SYMPOSIUM ON PROJECTION*

PREPARED FOR THE PROJECTION PRACTICE COMMITTEE AND PRESENTED AT THE ROCHESTER CONVENTION

Summary.—*This symposium on projection comprises three parts: (1) Projection Room Equipment Requirements; (2) The Projection Room—Its Location and Contents; and (3) Factors Affecting Sound Quality in Theaters.*

PROJECTION ROOM EQUIPMENT REQUIREMENTS

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What is installed in a modern projection room is of great importance to all connected with the motion picture industry. A projection room may possess all the requirements for a safe and efficient layout and still remain equipped with obsolete or inadequate apparatus. To set a 100 per cent workable standard is quite impossible, but from every-day practical experience, much knowledge has been gained that tells us quite accurately just what a piece of equipment will do and how the equipment can best be applied.

In the old "magic-lantern" days, a projector was bought haphazardly, not as a matter of choice but because of the limitations of the infant industry. At the present time, there is no legitimate excuse for not knowing what is best and most efficient in motion picture equipment, as nearly everyone is "picture conscious" and is clamoring for good screen performance. A good projection room layout has well planned and sufficient working space around the various pieces of equipment for the convenience of the projectionist, and the equipment installed therein is adequate for the needs of the particular theater. However, in many instances, projection rooms in theaters are not provided with adequate and suitably planned space for the workers and the equipment, and it is for the designers of such rooms that reliable information should be available as to the most practicable methods and procedures.

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In purchasing and installing projectors, several important items should be carefully considered. The pedestal or base should be sufficiently strong and steady to support properly the heavy load of the lamp house, magazines, and mechanisms in order to produce a steady picture on the screen. An old-type, obsolete pedestal, even with makeshift braces, can not be as steady and reliable as a pedestal especially designed to carry the load of the modern projector and sound mechanisms. A lamp house should be selected that will be adequate for the size of the picture and the auditorium. At present, there are three arc lamps on the market that are widely used, each having its advantages and specific applications. Theaters having an average-size picture of 14 × 18 feet should have at least a "1-kw" arc, thus providing a *minimal* screen brightness of 9 foot-lamberts; with a picture size up to 17 × 22 feet the "Suprex"-type arc will produce *minimal* brightness; for pictures wider than 24 feet, high-amperage condenser type arc should be used.

With regard to the upper and lower magazines on the projector, there is nothing special about them except that the 2000 and 3000-foot types are quite regularly used. The take-ups at the lower magazine are of several types: the friction type, the friction even-tension type, and the fluid drive. There are three methods of driving—belt, bicycle chain, and silent chain.

The selection of the projector mechanism is of prime importance, as its operation is very delicate and the parts must be precision-made, with a high degree of accuracy. The average projector mechanism must operate about twelve hours a day, over a period of one to two years, pulling a 35-mm film intermittently at a rate of 90 feet per minute, or 24 pictures a second and magnifying a frame area of about $^1/_2$ square-inch to about a screen area of 350 square-feet. It can be seen that the proper selection of the projector mechanism is of great importance in assuring trouble-free operation and screen results as fine as it is possible for modern mechanisms to produce.

For picture change-over from one projector to another, a good type of electrical device should be used. A projectionist can not make a good change-over when he has to manipulate a home-made device. Everything in the projection room is timed so precisely that anything that disrupts or hinders the timing will show itself quickly on the screen.

Regarding the sound equipment, a choice of several well known systems can be had today. The amplifier, monitor, volume controls,

and change-over device should be installed as near to the projectionist as is practicable, within the available working area, for convenience of manipulation. The dials, switches, and pilot-lights should be so arranged in the sound equipment as to be easily distinguishable.

In planning the projection facilities, three separate rooms should be provided: one for the two projectors, the spotlight or third projector, the sound equipment, and, in the larger theaters, the dimmer bank; a second room, for the rewind equipment, and a third room for the d-c generating equipment. A separate toilet and wash room should be provided near the projection room proper; in some states this is compulsory. The walls of the rooms must be fire-proof, with metal access doors and two main metal doors on opposite sides of the projection room. Two port-holes should be provided for each projector, one for projection and the other for viewing the screen. If a spotlight is included in the equipment, a port somewhat larger than the projection port should be provided as well as another observation port of the same size as the projector observation port in the rewind room. Over these various port-holes, approved metal fire-shutters must be installed and so arranged by a master trip system that the shutters will drop and cover the openings in case of fire, automatically, by the melting of fusible links, or manually, by the projectionist. For exhausting the hot, stale air from the various rooms, a mechanical blower with a metal duct system and grille-taps into the rooms should be installed. The blower may be controlled electrically by a snap-switch and by a special switch connected to the master trip arrangement on the fire-shutter apparatus, which will automatically turn on the blower in case of a fire. Another blower with a metal duct system and taps into the arc lamp houses should be provided for exhausting the heat, gas, and ash of the arc. This blower should also be mechanically electrically controlled and of sufficient capacity to exhaust the arc lamp house properly and yet not affect the burning of the arc.

For sound-proofing the projection room or for cutting down noise transmission to a minimum, a good practice is to use cement plaster up to a height of 5 feet from the floor, all around the room, and above this height acoustone *D* or other approved material of equal acoustical properties. The port-holes in the projection room may be sound-proofed by glass in a separate track over the shutters or by installing acoustical baffles inside the openings. If glass is used in the projection ports, it should be special "optical" glass.

The projection room floor should be coated with a good grade of paint to stand the wear and tear and the penetration of oil or, better, it should be covered with a good grade of "battleship" linoleum. A popular color scheme is olive-green on the floor and walls, up to a height of 5 feet all around the room, and buff or gray on the upper walls and ceiling. The complete fire-shutter apparatus should be painted a flat green color instead of the former black enamel finish.

The projection room proper should be so planned that the horizontal center-line of the auditorium and screen is midway between the two projector lenses, which latter should be 5 feet apart. If the projection room is located an appreciable distance off this screen and auditorium center-line, due to disadvantageous structural conditions, a definite and noticeable "keystone" will result on the screen. The edge of the screen image farther from the lens will be longer than the opposite edge, and so the screen picture will not be rectangular. The "keystone" effect will likewise occur if the projector lenses are too high above the center of the screen, necessitating a steep projection angle. There are two ways to help overcome the "keystone" effect; one is to use dark, heavy velour masking around the picture to absorb light falling upon the screen outside the required rectangular area, and the other is to file a blank aperture plate to the proper dimensions required for a rectangular screen picture. This method is quite critical as the filing must be quite precise.

A safe working area around the projector and other equipment in the projection room can not be stressed too strongly. At least 30 inches of clear space should be provided at the sides and rear of each piece of equipment in the projection room. The projection room, rewind room, and generator room must be constructed of substantial, approved, fire-proof materials. In all cases, before proceeding with the construction, approval of the design should be obtained from the local, state, or city authorities having jurisdiction. This will avoid any costly revisions or penalties after the work is done.

The architect, engineer, or even the theater owner can obtain reliable, up-to-date information from the Society of Motion Picture Engineers' specifications on projection room planning, prepared by the Projection Practice Committee, which provides all the important and desirable dimensions.