Building a recording studio in a bank! A practical examination of some of the acoustical and audio design considerations for a new multi-track digital facility for Montréal's *Les Disques Star.*

Timothy Hewlings and Jean-Luc Louradour
Résonance TJL Inc., PO Box 5020, Ville St-Laurent (Québec). H4L 4Z6 (514) 745-8180

Introduction:

The owner of Les Disques Star, M. André Di Cesare, is one of Québec's most successful pop record producers. His work has taken him to some of the world's best known studios, both in North America and in Europe, so, when he was finally able to realize a longtime dream and build his own facility, he had some very definite ideas about what he wanted from a studio.

Site selection:

One objective was to keep the facility centrally located, so new construction was ruled out as being prohibitively expensive. The space had to be large enough to house the offices for the 30 or so, employees of a burgeoning record company, as well as the studio, but remain small enough to retain a certain amount of intimacy. The client also wished to own the property, rather than lease it.

After having evaluated several locations, the "bank" was found - counters, vault and all. The 40 year old, 3-story building had housed the offices of a local credit union and had been unused for several years since more modern quarters had been built. Situated in the City of Verdun, adjacent to downtown Montréal (and with numerous tax advantages), it has a store-front entrance on a street which, although relatively busy, carries mostly local traffic plus a few buses and a truck from time to time, but is situated far from any flight paths. It is in the middle of a city block and shares party walls with a community centre on one side and a small store on the other. The clear height of the ground floor is 3.5 m and the floors are wood-frame construction on 2 x 10 in. joists, supported by steel H-beams and columns - less than ideal conditions for building a recording studio.

Design Criteria:

The main room would be intended, primarily, for recording rock and pop artists/groups, but with the capability of recording larger ensembles such as brass or string sections, if necessary. Sessions for recording basic tracks often include acoustic and amplified guitars, acoustic piano, live drums and singers, so isolation from instrument to instrument would be important. The control room (CR) would require a large listening window behind a state-of-the-art 128-input mixing desk. Ample space had to be provided behind the console to install synthesizers. Noise levels were specified at < R.C. 18 for the CR and < R.C.15 for the studio.

Construction:

A large section of the ground floor of the bank was removed and Studio A built at basement level, to give greater interior volume to the room (finished height is over 6 m). The interior shell is completely self supporting. However, structural constraints made it impossible to remove the entire floor, so the control room was built at street level, overlooking the studio. Two large iso-booths were built, one on top of the other, facing the CR window, giving the interior a horseshoe-shaped appearance. The lower booth can be further sub-divided by a hinged partition. Access to the upper booth is via a catwalk approximately 2 m wide, which may also be used as a recording platform. The upper booth also supports one end of the ceiling trusses. The vaulted ceiling is a series of trapezoidal shapes for added rigidity - noise from the offices above was a major concern - and sound diffusion. Another booth, large enough for a grand piano, was built under the CR. Two other masonry "bunkers" were constructed outside the studio space. These have permanently installed instrument amplifiers for heavy guitar and bass tracks. The storefront windows were maintained, and a section of the studio inner shell wall was constructed in glass-brick to permit daylight to enter. Acoustical treatment consists of a combination of semi-rigid fiberglass panels and Schroeder diffusers. RT60 during and after completion of acoustical treatment (measured in 1/3 octave bands with a MLSSA system) are shown in figure 1. The first measurement was made before the installation of the low-frequency (LF) absorbers and diffusers, but after most of mid- (MF) and high-frequency (HF) absorption was already in place.

The main CR is essentially an irregular octagon, with lateral walls and ceiling splayed to direct first reflections away from the listening point. Monitor loudspeakers are flush-mounted in the front wall. Audio processing gear is installed in wings on either side of the mixing desk. The tape machines, amplifiers and power supplies are installed in an adjacent machine room.

A major addition was made to the rear of the building to accommodate a mechanical room, a second CR and a client lounge. The second CR and studio are essentially parallelepipedic and are intended primarily for pre-production and overdubbing.

HVAC:

To achieve the required sound isolation and ambient noise levels, four separate HVAC units were used. A system on the roof serves the office areas on the second and third floors, while another is used for Studio A. A third unit feeds the main CR, the second CR and machine room and a fourth smaller unit takes care of the overdub studio. Figure 2 shows the results of some recent measurements of the systems in Studio and CR A. (The slightly elevated noise levels in the CR measurements around 60 Hz and above 2 kHz were caused by the console computer and some audio gear which could not be shut off.) The mechanical engineers and contractors did an admirable job.

Electronic installation:

The installation includes audio, video, MIDI, AES/EBU, loudspeaker and control cabling throughout the building; there are over 13 km of audio cable alone. Four main audio patch bays allow access to any recording space from either control room - with their attendant special grounding and isolation requirements. Both CRs can access either the 24-track analogue tape machine or the 48-track digital recorder via a series of multi-pin connectors and the 66 microphone lines are also accessible from either CR through simple multi-pin connector patches.

There is an extensive CCTV network within the building with television monitors in both CRs so that visual contact can be maintained with areas that are not visible from the mixing desks.

From his office on the second floor, the studio owner can monitor (audio or video) and communicate with either studio or control room.

Foldback system:

A proprietary foldback system was designed and built. It has a 32 x 24 matrix which can be accessed by both CRs simultaneously and can be split between the two. The matrix can output with 12 individual stereo mixes accessible from either control room which can be patched to any pair of headphones. Each pair of headphones has its own amplifier with volume control and the whole system is powered by a single, central power supply.

How does it sound?

Figure 3 shows the magnitude of a typical transfer function in the MF and HF measured at the mixing position. The solid line represents the left loudspeaker and the dotted line the right. Similarly, figure 4 shows the LF response. No room equalization was used. There are some anomalies caused by console reflections, which tend to disappear with some spatial averaging. Several mixers have been using the room for the better part of a year and have been universally satisfied with the results. As well, the loudspeaker designer from Finland has conducted his own listening tests and given the room his benediction.

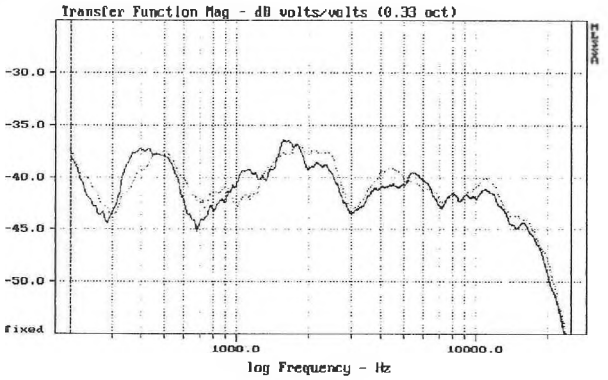


Figure 3

Figure 1
RT60 - Studio A

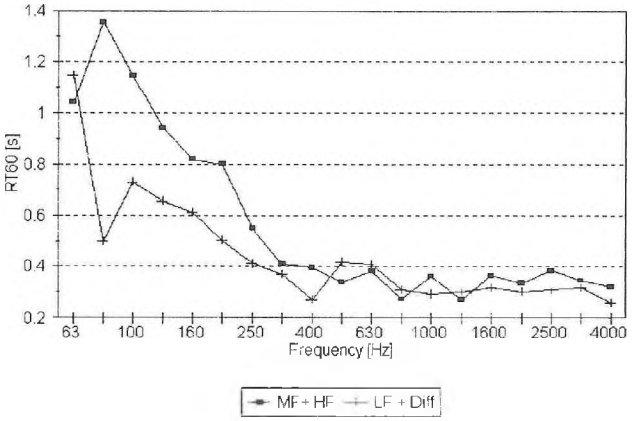
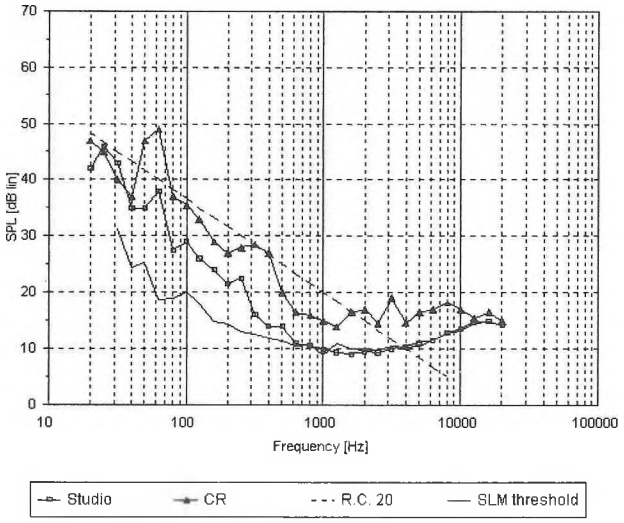


Figure 2
Ambient Noise



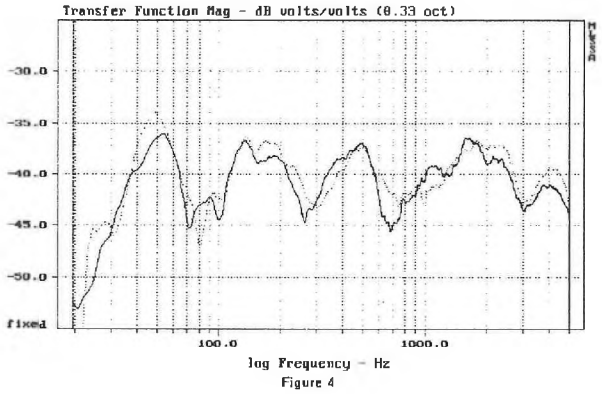


Figure 4