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THE MEDITERRANEAN CONFERENCE CENTRE, VALLETTA, MALTA

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INTRODUCTION

The original proposal for this hall was for three main purposes, as a conference centre, a concert hall and a contract television studio with full static facilities. A preliminary scheme was therefore submitted to the Government of Malta in which the television requirement would be met by the construction of a heavy double cyclorama which could be drawn along rails all round the working area. The working area would be limited to about a third of the floor between the stage front and the permanent seating,

This scheme was discussed with the architects and found to be impracticable and it was eventually decided to eliminate the television requirement except for drive-in television coverage of conferences and concerts. By this time the matter was becoming very urgent, as a booking had been made by the Prime Minister, Mr. Mintoff, for an international Security coference in February 1979, and it was now October 1978.

A site meeting with the architects was held on November 7th, and all the main decisions on acoustics and sound insulation were made on that day. There were several constraints on the design: the site was the closed courtyard of the 16th Century Sacra Infirmeria of the Knights of St. John and the government insisted that the walls and ancient stone arches should remain as a visible feature. Sound insulation had to ensure a maximum level of NC20, excluding aircraft noise not only from civil craft using Luqa airport four miles away, but also British military aircraft based at the time on the island. The roof trusses had already been designed and delivered with a maximum loading capacity of 100kg/m^2 for the whole roof. The very short time for construction left no opportunity for tests on models or materials, or for intermediate measurements.

SOUND INSULATION

A three-skin roof seemed the only possible way to provide a high enough insulation. The trusses support an outer roof of 22g corrugated steel and the lower truss members carry 75mm thick Woodcemair slabs on steel channels. 5m below this is a floor of 19mm t & g chipboard suspended from the truss by steel rods. There being no precedent for the accurate calculation of the transmission loss of such a structure, estimates were made by various devices, that the level difference between the space above the roof and the hall would would be not less than 30dB at 63 Hz, rising to 70dB at 1 kHz; this would be adequate

apart from a possible slight deficit around 125Hz.

Tests after completion showed this prediction to be fairly close, and no aircraft noise has been reported as heard inside the hall. Joints between the Woodcemair slabs were sealed with adhesive tape and both the inner skins were covered with 50mm thick rockwool as thermal insulation and acoustic damping.

Fig. 1 is a vertical cross section of the roof.

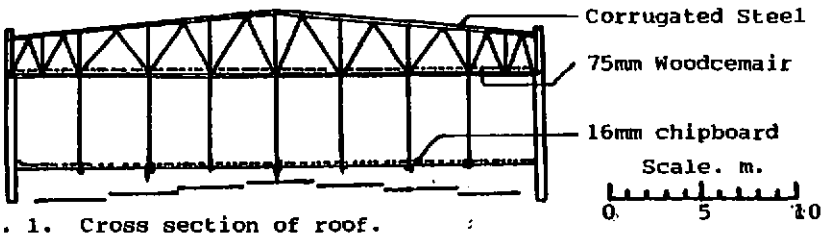

Fig. 1. Cross section of roof.

ACOUSTICS.

The long section of the hall is shown in Fig. 2. The volume is 11,460 m^2 and it was decided to design for a maximum reverberation time of 1.75 sec. with 2/3 audience, or 700, and to make any possible provisions for reducing it for speech. The plan dimensions excluding stage are 33 x 25 m, too square for musical warmth but giving a moderate distance of 35m to the furthest seat for intimacy.

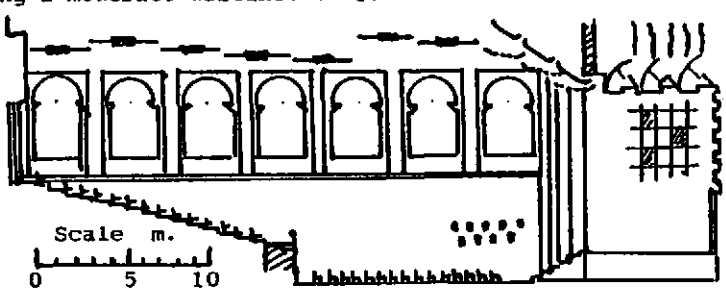

Fig. 2. Long section of hall

To achieve the greatest accommodation to music and speech, it was decided to follow the lead given by Somerville et al. (1) and independently by Schultz (2), by introducing variable elements in the stage itself to give local diffusion for music and direction for speech. The interior walls of the stage are deeply coffered and there are profiled flats which can be lowered to blank off the fly tower. Three flat reflectors are suspended over the stage apron, and these can be lowered from drawn-up positions to assist early reflections for speech.

Some variation in general absorption was allowed for by provision

heavy curtains which may be drawn across the arches on each side of the hall. Behind the arches are wide stone corridors which are undamped except for carpet runners to silence footsteps.

The visible ceiling of the hall consists of 3.7m square plates of tinted rigid acrylic plastics, each carrying a lighting fitting above. These are individually horizontal but stepped up towards rear and the middle line of the hall; the front two rows are, however, 1.2m higher than the third, leaving a gap through which stage spotlights can be operated. Reflections from the rear wall are absorbed or diffused by vertical polygonal prisms alternating with 100mm deep slatted rockwool absorbers, from 1.5m upwards.

Additional low-frequency absorption was provided on the side walls of the hall in the form of polished plywood in two thicknesses, over air spaces of various depths damped with rockwool, arranged in a manner similar to that described by Kuhl and Kath (3), and forming a series of regularly spaced coffers. A strip,2m wide, of rockwool was also fixed to the chipboard soffite above the gap between the ceiling plates and the side walls.

COMPLETION

By a miracle, wrought by the Architects of MaltConsult, the builders and craftsmen, under the dedicated and tireless leadership of Michael Ellul of the Ministry of Works, the hall was opened for the conference on February 13th, just 97 days after the site meeting. This was not achieved by any neglect of finish or workmanship; the woodwork of the balustrades, panelling and rear wall is superb and the added stonework is carved to match the existing surfaces. The whole gives great aesthetic satisfaction.

TESTS

Reverberation and other tests were carried out in April 1979. The stage interior was unfortunately not complete and was shut of by temporary curtains fron the Naples Opera House. It was therefore only possible to test in a compromise condition. Listening tests failed to detect any slap-back from the rear, but there was a high frequency flutter echo between the side walls audible in positions near the centre. This is unlikely to affect sound from the stage, but could interfere with the speech reinforcement system which uses loudspeakers at the sides. Fig. 5 shows the results of reverberation measurements in curve (a). The rise at high frequencies is due to the flutters and is mainly contributed by central test positions. A thin porous layer covered with fabric inserted at the back of every third coffer was recommended as the cure. Curve (b) is an estimate of the eventual time with 2/3 audience, in the music condition.

Listening to speech confirmed the impression gained from reports of the conference that the intelligibiliy is satisfactory. With recorded music from the stage apron, a pleasant 'spatial impression (4) was noticed, most particularly when listening near the back,or near the front of the permanent seating. Two observers from Xandir Malta (Radio Malta) concurred with these observations.

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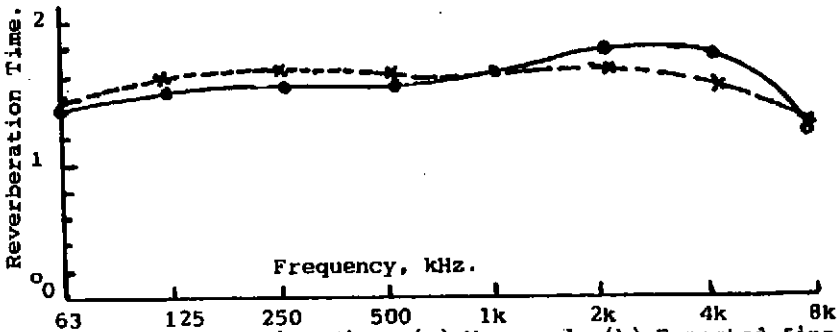

Fig. 3. Reverberation Time. (a) Measured (b) Expected final.

I left with Mr. J. Avellino of Xandir Malta, who is in charge of technical arrangements, details of musical acoustics questionnaires and intelligibilty tests, but at the time of writing, no results have been received, nor have I been advised of the final completion of the stage area. This is very disappointing, as I had hoped to be able to present with this paper some well-founded test results and opinions of the hall in both speech and concert uses. As it is, I can only say that I felt very happy with the sound of the hall and with the probable outcome when complete, and also with the test figures of insulation and reverberation. When it becomes possible to make measurements in both conditions and examine the results of properly-conducted listening tests, I shall be very pleased to send a copy of a final report to anyone interested.

REFERENCES.

(1) T. Somerville, C.L.S.Gilford, N.F.Spring, R.D.M. Negus, 1966, J.Sound.Vib. 3.127.'Recent advances in Concert Hall Design'

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(3) W. Kuhl and U. Kath. 1963. Rundfunk. Tech. Mitt. 7.270. 'Akustische Anforderungen in ein Konzertstudio des NDR in Hannover'

(4) A.H. Marshall, 1967. J.Sound Vib. 5. 100. 'The influence of cross section on the acoustics of concert halls.