



# FORUM

Conducted by Neville Williams

## Curses . . . they've done the impossible!

"The difficult we do immediately. The impossible takes a little longer." So runs the old slogan, which nobody ever took seriously. But it seems to have happened to us and left us with a slightly pink face. Pink, I said, not red!

The situation to which I refer had its beginning when we received a request from a reader which was summarised thus, for publication in the January issue:

**ECHO UNIT:** I have been searching for circuit diagrams of an echo unit other than a spring delay-line type, a reverberation plate or a tape unit. I require a type that possesses a variable delay time with a natural echo that I can use in conjunction with a PA system and other musical systems. (M.H., Brisbane, Qld.)

We've been receiving letters like this quite regularly for the past ten years at least. Most frequently they have come from electronic organ enthusiasts who have realised that such an instrument, played in a largely echo-less lounge room, needs some artificial reverberation to make the sound more satisfying and more like it would be if the same instrument were being played in an auditorium.

To be satisfactory for this purpose, the artificial reverberation needs to be quite diffused and to persist over one to two seconds. Methods which have been attempted or exploited include the following:

1. Diverting part of the organ output to a loudspeaker in a cellar or a large buried stormwater pipe, then picking up the sound, plus echoes with a microphone which feeds a second amplifier in the listening room.
2. Using a horn driver loudspeaker to feed sound down a long coiled length of plastic hose pipe, with a microphone at the other end to pick up the sound after it has travelled down the pipe.
3. Diverting some of the signal from the organ to a transducer which vibrates a large, free-hanging metal plate. A contact microphone attached to the plate picks up the sound energy after it has traversed the plate, along with random residual vibrations.
4. Feeding the energy into coiled springs, picking it up again at the far end of the springs with a suitable transducer.
5. Recording the original sound on a loop of tape then picking it up again with a series of playback heads. This produces a series of artificial echoes, delayed in time according to the speed of the tape and the distance between the heads.

The spring reverberation unit is the one which has proved most practical for standard electronic organs, guitar systems, and such like.

The level of the signal fed to the springs, and the frequency response of the input and

output amplifier chain has to be chosen very carefully, however, if the system is to work well. With too much level or too much bass fed into the springs the reverberated output will suffer from cross-modulation. On the other hand, too little input and too much gain after the springs will cause them to produce shattering noises when bumped.

Get everything just right and they can give extremely good results.

But, of course, springs, plates, chambers, tubes and tape systems are mechanical in operation and "primitive" in the mind of electronically oriented people. Hence the frequent questions about achieving the desired results by purely electronic means.

Over and over again through the years we have had to make the point that, for all practical purposes, it could not be done. It has just not been practical to delay signals for a second or more in electronic circuits — unless you're prepared to think in terms of a transcontinental telephone line, or something of that nature. So we've got used to saying "it's not possible".

That's what happened towards the end of last year, for the umpteenth time. Faced with the letter mentioned above, one of our staff dashed off the answer which appeared in the January issue. All this would probably have happened sometime during November. The answer read as follows:

There appears to be a popular misconception among a section of our readers, namely that it is possible to produce an audio echo effect by purely electronic means. Unfortunately, we know of no way in which this can be done and, while it might be presumptuous for us to say that it cannot be done, we

will go so far as to say that it is impractical at the present state of the art. What's more, we would suggest that anyone who can come up with a practical solution will make a lot of money. In the meantime, M.H., we are afraid you are going to have to settle for one of the systems you have nominated, or go without, for we know of nothing else.

Editor Jim Rowe noticed the par in the final page proof; he had some reservations for reasons that will become apparent in a moment but decided that it was near enough to the truth to let it go. Once material gets into made-up page form, close to printing deadline, fairly powerful motivation is required to induce an editor to tear it to pieces!

But a couple of readers were free from such inhibitions. The more outspoken of the two has this to say:

Dear Sir,

In your columns of the January 1971 issue of "Electronics Australia" you had a query about an echo system. Your reply, I feel, was made from an uninformed viewpoint.

There has been on the Australian market for several months an electronic echo generator. It uses analog to digital conversion, digital delay up to 320 milliseconds, then digital to analog reversion (See "Australasian Electronics Engineering", November 1971.)

Your magazine obviously is one of the main links between the industry and the public in Australia and I feel that you have a responsibility not to perpetuate obsolete ideas.

G.G. (South Yarra, Vic.)

Superficially, it looks like a real red-face situation. But, before we become too ruddy of countenance, let's have a closer look at the actual device in question.

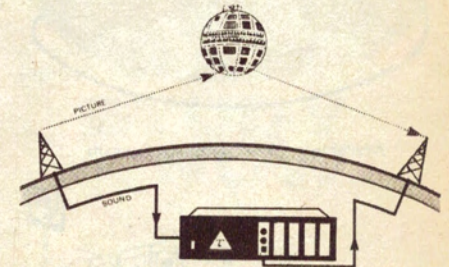
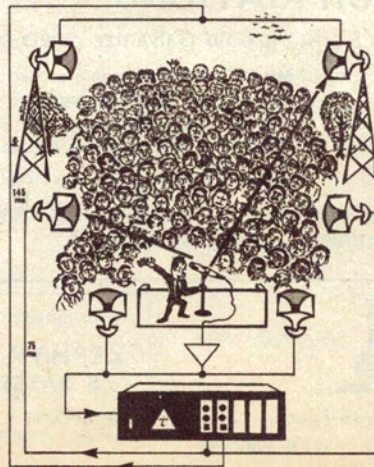
We assume that our correspondent is referring to the unit advertised on page 30 of the issue of the aforesaid journal, and advertised by Simon Gray Pty Ltd.

To give it its full name, it is the Gotham Delta-T 101 Audio Delay System. It operates in the manner which our correspondent describes and does indeed produce a significant audio delay. What is more, the specifications make beautiful reading to anyone who has had to put up with the problems of electro-acoustic delay devices:

Response, 20Hz to 12KHz, plus and minus 2dB; harmonic distortion, less than 1%; input signal dynamic range, 60dB; wow and flutter 0%

You little beauty, but . . . . .

The least expensive model sells wholesale (including duty) for \$5,154. For that you get a single echo which can be delayed in time



Reproduced from the manufacturer's brochure, these are the kind of jobs for which the Delta-T Audio Delay System is best suited. At left it is being used to delay the signal fed to the more distant loudspeakers so that the audience hears the sound from all sources at the same instant.

up to a maximum of 40 milliseconds.

Undoubtedly there would be some professional and/or specialised applications where a precise 40mS echo would be worth every bit of \$5,154. If it were otherwise, the companies concerned would hardly have gone to the trouble of developing and marketing a device of that nature.

But for the production of electronic music, as from an organ or guitar, it would be an awful lot of dollars to pay for a tiny bit of echo. As we mentioned earlier, synthetic echoes for that purpose need to be so numerous that they blend into a smooth reverberation effect, and they need to extend over a couple of seconds, if required.

To be sure, you can get a Delta-T unit with a longer delay but the price has climbed to \$11,801 by the time the delay has reached a maximum of 320mS. I gather that it is possible to extract up to 5 outputs, but each extra output involves several hundred dollars for the requisite extraction circuitry!

If you happen to own a recording studio and you want to transfer your artists acoustically into the City Hall, the Delta-T unit would be nice to have around.

Or, if you're wiring the City Hall with a multiple loudspeaker system and want to introduce a progressive delay towards the rear of the auditorium, a Delta-T would make it very easy to arrange.

But, best of all, if you own a satellite system and want to delay cable-borne sound to coincide with the satellite-borne picture, \$12,000 odd for a maintenance-free electronic delay system would be a mere detail!

On the other hand, to hang on to an

Gentlemen:

The **ELECTRO MUSIC Department of Columbia Broadcasting System Inc.**, is the owner of the well-known trademark **LESLIE**. I call your attention to Australian registration number **B208, 357**.

The September 1971 issue of "Electronics Australia", in an article starting on page 36, refers to "so-called Leslie systems" and "conventional Leslie".

Will you please note and permit your readers to note

- (1) **LESLIE** is a registered trademark owned by Columbia Broadcasting System, Inc.;
- (2) **LESLIE** denotes a brand of goods — goods emanating from a

particular source of origin;

- (3) There is no such thing as "so-called Leslie systems" or "Conventional Leslie". The proper terminology would be effects or sound produced by rotary sound channels;
- (4) The trademark **LESLIE** is properly used only thus:

**LESLIE SPEAKER SYSTEMS; or  
LESLIE DEALERS; or  
THE LESLIE TRADEMARK.**

For your information, **LESLIE** is also a trademark for organ accessories other than speaker systems.

Very truly yours,

Paul T. Kramer  
Export Sales Manager  
**ELECTRO MUSIC**

domestic electronic organ, \$12,000 worth is a bit much for a reverberation system!

Can one buy or build an all-electronic unit more appropriate to the task, with a diffused and sustained output, and selling at, say, \$200?

No you can't. If that's what you need and that's the kind of money you are prepared to pay, you may as well settle for a spring system and forget about the all-electronic approach for the foreseeable future.

But even though it's still not possible "at the present state of the art" to build or buy a practical unit for the role envisaged, we

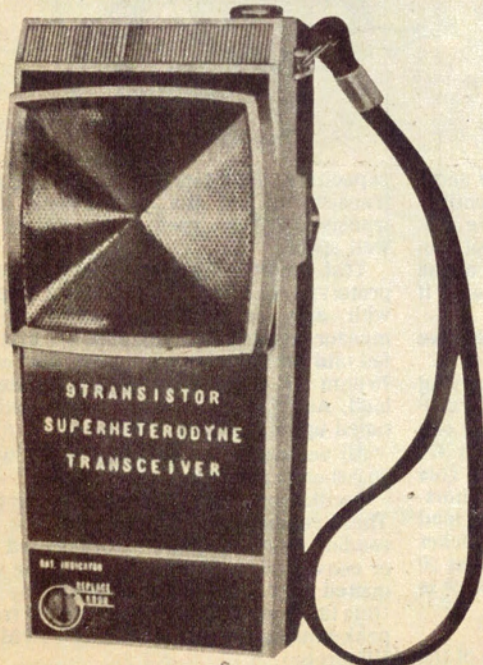
must agree to modify the stock answer we have been giving all these years.

The manufacturers of the Delta-T unit claim that, in its most developed form, their Audio Delay System utilises the equivalent of 600,000 transistor functions. The question is how long it will take to enlarge the time delay and signal content of its output while, at the same time, rationalising circuitry on this scale to the point where it can be marketed for one-twentieth the price or less.

Anyone who manages to do this may very well "make a lot of money".

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