again within five seconds, i.e. whilst the cathode is still hot.

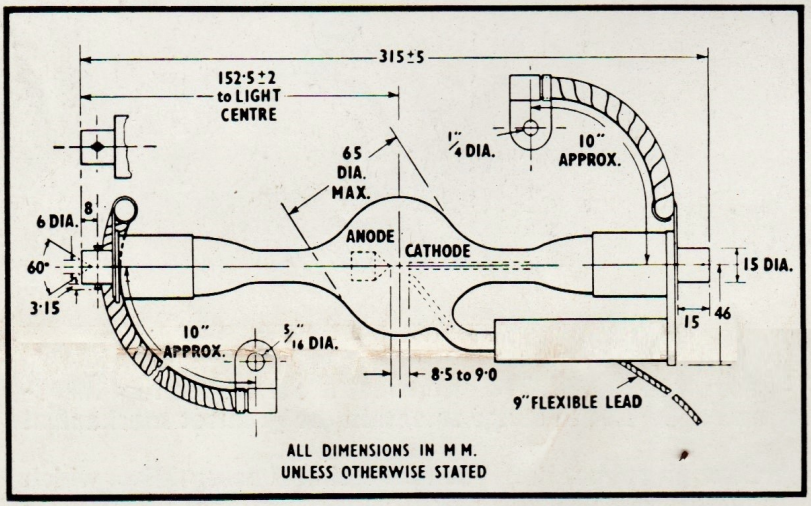


Fig. 5

TECHNICAL DATA

Type	Mazda XE/U/27
Rating	
Watts	2 kW
Supply volts	35 volts D.C. (minimum)

Physical Characteristics (*see* Fig. 5)

Caps: At each end, a special cap with a conical centre hole for mounting, and a flexible lead

Dimensions (in mm)

Diameter of bulb	65·0 (max.)
Overall length (incl. caps)	315·0±5·0
Length to light centre from end of 'anode' cap	152·5±2·0

Electrical Characteristics

Lamp rating	2000 watts (nom.) 1000 watts (min.)
Supply voltage	35 volts D.C. (min.)
Arc voltage	27–29 volts
Lamp operating current	80 amp. (max.) 45 amp. (min.)

Operating Position

The probe must be located below the arc-gap

Light Source Characteristics and Performance

Source size (in mm)	Arc width 4·0 (approx.) Arc length 8·5–9·0
Mean horizontal candle-power	7800 candelas
Lumens/watt	35 (approx.)
Polar curve of candle-power	Fig. 6
Brightness distribution	Fig. 7
Spectral distribution	Fig. 8

Average Life

Approximately 1000 hours at normal rating from ripple-free D.C. supply. At lower lamp-loadings, life is increased

Temperature

Temperature measured at a point halfway along the cap must not exceed 300° C.

SCREEN SIZES

The Table below shows the CinemaScope screen widths for which the Gaumont-Kalee Xenon lamp is suitable, on the basis of 12-ft. lamberts at the centre of the screen, with screen gains of 1·5 for silver, and 0·8 for matt white. Wide screen picture sizes can be calculated as approximately 75 per cent of the CinemaScope area.

CINEMASCOPE WIDTH				Initial Current New Lamps Amperes	Minimum Final Current Amperes
Silver Screen (Gain 1·5)		Matt White (Gain 0·8)			
23·5 ft.	(7·16 m)	16·5 ft.	(5·03 m)	50	60
28 ft.	(8·53 m)	19·5 ft.	(5·94 m)	55	65
31 ft.	(9·45 m)	22 ft.	(6·71 m)	60	70
34 ft.	(10·36 m)	24 ft.	(7·31 m)	65	75
37 ft.	(11·28 m)	26 ft.	(7·92 m)	70	80 max.

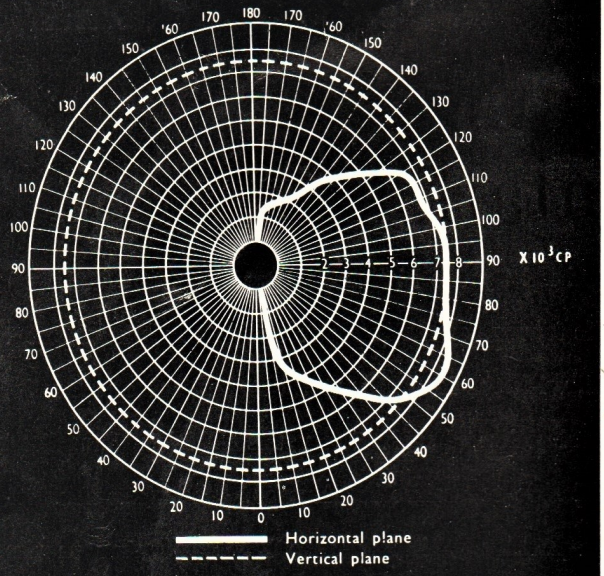


Fig. 6. Polar curves of candle-power for typical Mazda XE projection lamp.

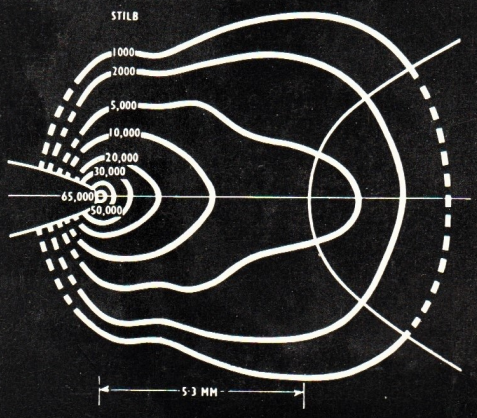


Fig. 7. Brightness distribution for similar lamp with 5.3 mm. arc gap.

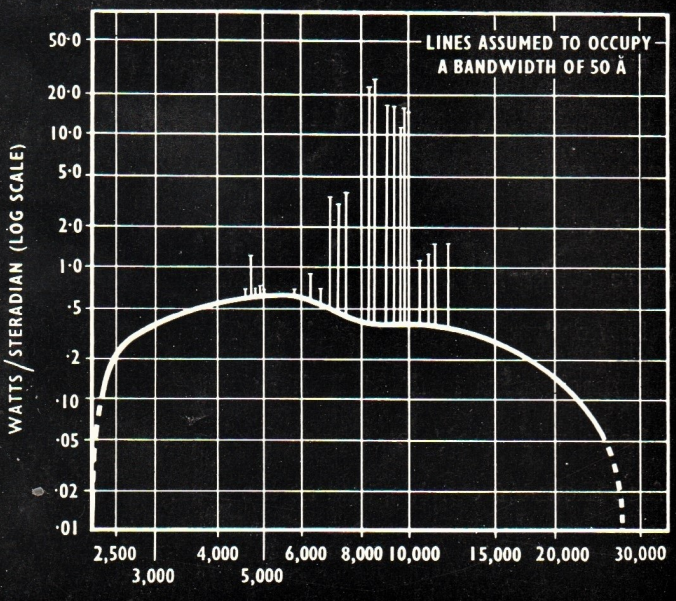


Fig. 8. Spectral distribution of light from xenon projection lamp.

POWER SUPPLIES

The Xenon lamp will be required to run at its maximum rating of 80 amperes as it nears the end of its useful life, so the power supply must be capable of providing at least 80 amperes per arc. In order to match approximately the light outputs of an old and a new lamp, and so to keep an approximately uniform light on the screen, it will be necessary to be able to adjust the supply to give 70 and 75 amperes, as well as the full rating of 80 amperes.

For cinema use, if the existing supply medium is a choke-controlled rectifier rated up to 80 amperes per arc, it will in general be suitable for the supply to a xenon lamp, without any change except, perhaps, a slight adjustment to the choke air-gap. With such a rectifier, the cost of power supply to the xenon lamp will be proportional to the arc wattage, and will thus be a little cheaper than for a carbon-arc, to give equal light on the screen.

If the existing supply is by means of a rectifier or motor-generator set with resistance-ballast control, and able to supply up to 80 amperes per arc, new resistances will be required, owing to the lower arc voltage (27 volts) of the xenon lamp. With such arc supplies, the cost of power supply will be somewhat higher, due to the higher current losses in the ballast resistance.

Where the existing power-supply system is of high voltage, with resistance ballast, the installation of a reactance-controlled rectifier specially designed for xenon-lamp operation will usually justify itself in a comparatively short time by the saving in power costs due to increased efficiency.

Single-phase rectifiers may require additional smoothing to reduce ripple.

Illustrations must not be taken as binding; alterations are made as occasion arises.

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