Note

# Wind Generated Tonal Noise - A Practical Solution

**R T Benbow**
Principal Consultant,
Dick Benbow & Associates Pty Limited
Member firm Aust. Association of Acoustical Consultants

A consulting acoustical engineer is often called upon to solve unusual noise problems. Many of which are quite perplexing when first explained by the client and at times unbelievable. This article recounts my experience investigating and solving wind generated tonal noise from the television industry's transmission tower located at Chatswood in Sydney.

The transmission tower is located adjacent to the Pacific Highway and from the top of the tower - approximately 240 very long metres above the ground - a magnificent view of Chatswood CBD and the whole of Sydney may be enjoyed - photograph 1 presents the view.

A residential area is located to the west of the tower and approximately in the middle of photograph 2, the occupants of one residence began experiencing an unusual whooing noise during night time. A discussion with their neighbours failed to assist them in understanding where the source of this strange noise was located. It appeared that their home was being affected in isolation. Over a period of several months two other residents, one immediately north of the tower and another to the south east, registered complaints with the local council.

How the transmission tower became the suspect source is not known but my client - one of the operators of the tower - requested that I speak to the affected residents. The residents to the west were being greatly affected by the tonal noise, their sleep patterns were significantly disturbed and the investigation concentrated on this residence. Acoustical instruments - a precision SLM and acoustic tape recorder were installed in the residence. The noise occurred during the early hours of the night and the residents were shown how to operate the instrument set.

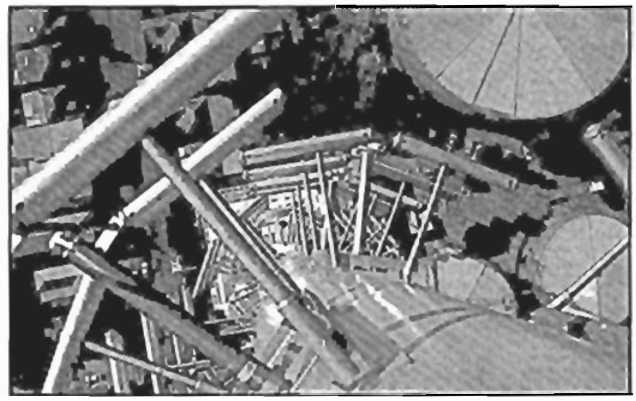
Further enquiries were able to correlate the date of the first complaints with the installation of a set of new dipoles at the top section of the tower. A spare dipole was available and subsequently installed in a studio at the television centre. Wind speeds obtained from the Bureau of Meteorology for the times of the night recorded by the residents were adjusted for height above ground. A silenced fan and ducting were used to simulate the exact wind speeds and the whooing sound was suddenly audible in the studio. The dipole configuration is shown in photograph 3. Drain holes are provided in the ends of the dipole tubing.

Now that the source has been located it should be a relatively easy task to design the solution!

Fortunately, there were very few options available. The common sense approach was to block the holes, however, this would cause unacceptable maintenance problems. The solution was designed using a very practical technique - masking tape was placed over the holes and a biro used to pierce the tape and gradually enlarge the diameter of the hole. A variety of equivalent wind speeds were generated until the best hole diameter could be found. Rubber grommets were designed and a rigger enjoyed swinging from a boswain chair inserting the grommets in all 36 dipoles. No more complaints were received from the residents. The project absorbed about 20 hours of consulting time.

*Photograph 1*

*Photograph 2*



*Photograph 3*

One interesting aspect remains which has bedevilled me ever since in regard to the whooing sound. A third octave band analysis of the tape recordings showed the tone to be located in the 800 Hz band whereas the simulated tone was located in the 630 Hz band. I would enjoy receiving any technical explanations from the more analytically minded readers.