The Live End Dead End (LEDE) concept is a relatively recent approach to control room design and there are very few fully certified rooms at present in operation. This is the background—both theory and practical experience—of Tres Virgos, one of the first LEDE studios built.

Jerry Jacob

The LEDE* control room design

*LEDE is a US registered trade mark of Syn-Aud-Con

The studio under Robin's management grew rapidly to 16-track. Unfortunately we were getting famous, not just with musicians, but with our neighbours as well who just loved hearing vans load up at 4:30 in the morning. Each session brought new success and a summons from the law to keep it quiet.

By 1978 we knew our days were numbered. We started to think about the new studio.

Our demands seemed simple. We believed that a place which is to be used to record music should make musicians feel good. Feelings are what music is all about and a studio should take on the characteristics of the players regardless of the form of their creative expression. A studio should be able to handle everything from solo cello to a full rock ensemble.

Studio technology, aside from its cosmetics, should be invisible to both the performer and the producer. The musician, producer, engineer, microphone and loudspeakers, and the listener and record buyer, should be one linked chain responding to the emotion of the music. No portion of the set-up from cue system to master tape can be askew.

A control room is a monitoring system in which producers and engineers perform. It is their stage and it should allow them to acoustically view the performance as the microphone hears it and as the tape captures it. A control room should not impose its will on the performance. If you want to achieve these lofty goals then it stands to reason that any tape recorded there will translate exactly on any playback system.

The new kind of control room design was supposed to be revolutionary. The idea was to put the soft stuff at the front of the room and the hard stuff at the back and nice things would happen to your tapes and your ability to hear. LEDE developed out of a new level of scientific acoustic measurement technology called Time Delay Spectroscopy (TDS). This patented measurement system was developed by Richard Heyser, of the Jet Propulsion Laboratory.

A studio owner and designer named Chips Davis had actually translated the theory to reality in his own control room at Las Vegas Recording in Nevada. Chips had received the first certification and authorization to use the trade mark LEDE from Syn-Aud-Con. His room had been measured and it performed predictably! It did what it was supposed to do. Allen insisted that we consider the LEDE design and proved his point with a couple of hundred dollars worth of building materials, a pair of UREI 813 Time Aligned loudspeakers and a weekend of hard work. On Monday morning we owned what might have been the first LEDE-style garage. The frequency response flattened out to the point where we could toss away our 1/5 octave graphic equalisers, the stereo perspective was like wearing a headset and the imaging was really amazing. More amazing now that we know how really primitive our early efforts were.

The success was short lived for soon the sheriff and the county encouraged by our outraged and very tired neighbours were at the door with paycheck.

We started searching for a location for our nice little new studio. Due to considerations including our budget, skills, quality and emotion we were forced to build the new room ourselves, with our own hands. We talked to designers who thought they might be qualified to provide a real LEDE room for the new Tres Virgos, and although most backed away from the project Chips Davis said yes almost instantly.

Chips had built a couple of rooms since Las Vegas Recording, but he wasn't quite satisfied with any of them. They weren't what Chips knew he could deliver to a committed set of owners building from the ground up. We promised Chips that there would be no compromise. What he designed we would build. What he specified we would do—on the agreement that if it didn't work we would probably do him great bodily injury.

In January of 1980 we signed a very attractive lease on 2,900 sq ft of warehouse space in a most convenient location in San Rafael, California. We planned to add an additional 900 ft by creative lofting over halls and offices. The full 20 ft ceiling height was to be utilised over the studio and control room.

February 1, 1980, saw the beginning of the construction project that was to last 22 months until opening day and probably for ever to complete the off-line facilities and to accommodate future plans.

So that we're all on somewhat common ground perhaps this would be an ideal time to list the seven criteria established by Syn-Aud-Con to qualify for LEDE certification.

1. There should be a low-frequency asymmetrical outer shell, free of pronounced resonances at low frequencies. This shell to be large enough to allow the development of bass frequencies.

2. There should be a symmetrical inner shell. The crossover frequency between the outer bass shell and the inner geometric frequency shell should be:

$$f_x = \frac{3}{4} (velocity \ of \ sound)$$

3. The smallest room dimension

4. An effectively anechoic path should exist between the monitor loudspeakers and the mixer's ear which extends for at least 2 to 5 ms beyond the studio's initial time delay gap.

5. A highly diffused (at geometrical frequencies) sound field should be present during the initial onset of the so-called Haas effect.

6. The monitor loudspeakers, microphone technique, and mixing console should not 'mask' the desired anechoic path from the monitors to the listener, including the period beyond the monitor to the ear's physical distance (studio ITD + 2 to 5 ms).

7. No early sound (EES) should be present. This is sound that arrives at the mixer's ears ahead of the direct sound travelling through the air. EES occurs when monitor loudspeakers are not shock mounted and therefore radiate through the structure and re-radiate in the air, usually from the ceiling, near the listener.

The hard-surfed rear wall, rear side walls, and rear ceiling should be so spaced temporally as to provide interwoven comb filter patterns which become a high-density early sound field without measurable anomalies.

We agreed that if we were to become LEDE certified, we would have to really understand the reasons and the logic behind the system. It all became clear as Chips explained TEF, TDS and the LEDE concept: "TDS is a vast improvement on pulse testing which has been in extensive use for over 40 years.

"STUDIO SOUND, APRIL 1983"