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ACOUSTICS AND THE FOLK DANCE BAND MUSICIAN

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INTRODUCTION

Small choirs and instrumental ensembles playing in medium sized halls such as are found in most towns and villages are familiar with the differences between such halls in the ease with which the members can hear the others in the ensemble, a factor which is essential for maintaining good cohesion. Folk dance bands, usually consisting of from three to eight players, encounter a particular difficulty as they have to play in a high noise background caused by the movements and conversation of the dancers. The author has led folk dance bands in approximately a hundred different halls over the past ten years and this paper is a preliminary study of relationships observed between aural contact among players and their acoustic environment.

The sections which follow are based on observation and experience during this period, illuminated where possible by acoustic principles. As a working hypothesis, it is assumed that the properties of a hall contributing to good aural contact are:

1. Those properties which contribute to aural contact in the absence of noise.
2. Those properties tending to reduce audience noise, particularly around the players.

These two effects are assumed to act independently. even though particular physical attributes of the hall may influence them in the same or opposite directions.

To make further progress it will first be necessary to establish a subjective scale of aural contact by which playing situations can be ranked and correlated with objective data. The relative importance of the two groups of properties above could then be assessed; at present, observation suggests that the background noise may largely swamp acoustic differences which become revealed in its absence.

BACKGROUND NOISE.

Owing to its importance, this will be considered first. Folk dancing, by its structure in which each couple combines with many others in the course of a single dance, encourages verbal exchanges which add to the noise of movement and there may be people sitting out and naturally wishing to converse. Sound reinforcement is usual nowadays, but only to a level sufficent

to overcome noise so that the music is clearly audible and the call intelligible at the back of the hall, though this level may vary greatly as a result of the 'Cocktail Party' effect.

The importance of background noise was recently demonstrated by comparison of recordings of an experienced band in rehearsal and in the course of a dance which gave rise to unusually high noise level. Although the players were only vaguely aware on the second occasion of lack of cohesion, the difference between the recordings was dramatic, the more so because the background noise causing the difference was largely suppressed by the close microphone positions used for the recordings. More familiarly, the effect of noise is felt in the contrast between playing in a pleasantly live hall with a quiet listening audience as opposed to the same audience dancing.

It is advantage for the band to be in a proscenium stage, other things being equal. Playing from the floor in front of a stage, or even from a fore-stage, is always found more difficult than from behind the proscenium arch. In fact, conditions improve as they retreat further towards the back, but this is generally unacceptable because it destroys communication with the caller and social rapport between the band and dancers.

According to observation in many halls it is an advantage for the ceiling to be partially absorbing as the reverberant sound field generated by the noise is thereby reduced. Side walls do not seem to be so important, but if, as in the Aquarius Ballroom at Hednesford, Staffs., they are deeply recessed to provide or communicate with sitting out areas, the generation of noise in the hall is significantly reduced. The worst halls in this respect are those with low, reflecting, flat or barrel-vaulted ceilings. The high wooden pitched ceiling of Lichfield Guildhall was found to be excellent. Many post-war local halls have barrel-vaulted ceilings focussing near the floor, and one hall with a flat reflecting ceiling sloping down towards the rear was found perticularly bad.

These observations are in accord with expectations of noise generation in the respective spaces but measurements of levels in relation to loudspeaker power, room characteristics and attendance are needed to confirm them on an objective basis. It would also be useful to carry out measurements to verify the apparent fall of noise level inside a typical proscenium stage, as this may be a directional effect rather than one of absolute level. Such measurements are now being planned.

ACOUSTIC FOLD-BACK

This describes the transmission of sound from a player back to himself and to other members of the ensemble by reflections from

the surroundings, by analogy with the use of headphones by some performers during recording sessions. It has been noted previously that a horizontal surface at a moderate height over the stage of a concert hall (as in the Colston Hall, Bristol) improves contact between orchestral players (1) and horizontal flats have been used by the author in television studios for the same purpose, the extreme deadness of the studio acoustics otherwise presenting difficulties. Choirs singing on stages normally equipped for drama likewise experience a sense of isolation caused by the absorbing surroundings.

A small reverberant hall, in the absence of noise, assists cohesion but if the surfaces of the hall are too distant, the support is not present, presumably because the reflections are weak and arrive too late to reinforce the direct sound between the players.

These observations lend support to the expectation that local reflecting surfaces are important even if the players are closely grouped to exchange the maximum amount of direct sound. In a proscenium stage, the surfaces are near enough to be useful if they are not deliberately sound-absorbing. High flies packed with waiting sets and a generous provision of permanent borders and legs increase the difficulty of maintaining contact. A box-like stage with reflecting surfaces is better though not always very much so and may be disappointing. The Southampton Guildhall stage, after reinstatement following a fire in 1963, was lined with scattering shapes with the object of improving the warmth and definition of sound in the auditorium.(2) Conversation with members of the choir which performed in the opening concert revealed that, as a side effect, they found it easier to hear each other than it had previously been with flat surfaces, suggesting that diffusion helps.

DESIGN PRINCIPLES

The features of a hall contributing to low noise levels and local reflections may well prove to be mutually contradictory, e.g. the observations on the effects of a prosceniumstage in reducing noise and also absorbing reflections. They may also conflict with requirements for other uses of the hall; these possibilities must be kept in mind when considering design.

Firstly, the playing area should not be an integral part of the main body of the hall, particularly if the hall is large and reverberant. The stage should preferably have a low ceiling relative to its other dimensions with an opening adjustable to the width of the band. (Stage curtains are suitable) The interior surfaces should be reflecting but preferably irregular to promote diffusion. Some low frequency absorption may be desirable though enough may be supplied by the stage structure. A stage designed permanently on these lines will undoubtedly be unsuitable for some other uses

as, for example, drama; the resolution of such conflicts by the use of free-standing or flown sets, curtains, flats etc. is not in principle difficult but is a problem of management and finance that will be most likely to be solved if the hall has a central management organisation promoting its use for varied professional and amateur performances, and capable of organising the design and manufacture of such facilities.

Secondly, the main ceiling should be flat or pitched and at least partially absorbing. A coefficient of 0.2 at middle frequencies appears to be sufficient. It should not be unduly low - about 7m appears to be adequate for a medium sized hall - and if curved its radius should exceed twice the ceiling height to avoid focussing of noise generated near the floor. If sloping, the slope should not be downward from front to rear.

If a hall is being designed with a considerable usage for dancing and similar entertainments in mind. it is worth while to recess sitting-out areas, service hatches, bars etc. well into the side walls so that noise from them does not contribute to the audience noise in the hall itself.

CONCLUSIONS

Certain tentative rules for design of medium-sized halls to improve aural contact within musical groups are given with particular reference to folk dance bands playing in the presence of noise from the dancers. Further work is required for the establishment of a subjective scale of aural contact and to establish the relative importance of the factors involved. Such work could lead to improved design and treatment of the many local halls which serve communities with varied types of musical and social entertainment, thus helping to improve the standard of what is offered.

REFERENCES

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2. T.Somerville et al. 1966 J.Sound Vib. 3 (127-134). Recent work on the effects of reflectors in concert halls and music studios.