TUTORIAL

Photographic Sound Reproduction

by Max Bell, MBKSTS*

(This short outline of the principles of sound reproduction in the cinema is taken from the BKSTS Manual "Photographic Sound Technology".)

The reproduction of photographic sound is based on elementary principles which have not changed very much in the past 50 years. The basic components include a driven sound head for film transport, an exciter lamp and optical system, a light sensitive cell coupled to a pre-amplifier, and a power amplifer. All these items must be carefully aligned both mechanically and electrically, and the associated loudspeaker system chosen to suit the characteristics and size of the auditorium.

Sound Head

In all projectors used for cinema presentation the photographic sound head is located underneath the picture head, and is motor driven at a constant speed of 24 frames per second. Since it is impossible to have the intermittent picture mechanism and the continuous sound mechanism side by side, the sound track on 35mm film is printed 20 frames in advance of the corresponding picture frame (26 frames on 16mm and 22 frames on 8mm type S).

Fig. 1 shows the lay-out of a typical sound head, with film transport being provided by a driven sprocket which pulls the film over a sound drum. This drum has a large flywheel attached to its shaft, which provides an impedance to iron out any irregularities in the motor drive. Scanning takes place at the edge of the drum, where a beam of light is focused on to the film plane. In front of the exciter lamp is a condenser lens followed by a slit. An

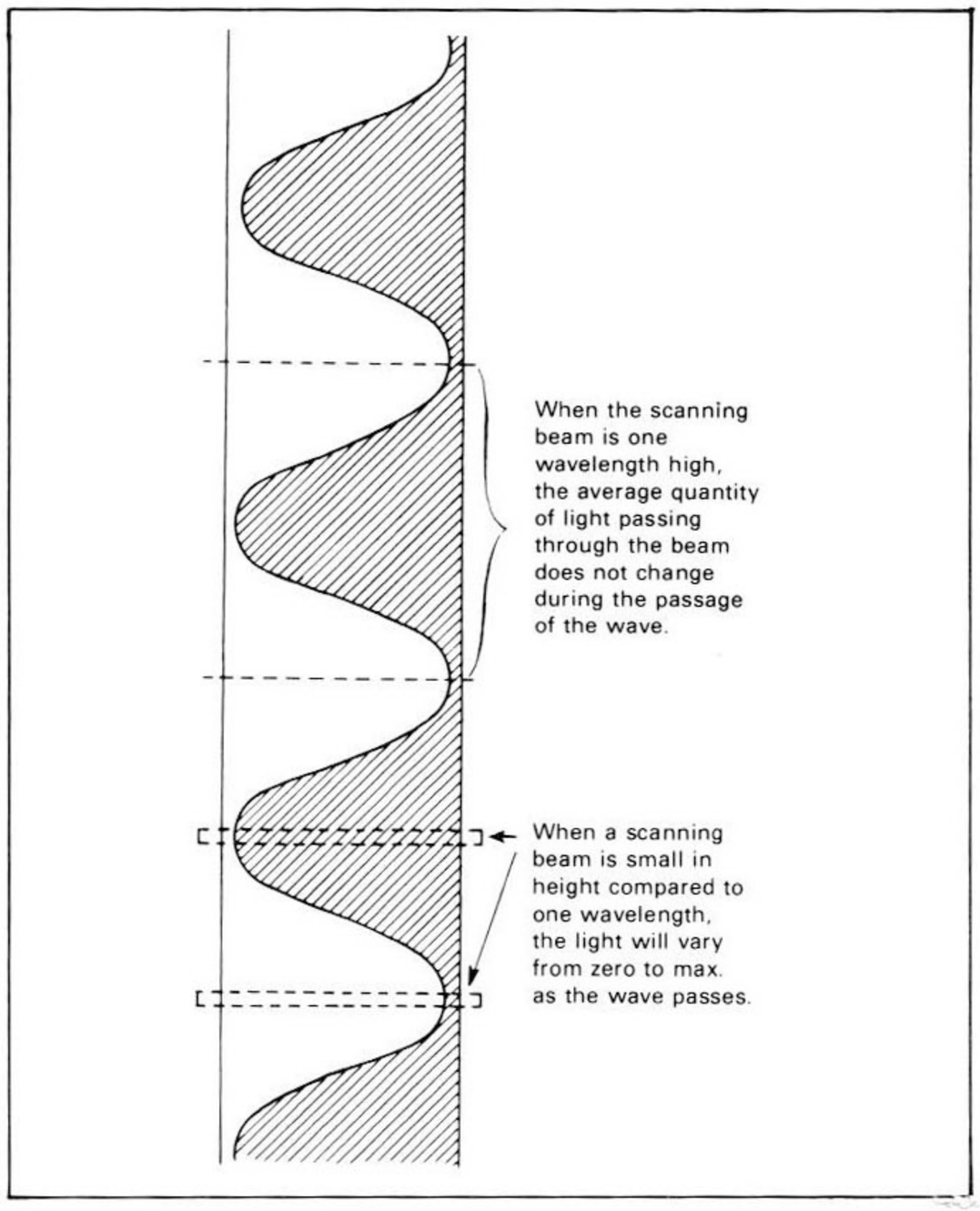

Fig. 2 The effect of slit loss at high frequencies due to scanning beam height.

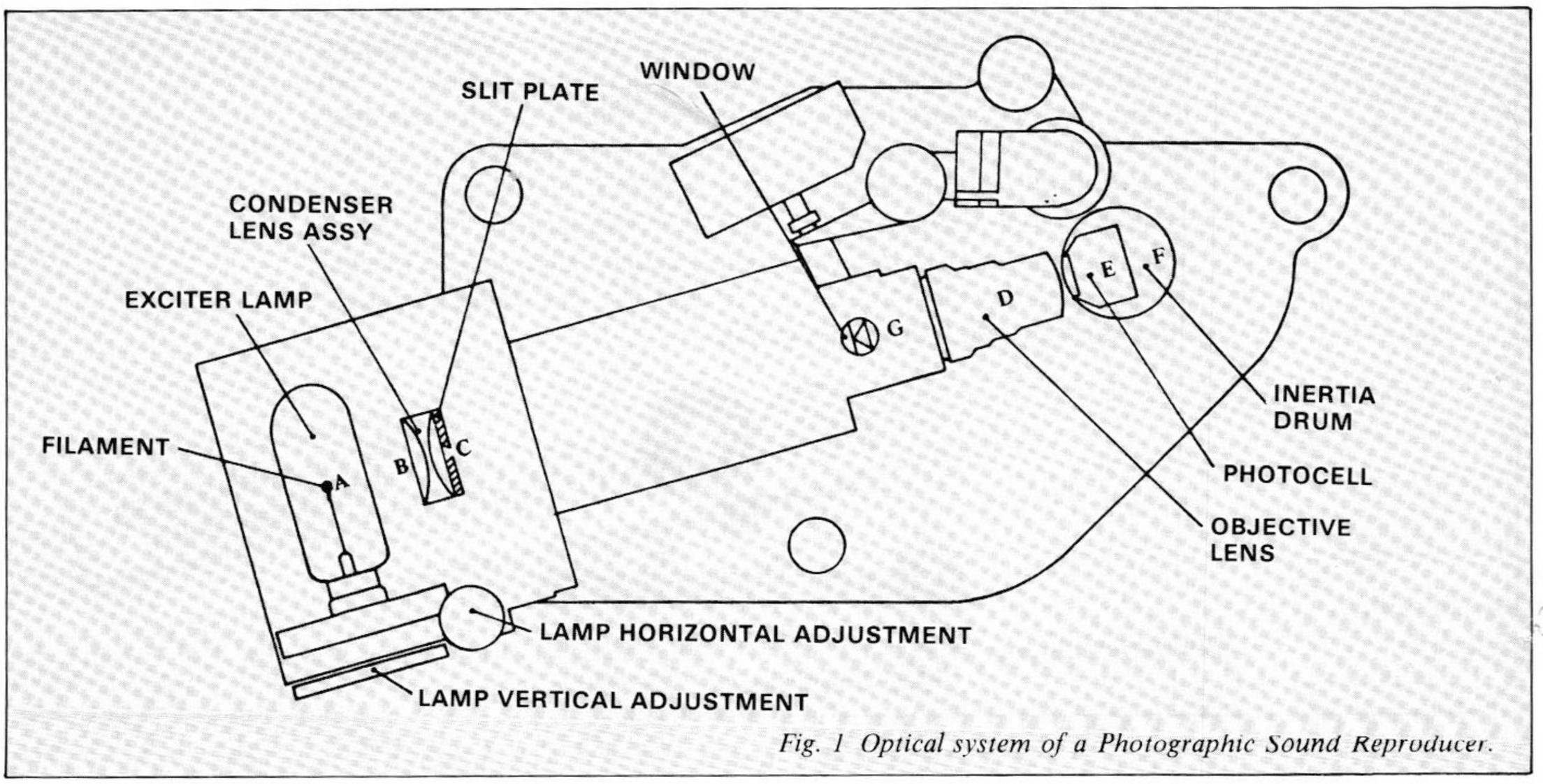

Fig. 1 Optical system of a Photographic Sound Reproducer.

* *Dolby Laboratories Ltd.*