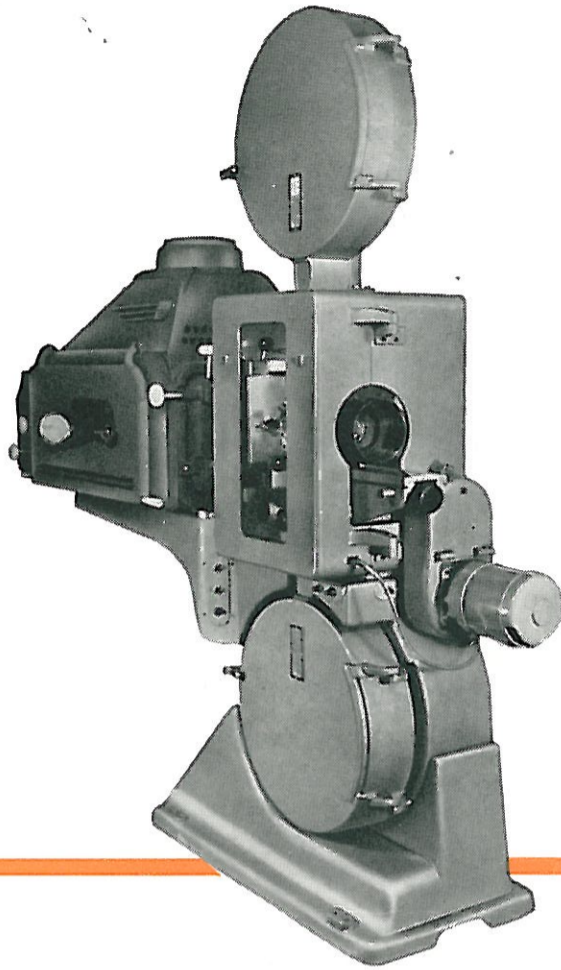


THE PHILIPS MULTI-PURPOSE TODD-AO PROJECTOR (DP 70)

Philips Multi-Purpose 70/35 mm film projector is a machine capable of projecting films made in any of the motion picture systems available for normal distribution to-day! It offers all facilities for Large Picture Projection and Multiple Track Magnetic Sound Reproduction.

The projector is suitable for:

- 70 or 65 mm film provided with up to six magnetic sound tracks.
- CinemaScope film provided with four magnetic sound tracks.



- CinemaScope film with optical sound track or Perspecta-Sound.
- CinemaScope Magoptical prints.
- Wide Screen film of any aspect ratio, provided with magnetic or optical sound tracks.
- Standard 35 mm films.

Its versatility is such that changing from one projection system to another (i.e. from 70 mm to 35 mm systems and vice versa) takes only a few minutes.

WHAT IS TODD-AO?



TODD-AO is a process for motion picture shooting and reproduction that gives the audience in the theatre a sense of participation in the action—the feeling of being present in every scene.... The system was developed by American Optical Company engineers under the direction of Prof. Brian O. Brien, to bring into being an idea envisioned by Michael Todd.

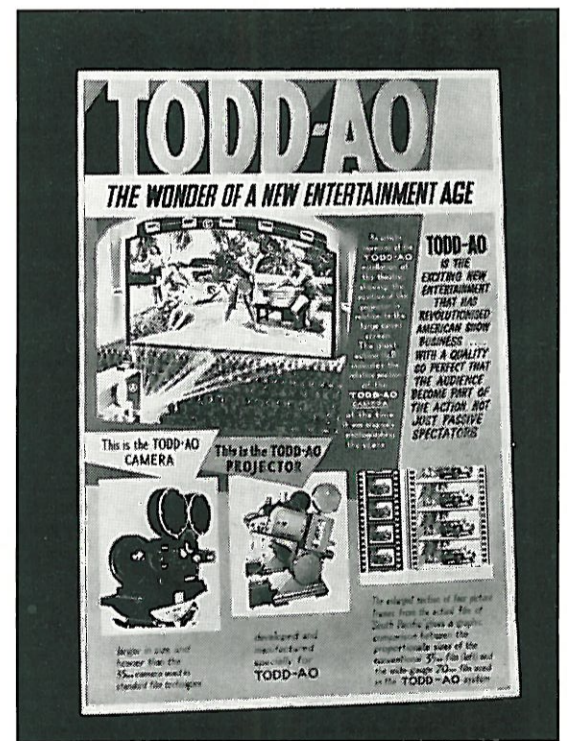
The goal was to develop "a motion picture system that would photograph action in a very wide angle.... with one camera.... on one strip of film.... to be projected from a single machine.... onto a very large and deeply curved screen.... with a quality so perfect that the audience will be part of the action, not just passive spectators." Films in the process are made with different wide-angle camera lenses, covering angles up to 128°. For achieving the highest picture quality, the factor of magnification had to be reduced, which was accomplished by using a wide-gauge film. This large-area negative is printed on a 70 mm wide positive film, on which also 6 magnetic sound tracks are accommodated.

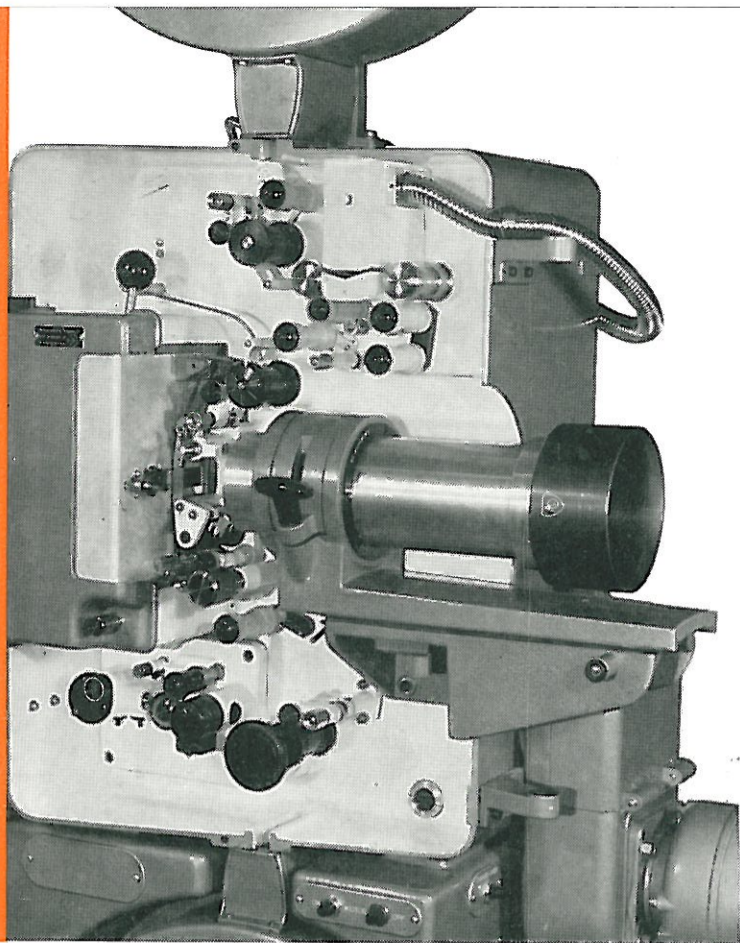
Thus, optically ideal pictures are obtained, without visible grain patterns, and without unsharpness or other losses of definition, brilliancy, etc. Sound recording, on six high-fidelity magnetic sound tracks, fulfils the most critical requirements. These standards, carried through in reproduction, fully satisfy the highest demands of both public and sound specialists.

It is no coincidence that PHILIPS were approached by the American Optical Company for the development and manufacture of the projector, which

basically had to be suitable for Todd-AO as well as for 35 mm film reproduction.

The design of this equipment had to be faultless! Philips—with their many years' reputation in the international cinema field—could meet the highest requirements of ingenuity of invention, quality and reliability. The outcome: Philips' DP 70 projector, a projector which gives proof of Philips' professional skill in this domain.





CONSTRUCTION DETAILS

It will be obvious that for the projection of 70 mm films a 35 mm projector could not just be adapted.

A completely new machine had to be built with a very rugged construction, in order to satisfy various special demands.

Driving mechanism

The driving mechanism is very sturdy and at the same time very simple, making it perfectly reliable. The sprockets, the intermittent mechanism, the shutter and the take-up spool are driven by a stout vertical main spindle. This spindle is driven by a horizontal shaft, which also drives the spur-gear oil pump located in the base of the projector housing and hence is always below the oil level. All the gear-wheel transmissions and bearings are richly lubricated via an oil conduit with tappings.

Intermittent mechanism

In principle, the intermittent mechanism of the DP 70 projector equals that of normal 35 mm mechanisms, but it is of much more robust construction. However, to keep the acceleration forces and therefore wear of the mechanism as low as possible, it is of the utmost importance that the Maltese cross and the intermittent sprocket be light. Aluminium was the most obvious material to use, since it is light in weight, but it is also soft and therefore at first sight did not seem suitable for the manufacture of sprockets. After many experiments, a special method was

found for hardening the surface of the aluminium, and a life test proved that aluminium sprockets treated in this way compared very well with chrome-nickel sprockets.

Picture gate

The larger size of the image area entails also a different construction of the picture gate.

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Due to the greater mass of the 70 mm film, the normal construction (a flat runner plate and resilient pressure skates) provides inadequate braking power. For good definition it is furthermore necessary that the distance between the film in the gate and the projection lens should not vary.

When a flat gate is used, 70 mm film is liable to bend in a transverse direction and this cannot be remedied. For these reasons, the DP 70 projector is equipped with

a curved runner plate. The slight bend in a longitudinal direction gives the film a greater transverse stiffness.

Shutter

The DP 70 projector is equipped with a one-blade conical shutter with a very large diameter. At a film speed of 30 frames/sec the shutter rotates at a speed of 3600 r.p.m. and at a film speed of 24 frames/sec at 2800 r.p.m. This type of shutter has been chosen for the following reasons: The Todd-AO system is intended in the first place for the projection of very large pictures. Loss of light must therefore be avoided as much as possible. The conical shutter can be mounted close behind the mask, so that it intercepts the light beam where it is narrowest. This, in conjunction with the large diameter and the high speed, guarantees the smallest possible angle of interception and the highest efficiency for this type of projector.

Cooling

The high light-intensity and the great heat it generates require powerful and efficient cooling of both the film and the projector. For this reason, the plate on which the pressure strips are mounted is watercooled.

The shutter of the DP 70 projector has been constructed as a powerful fan which sucks in the cold air from the rear of the projector and blows it against the film in the gate.

Lens holder

The Todd-AO system requires a very large optical system. The

size of this system determines that of the lens holder. The lens is focused by means of the knob underneath the lens mount bracket over which the entire lens holder slides during focusing; this adjustment is free of any backlash.

Soundheads

The soundhead for the scanning of magnetic sound tracks is located in the top right-hand part of the projector. A combined scanning head for 70 mm films and

CinemaScope films is located at the top of the two rotating sound drums of antimagnetic material. The optical soundhead also forms a single, easily removable, unit. One of the most important characteristics of this soundhead is that in the scanning system a 13.5 times enlarged picture of the sound track is projected on to the scanning slit. This picture is visible through an observation window, so that the position of the sound track with respect to the slit can easily be adjusted by the projectionist.

Light source

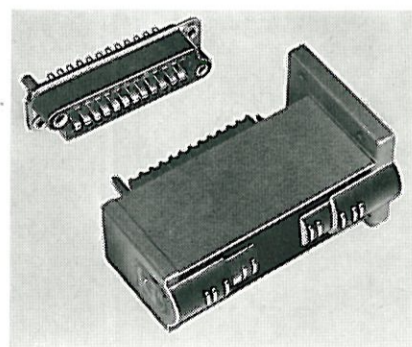
The shape of the projector and of the mounting table are such that any light source can be used, provided that its optical properties match the image size.

Parts for modifying the projector.

As, for the time being, it is not to be expected that a given theatre will show only 70 mm films, it is necessary that the projectors can also be made suitable for running 35 mm films.

The DP 70 projector is undoubtedly most universal in this respect. Films shot in any of the previously mentioned systems can be shown with this projector.

The modification from 70 mm to 35 mm film projection or vice versa takes only a few minutes. The mask of the gate for 35 mm films can be replaced in a few seconds by that for CinemaScope films or by a wide-screen mask. All the sprockets used in this projector and the rollers of the fire traps are universal and do not need to be replaced. Each sprocket is provided with two sets of teeth, one set spaced for 70 mm film and the other spaced for 35 mm film. The outer flanges of the intermittent sprocket have 20 teeth and the dinner flanges 16 teeth; for the other sprockets the number of teeth is 30 and 24 respectively. The teeth have the required shape for CinemaScope film.



Magnetic scanning head