

Proceedings of the Institute of Acoustics

THE ACOUSTIC DESIGN OF TWO RECENT TV STUDIOS

T L REDMORE

SOUND RESEARCH LABORATORIES LIMITED

INTRODUCTION

Studios have always been considered critical with regard to the background sound levels, noise intrusion and the internal room acoustics. Generally the design has been based upon minimising the background sound level, eliminating noise break-in and, in the case of TV studios, providing an acoustically 'dead' internal environment. The application and style of some modern TV studios has, however, led to a re-evaluation of the standard acoustic requirements on grounds of practicality, feasibility and how the studio is to be used.

Two recent TV studios with which the author was involved were to be located in areas that were originally designed as office accommodation. As such the shell of the studio was that of a standard office and the space available, in particular the height, was limited to that which would normally be expected in an office development. One studio was located at the end of an open plan office, with the studio open to the office. The other studio was located in an area that used to be a cellular office mid-way up a tower block.

Although some of the basic problems were similar for both studios the design aims adopted and methods of achievement were different. In both studios there appeared to be a practical lower limit to the background sound level. Also the level of noise intrusion to both studios could only be limited not eliminated.

Both studios were to be used for 'live' programmes, generally for regional news presentation, although not limited to this use. This had an important bearing on the design aims adopted. The size of the studios precluded large sets or use as a drama studio. Close microphone techniques were to be the standard production method.

The original considerations in setting the acoustic design targets together with the acoustic control treatment can be discussed separately for each studio. Although final modifications which may include acoustic changes to the most recent studio may yet occur, details of the acoustic performances achieved to date can be considered in relation to normal studio standards and the acceptability of the studios.

Proceedings of the Institute of Acoustics

THE ACOUSTIC DESIGN OF TWO RECENT TV STUDIOS

FIRST STUDIO

The first studio was to be a dedicated regional News Studio. The studio was to be located at the end of the News Gathering Room alongside the control room. The area had originally been a cellular office at the end of a large open plan office. The studio was to be an open studio with no wall between the studio and the News Gathering Room.

The basic concept was that the News Gathering Room would be seen behind the presenters desk. However two desks were introduced with the additional desk facing away from the News Gathering Room. Furthermore the weather forecast was to be presented in front of one of the side walls, again with no vision of the News Gathering Room.

An initial assessment of the location identified the following problems:-

- although the three walls to the studio were blockwork, one side of the News Gathering Room had windows to outside for the full length. These windows were exposed to reasonably high levels of traffic noise.
- directly above both the studio and the control room was a reprographics room. The intervening slab was only lightweight concrete and the noise intrusion to the studio area was up to NC40-45.
- a train line ran underneath part of the building and trains were clearly audible in the quieter areas.
- as space was limited the structure between the structure and the control room, which had the sound area next to the studio wall, was limited and the doors to the control room could not contain a lobby.
- the most obvious problem was the opening from the studio to the News Gathering Room. Besides the likely transfer of occupational noise (speech, telephones, equipment etc), the News Gathering Room was air conditioned with a noise level significantly above that normally used for studios.

In setting the design aim the extent of these problems was assessed as:-

- the traffic noise break-in could be reduced to NC20 or below by adding secondary glazing to the existing windows.
- noise intrusion from the reprographics room could be significantly reduced by treatment at source, and by adding an isolated ceiling to the studio and control room. It was not possible to exactly predict the reduction, but reduction to approximately NC20 was anticipated.
- there was no potential for reducing train noise intrusion as an isolated studio was not possible. This, however, was considered to be the least

Proceedings of the Institute of Acoustics

THE ACOUSTIC DESIGN OF TWO RECENT TV STUDIOS

important as the break-in only became apparent at very low background noise levels.

- noise intrusion to both the studio and the control room was obviously going to be governed by their location and separation from the News Gathering Room. Occupational noise transfer to the studio could only be reduced by means of sound absorbent surfaces between the two areas, and by 'deadening' the studio as much as possible. This intrusion would always be more than from the Control Room. Also the air conditioning noise from the News Gathering Room would transfer to the Studio.

The design aims were significantly governed by this last problem. The air conditioning noise in the News Gathering Room was NC30-35. With the intervening sound absorption and taking a low Reverberation Time in the studio into account, it was considered that a background sound level for the studio's air conditioning of NC25 was the best that could be achieved. Although above the background sound levels in other studios in the complex, it was considered that this should be acceptable, especially with the use of close microphones.

Based on this background sound level the remaining aims became:-

- low Reverberation Time to minimise the level produced by noise intrusion.
- reduce noise intrusion from the road traffic, the reprographics room and the control room to below NC25.
- reduce occupational noise transfer from the News Gathering Room as much as possible, although no actual aim was set.

It can be noted that noise intrusion was grouped into that caused by sources that could be identified by the viewer i.e. News Gathering Room, and those which could not be identified i.e. a reprographics room, traffic noise. It was considered that noise intrusion from an identifiable source would be acceptable, whilst unidentifiable sources should be eliminated if possible.

The basic aims were achieved. However the following was found on completion:-

- the background sound level of NC25 was acceptable.
- although traffic noise break-in was reduced to below the background level and was not audible in the studio, the low frequency component was amplified by the studio microphone relative to other frequencies. This could be eliminated by use of filtering on the control desk and although it was thought initially that the sound engineers would not consider this acceptable, this has been the method of overcoming this problem.
- noise transfer from the reprographics room was eliminated to the studio. However one item of equipment that was not isolated as recommended set up a

Proceedings of the Institute of Acoustics

THE ACOUSTIC DESIGN OF TWO RECENT TV STUDIOS

standing wave in the Control Room, with a peak at the producers chair. Again it was thought that this would not be acceptable, but no further work was necessary.

noise transfer from the News Gathering Room was audible on transmissions. No reduction was requested as this was considered part of the studio concept. When the News Gathering Room was in shot the noise intrusion was more in keeping than when the desk facing away from the News Gathering Room was used. One initial problem with this desk was the original set was concave and acoustically reflective, which caused focussing to the desk. This was overcome by changing the surface treatment.

Overall the studio was considered very successful.

SECOND STUDIO

London Weekend Televisions South Bank Television Centre contains a tower block of offices over the standard studios. This office block overlooks the Thames with views northward to the river and many of London's landmarks beyond. As part of their night service LWT decided to set up a links studio on the 10th floor, which allowed views of London through the windows behind the presenter. As a links studio the acoustics were not critical, and on-air time was restricted to very short periods. Subsequently LWT decided to change this into a fully equipped presentation studio.

The initial concerns identified were:-

- the tower block is air conditioned using a perimeter induction system with return air through the central core. This air conditioning is not sufficient for a studio. When converted into the links studio two air conditioning units had been installed below the ceiling of the studio. These air conditioning units contained no attenuation, as during the very short period during which the links studio was 'on-air' the units were switched off. Measurements showed that these units produced a sound level of just under NC60.

In the new studio these air conditioning units were to operate continuously. In addition to these two units there were also two fresh air fans and two extract fans which served the studio from adjacent rooms. With the air conditioning units off these four fans produced NC40-45. These would also operate continuously.

- with all the mechanical services switched off the noise level in the studio was approximately NC30. This was due to traffic noise break-in through the windows. Because the traffic was quite distant the variation in level was small, with no pronounced peaks.

Proceedings of the Institute of Acoustics

THE ACOUSTIC DESIGN OF TWO RECENT TV STUDIOS

- other noise intrusion was quite high. In particular the control room was only separated from the studio by a sliding glass door, the return air plenum for the remainder of the 10th floor was open to the studio and the noise of the lifts could at times be heard.
- the studio was 'live'. There were no sound absorbing finishes except a thin carpet. The walls were either plasterboard or glass and the ceiling was the concrete slab.

The background sound level design aim was dictated by the level of traffic noise break-in. Although it would have been possible to reduce this break-in by means of secondary glazing, this was likely to cause problems of reflections (light) and was not feasible to accommodate in the short fit out period. Furthermore any reduction in this background level would make the lift noise break-in significant, together with the potential noise transfer from the 9th and 11th floors. Reducing the lift noise would have been difficult, whilst there was no possibility of increasing the sound insulation in the vertical direction as there was no space available.

It was decided, therefore, to aim to reduce the air conditioning noise to NC25, if possible. (Therefore not significantly adding to the background level in the studio). This was difficult to achieve as the air conditioning units required attenuation on both the supply and return side. It was possible to re-locate one of the units in the corridor alongside the studio, together with the return air attenuator. The supply attenuator, however, had to be located inside the studio. The other unit had to remain in the studio together with its return air attenuator. The supply air attenuator was located in the control room. All attenuators were approximately 1.8 metres long. To reduce casing radiated noise the casings of the units were upgraded and a plasterboard enclosure installed around the unit in the studio.

Noise from the fresh air and extract units were reduced by attenuators.

The potential Reverberation Time was also limited due to the basic layout:-

- the two external walls were 50% glazed.
- a third wall was also glazed, showing a view through to a telephones room.
- the ceiling was concrete and could not be significantly covered with absorbent material as the studio lighting hung from a large percentage of the ceiling.

With the space available it was decided that a Reverberation Time of 0.4 seconds was the lowest possible.

To improve the sound insulation to the control room the glass door was removed and a plasterboard partition installed.

Proceedings of the Institute of Acoustics

THE ACOUSTIC DESIGN OF TWO RECENT TV STUDIOS

Basically the design aims were achieved. The air conditioning units were quietened as well, if not better, than expected and were below the level of the traffic noise break-in. The Reverberation Time was reduced to 0.4 seconds, although because most of the absorption is located along one side of the studio some areas appear livelier than others. No absorbent material has yet been applied to the ceiling, as the requirements of the lighting director are still being determined. Once the location of lights are fully established some absorption will be applied to the ceiling, especially around the 'livelier' areas.

The studio has been in use for three months and so far the level of noise break-in appears acceptable, as does the Reverberation Time.

CONCLUSION

For both studios the acoustic design aims were, generally, by necessity, set at levels outside those normally used for studios. In particular the background sound levels and the level of noise intrusion were higher than the standard levels. Both studios have operated successfully with these levels. It cannot, however, be said that the levels used would be acceptable for all types of studios. It would, in fact, be expected that the levels would be excessive for most other types of studios.

It is considered that this demonstrates how each individual building or room needs to be assessed for its individual needs. Noise intrusion to these studios is acceptable because the picture indicates that there are external noise sources, whilst the effect of the background sound level is reduced by the use of close microphones. Similar acoustic conditions are unlikely to be acceptable in a radio station where the external noise sources cannot be seen, whilst the background sound level is more important as the source to microphone distance is increased.

Studios, as with most other types of room, have a wide variety of uses. The acoustic standard should mirror this variety and be suitable for the particular application i.e. radio studio, drama studio, music studio etc.

ACKNOWLEDGEMENT:-

The author would like to express his gratitude to London Weekend Television for allowing the publication of this paper.

3000

ISBN 1 873082 21 5