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BKSTS - The Moving Image Society

# cinema technology

Volume 15 • Number 4

December 2002

**cinema  
sound  
special**

# Projection Room Design in Multiplexes

by Bill Chew MBKS

Eight years ago, my colleague and I in Bill Chew Associates (\*), wrote an article on projection room design for CT which covered mainly the design of projection rooms in traditional cinemas and touched briefly on design aspects in multiplexes.



The shape of cinema exhibition in the UK has changed enormously in the intervening period, largely as a result of the huge investment and boom in the construction of multiplexes.

The aim of this article is to provide an overview of the modern projection room, discussing the requirements of the projection and sound system, cinema automation, fire alarm system, infra red system (to comply with the requirements of the Disability Discrimination Act 1995), new innovations in the projection room, mechanical ventilation and electrical installations for cinemas. To assist me in providing a more objective assessment of the current state of projection room design, I visited two recently completed multiplexes, namely the 9 screen Warner Islington and the 16 screen Ster Century multiplex at The Brewery retail and leisure complex in Romford. My thanks are due to the management and projection room staff of both these cinemas for their help and co-operation in the writing of this article.

Bill Chew.



\* Projection Room Design by Bill Chew and Darius D.Umrigar (CT, October 1994)

## Modern Multiplexes

As a general rule, modern multiplexes comprise anything from 8 screens to 16 or more screens. Seating capacities of these cinemas range from around 1250 to over 3500 seats. In turn, the seating capacity in each screen will vary from just over a hundred seats to about 450 seats for the largest screen. The rationale for arriving at these specific numbers is that newly released films are shown in the 'main auditoria' and are then relegated to the smaller screens over time to make way for other new releases. This strategy has enabled the multiplex to consistently achieve substantially higher annual admission figures when compared to traditional cinemas. The number of screens in a multiplex in any given location and the size of seating capacities is a judgment which cinema management makes based on demographic and other available data.

## Projection Room Design

Whereas projection rooms in traditional converted cinemas can be found in some unusual locations within the cinema premises - rear of stalls, behind the proscenium arch, suspended below the circle balcony line are some examples (thereby requiring a higher staff ratio to operate these cinemas on account of the 'relative inaccessibility' of the 'boxes') - the projection room in a modern multiplex is a much more streamlined affair. The whole multiplex complex of 8 to 16 screens can generally be managed by 2/3 projectionist staff at any one time. It will generally be 'sandwiched' at high level between banks of cellular cinemas of the sizes described above (see figure 1).

The projection room in a multiplex is a clean, spacious air-conditioned environment with easily maintained floor, wall and ceiling finishes. It is in some respects not dissimilar to the hi-tech nerve center of a modern industrial complex (see figure 2). Projection room depths can vary from 3 m to 4.5m (depending on site circumstances) and extending over the accumulated widths of the cellular cinemas. From a management viewpoint it is preferable to have one long continuous room; however site constraints sometimes make this not possible and therefore linking corridors will have to be introduced, such as at Warner Islington.



Fig. 2: General impression of a modern projection room, Ster Century, Romford

Another important 'new' feature of the projection room to note is the height of the floor level relative to the screen section (see figure 3). These 'boxes' are now located at a much higher level as a result of the introduction of the wall-to-wall picture and the advent of the stadium seating arrangement in multiplexes in an attempt to provide much improved sight lines. The projection room floor level in section in some multiplexes is now almost above the centerline of the picture. This means that the angle of incidence from the center of the picture to the top picture line can be as much as 9 degrees, whereas previously this would be in the region of maximum 5 degrees. The 'keystone effect' is mitigated by side black serge masking and by the use of shaped aperture plates.

Wherever possible, when planning auditorium design, architects should note that projectors serving different screens should be staggered (on plan) so as to avoid reflections in the opposite screen. It would also be preferable for the projectors to be located on the main projection floor itself rather than to be positioned on 'pedestals' (this is sometimes done to get an extra row of seats at the rear of the auditorium).

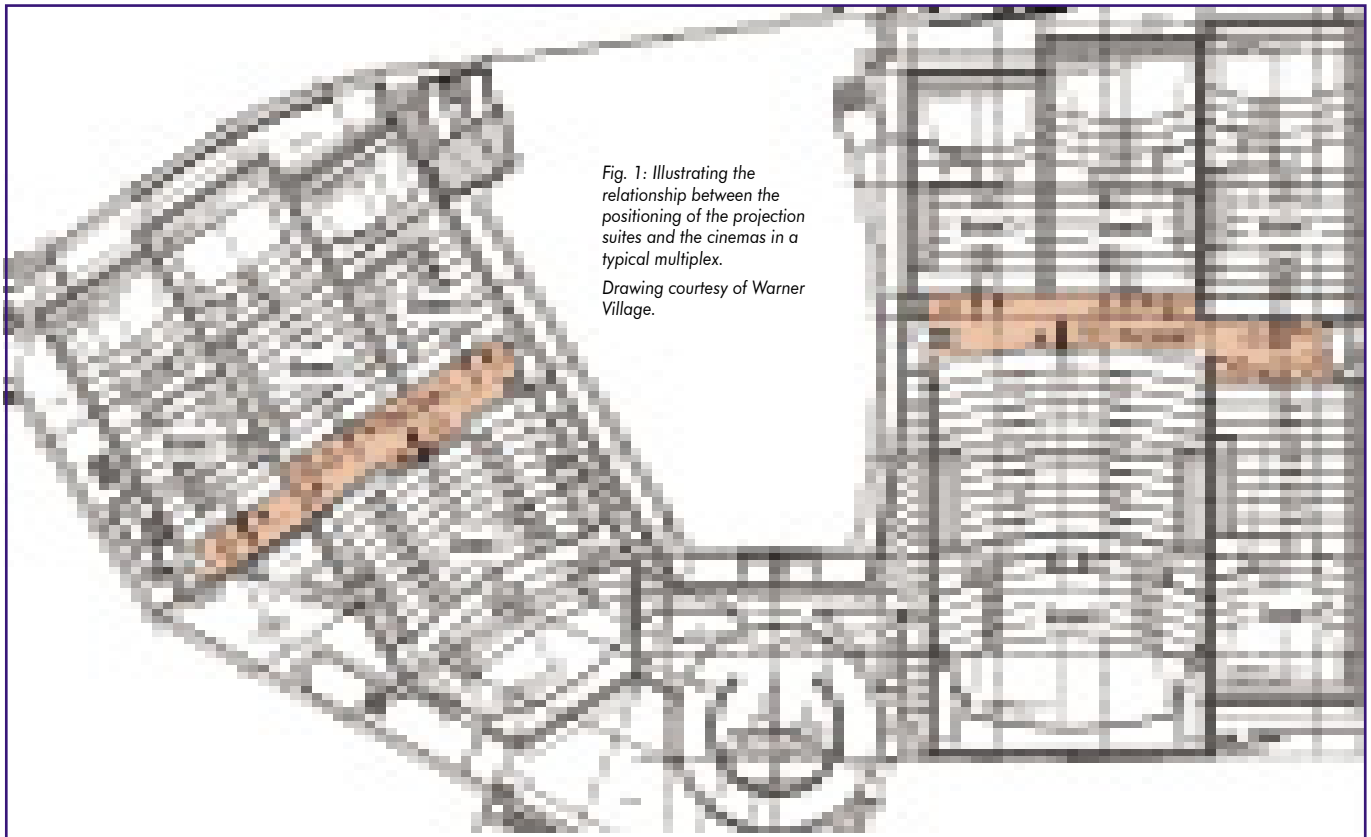


Fig. 1: Illustrating the relationship between the positioning of the projection suites and the cinemas in a typical multiplex.  
Drawing courtesy of Warner Village.

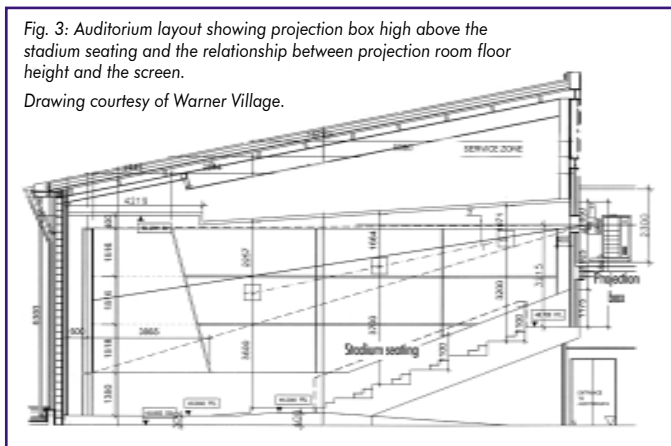


Fig. 3: Auditorium layout showing projection box high above the stadium seating and the relationship between projection room floor height and the screen.  
Drawing courtesy of Warner Village.



Fig. 4: View of platter, projector and sound rack (right). Ster Century, Romford.

### Equipment and Cinema Automation

We now need to discuss the equipment and hardware supplied for each screen to make it an operational cinema. The equipment specifications will vary with each individual exhibitor, depending on their outsourcing policies. The projection room equipment specification for both of these multiplexes that I visited are detailed and comprehensive. Essentially the equipment will consist physically of a console projector such as the Victoria 5 supplied by Cinemeccanica of Italy, a film platter (this is always located on the left hand side of the projector facing the screen- the right hand side of the projector being the operator's side) and the sound equipment rack located on the right hand side of the projector (see figure 4). The projector itself consists of a console, projector head, lamphouse and exhaust, twin lens turret (for widescreen and cinemascope ratios used in commercial cinemas) and digital and analogue sound readers mounted on the projector itself. The size of the lamp house will vary from 2kw to 10kw depending on the size of the screen and the throw (distance) from the lens to the screen plane and will require a ducted exhaust to open air to provide ventilation to the xenon lamp.

The real advance in the modern projection room is that virtually all func-

tions are now automated via the cinema automation system used, such as the Vector 1000 supplied by Cinemeccanica. The cinema automation can be programmed to start the show, strike the lamps, change the lens, control the auditorium lighting, change the sound format, etc. and perform all the functions required to operate the complete film screening. The PC hard drive of the automation system is normally housed in the projector console but there are VDUs located at strategic points in the projection room so that staff can keep an eye on the ongoing film programmes at all times (see figure 5).

The sound equipment rack will consist of the sound processor (now usually a Dolby CP 650), amplifier, pre-amp and audio CD player (see figure 6). Digital sound in the auditoria is normally Dolby Digital (5:1) and Dolby Ex (8:1) in selected screens. The Romford multiplex has 2 roving DTS systems which can be moved from screen to screen where required. In the Islington multiplex the big screens have the capability of playing SDDS, the third supplier of cinema digital sound systems. The quality of the sound delivered in the auditoria is monitored by means of the 'booth speakers'.

As is evident from the illustrations in this article, space is not an issue in multiplex projection rooms. However, for those readers interested in space

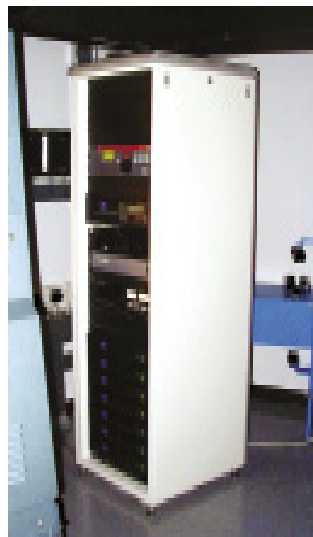


Fig. 5: (far left) Automation system

Fig. 6: (centre) Sound rack. Warner Islington

Fig. 7: (above) Rewind bench. Ster Century, Romford

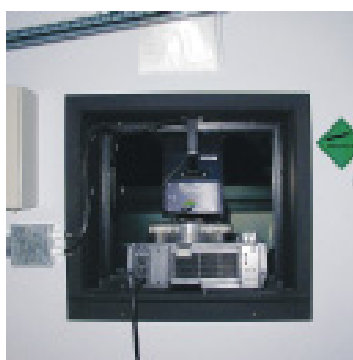
standards a bay of approximately 2.2m x 4.5m would be considered adequate to contain the main equipment required for a single screen presentation (including operating and maintenance space) with ancillary equipment such as rewind and make-up benches, etc. sited elsewhere in the 'box' at a convenient location (see figure 7). The release prints arrive in the cinema in 2000 ft spools and are deposited by the security company delivering them in the 'film drop' ready for collection by projection room staff. These prints have to be made up into the feature film and then broken down again before return to the film distributors. Apart from the Victoria 5 projector, other projectors are available for use in multiplexes. One such alternative is the Century Strong Projector Console and the corresponding 'CNA Series' cinema automation systems obtainable from a company such as Omnex Pro-Film Ltd. There are other manufacturers and suppliers as well to choose from.

Given the looming deadline of 2004 for Cinemas and other places of public entertainment to comply with the requirements of the DDA, another innovation which will no doubt feature shortly in multiplexes will be the DTS-CSS Cinema Subtitling System providing audio description and captioning to cinema audiences who are blind, partially sighted, deaf and hard of hearing. This innovative technology which incorporates a small video projector uses the same unique CD-Rom based technology as the DTS Digital Sound System. However the advantage is that it can be played independently with any other cinema sound system. Most multiplexes including the two visited will now provide an infrared system for the hearing impaired, whereby sound from the processor is relayed to a transmitter placed near the screen, and the signals are picked up by headphones worn in the auditorium by people who are hearing impaired. The infrared system does not have the same problems as an induction loop system, which can sometimes suffer from sound breakthrough between screens, if not designed correctly.

**Portholes**

Traditionally, there are usually three port-holes to each screening position - projector port, view port and the third port which is usually used for the slide projector for screen advertisements. The projector and advertisement ports require the use of optical quality glass such as Pilkington's 'Optiwhite' in order to provide the optimum picture in the auditorium and plate glass is normally used in view ports. Projector ports vary

Slide projector port.  
Warner Islington

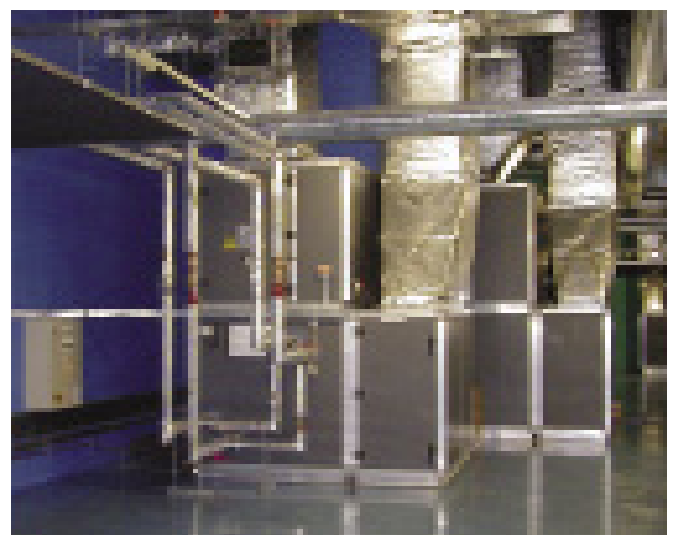


in size but are usually 550 x 550 mm (external). To prevent sound leakage into the auditorium, ports are now generally fixed rather than openable. A common trend nowadays in multiplexes and screening rooms is the use of the rectilinear port. This is becoming more prevalent because screen advertisements are now also available on 35mm film which can then be spliced in with the trailers and the main feature film. Because the level of the projection room floor is at a much higher level these days, the spillage of light onto the screen and into the auditorium does not pose such a crucial issue - hence the trend towards the rectilinear port.

**Mechanical Ventilation and Air Conditioning**

A mechanical ventilation and air conditioning system separate from the one used for the auditoria must be provided for the projection room. The recommended working temperature of the projection room is 18 deg C. For obvious reasons the air temperature and humidity must be fairly stable and constant, with fresh tempered air being introduced into the projection room and extracted to the outside. The location of AHUs (air handling units) has traditionally been sited in 3 broad areas - adjacent to the screen, in a separate plant elsewhere in the building or on the roof. Whichever location is chosen, the siting of the AHU will have its own benefits and drawbacks. Generally the air supply to the auditorium is provided at low level at the screen end and extracted at high level at the rear of the auditorium. In Romford the AHUs are located in the projection room (see figure 8)- the drawback for this location is that static and dust are created in the projection room and have to be dealt with as a potential problem. In the case of Romford the platters are fitted with

Fig. 8: Mechanical Plant. Ster Century, Romford



a cleaning unit with brushes, so that the film is 'cleaned' on its way to the projector gate. Because of the need to create the wall-to-wall picture in the auditorium, AHUs are rarely positioned next to the screen these days.

**Electrical Installation, Lighting and Fire Alarm System**

A single phase supply is generally provided to the projectors and 3 phase supply to the rectifiers. Lighting in the projection room needs to be arranged carefully so that light is not spilled on to the screen via the ports. Task lighting is provided at each working station. An illumination level of 500 lux is usually provided in the projection room and 200 lux at bench working level.

The fire alarm system in a multiplex is normally operated on a 3 stage basis. The first stage is when a problem is notified to the office. The second stage allows a timed interval for the problem to be investigated before the third phase evacuation procedure of the premises is carried out. Customers in wheelchairs will be provided with an escape route to an assembly point outside the premises. The assembly point will be provided with a 2-way communication system to the office so that trained designated staff can attend immediately to the wheelchair person/s by taking them down stairs in 'evac chairs', in cinemas located in a multi-storey building.

A range of fire extinguishers and fire blankets are provided in the projection room and are located at strategic points in accordance with the Fire Officer's recommendation. These are generally of the CO<sub>2</sub> and foam variety.

**Conclusion**

Despite the fanfare created by the promotion of the digital cinema era a couple of years ago, virtually all of the projection rooms in UK multiplexes still have analogue projectors with digital sound systems. However, the consensus



Electrical intake equipment.  
Ster Century, Romford.



Emergency battery room.  
Warner, Islington

view amongst the projection room staff I interviewed is that 'digital cinema will definitely happen in the future'- the question is 'when?'. Perhaps then it will be time for another article.

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**Bill Chew Associates  
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Established in 1988. Bill Chew Associates are specialist cinema designers and architects. The practice has successfully completed many cinema, multiplex and screening room projects in the UK and abroad for a variety of corporate and private clients.

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