

## PARALLEL PROCESSING

### Millennia Media TCL2 Valve and Solid-state Twin-topology Optical Compressor

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Millennia Music and Media Systems manufacture high-end signal processors with the unusual feature of dual circuit paths - solid-state FET and valve topologies running separately, side by side. Hugh Robjohns checks out the company's opto-compressor.



I don't know why all equipment manufacturers like to make compressors, but they do! There seems to be a compressor to fit every price range, feature set, colour scheme and rackmount size - and still new models continue to appear. But is there really anything new or different left to offer? Well, the TCL2, produced by the American company Millennia Media, has at least one novel feature. Like their NSEQ2 dual-channel equaliser, which I reviewed in *Sound On Sound* July '99, it can be switched between two separate signal paths, one based on solid-state technology, the other employing valve circuitry.

#### Giving It The Once Over

Appearance-wise, the TCL2 shares a strong family resemblance with the NSEQ2; it has a standard 2U rackmount case, although it is reasonably deep at 12.5 inches (318mm) and quite heavy at 25 pounds (11.5kg). It is constructed from substantial sheet metal, with plenty of ventilation slots on the sides and top panel. The manual recommends supporting the rear of the unit if rackmounted due to its considerable weight, and to leave 1U of space above and below to help with cooling airflow. The massive internal power supply occupies almost a third of the floor space within the unit, and is separately enclosed - a useful safety feature as it produces lethal DC voltages for the valve anode biasing.

The audio circuitry is mainly accommodated on a neat, but densely populated, circuit board mounted on the floor of the unit. Three valves are used in each audio channel (two 12AU7s and a 12AT7), while two encapsulated FET amplification blocks take care of the solid-state signal path. Two further sub-boards for each channel are supported horizontally from the front panel, interfacing the switches and potentiometers, as well as carrying the actual dynamic control element - an LED/opto cell device - which is connected as a shunt (in parallel, presenting an alternative path) rather than in series with the signal path. All pots are Vishay conductive-plastic types and the passive components are all selected for their sonic attributes. They include Roederstein resistors, Wima and Electrocube capacitors, Neglex silver/teflon OFC cabling and gold-plated valve bases and relay contacts and audio connectors.

## MILLENNIA MEDIA TCL2

### pros

- Excellent sound quality.
- Flexibility of dual topology.
- High build quality.
- Classic opto-compressor sound.

### cons

- Slow response time, misses transients.
- Level mismatches between solid-state and valve amplifiers in review model.
- Expensive in a purely relative way!

### summary

The TCL2 is a high-quality, well-built optical compressor which sounds every bit as good as you might expect at this price. The selectable valve or solid-state amplification is an interesting and useful feature.

**SOUND ON SOUND**

The TCL2 is simple to interface, using XLRs for all audio connections in and out, together with the ubiquitous IEC mains socket (with integral voltage selector and fuse holders). There is also a tag strip allowing the connection between chassis and signal earths to be separated (or extended for commoned rack-earthing systems). The compressor employs true balanced circuitry throughout - there are no transformers anywhere in the signal paths and no electronic balancing or unbalancing stages - but I experienced no problems when I deliberately used unbalanced cables.

The different circuit configurations, not surprisingly, present different output impedances: the FET path has a very low  $5\Omega$  impedance, whereas the valve path presents  $300\Omega$ . This may well have an audible effect depending on the capabilities and impedances of the connected monitoring equipment, although any changes should be extremely small if the input impedance of the succeeding equipment is much higher (say, over  $10k\Omega$ ).

Possibly as a result of this impedance change, or perhaps just because of a minor misalignment, I found there was a level discrepancy when switching between the valve and FET signal path: the output from the valve circuit was about 2dB lower (the level drop was the same on both channels). This level drop was more than enough to distract from the slightly more subtle changes of sonic character between the

two signal paths. However, since I did not experience a similar phenomenon with the Millennia Media equaliser (which uses very similar circuitry), I am assuming this discrepancy is a one-off problem with the review unit.

The circuitry of both signal paths is designed as a high-voltage Class-A system in a fully balanced topology. This provides excellent headroom, distortion and noise performance. The hand-matched valve section is also transformerless, with the attendant benefits of reducing the phase shifts, bandwidth restrictions and coloration often associated with inferior transformer designs. These characteristics are revealed in the specifications, with maximum input and output levels in excess of +30dBu, audio bandwidth extending between 2Hz and 100kHz (-3dB points), and noise better than -82dBu (valve) and -87dBu (FET).

## Controls

The TCL2 has a very simple and intuitive set of operational controls, although there are also one or two quirks and traps. Each channel is equipped with just five rotary controls and three push buttons (all illuminated). These are arranged either side of a pair of large, backlit VU meters, which dominate the centre of the machine.

Each channel is provided with a row of four continuously adjustable rotary controls which determine the Threshold, Attack, Release and Ratio parameters. The threshold knob is completely uncalibrated, but ranges between -infinity to +20dBu. The other controls all have comprehensive markings: Attack is scaled from 2 to 100mS, Release from 100mS to 3 seconds, and Ratio from 2:1 to 30:1 (the manual states that the lowest available ratio is actually 1.4:1). There are no programme-dependent algorithms for either the attack or release time constants. A fifth rotary control with an oversized knob is mounted below the others to the right of a set of three push buttons. It sets the output gain of the channel but is uncalibrated.

The three illuminated push switches just mentioned are mounted below the main rotary controls. The first (lighting green when engaged) provides a kind of bypass facility. I say 'kind of' because although the button engages or disables the dynamics processing as required, it does not bypass the entire unit as one might have expected. There is an operational trap here, as the Output Gain control remains in circuit even when the 'Ch In' switch is released. Furthermore, the fully counter-clockwise position of the Output Gain control attenuates the output signal to zero! Unity gain appears to correspond to a 10 o'clock control setting, with a further 10dB of gain available above this.

The second button (yellow) controls the meter display to show either the output signal on the VU meter (0VU equating to +4dBu), or the amount of gain

reduction (in decibels below the 0 point). There are front-panel screwdriver trimmers adjacent to each of the ratio controls to calibrate the zero points of both gain-reduction meters. The last button selects the signal path - button depressed and glowing red indicates the solid-state signal path is being used, whereas button released and dark means the valves are doing the amplification. As I mentioned earlier, the review machine exhibited a fairly consistent 2dB level drop when the valve circuit was active. The precise level drop seemed to vary slightly depending on the input impedance of the downstream equipment. When feeding a padded mic input or insert point with an impedance of 3k $\Omega$  or less, the level drop was a little more than when feeding a pukka line input of over 10k $\Omega$ .

There are two other switches, the first of which is a mains power rocker switch to the right of channel two's Output Gain control. The second is a Stereo Link button immediately to the left of channel two's 'Ch In' switch.



The Stereo Link illuminates red when active, and interconnects the dynamics side-chains of the two channels such that both channels respond equally to the one with the highest control voltage activity. However, all of the operational controls remain completely independent across the two channels - the settings of channel one don't determine those of channel two, as happens on many machines. Therefore, ensuring accurate response to peak signals on both channels requires that each control must all be set to exactly match its corresponding one on the opposite channel.

## Listening

The TCL2 is definitely a high-quality machine which justifies its high price with a smoothness and resolution expected of processors costing even more. Both the thermionic and FET signal paths are quiet, distortion-free and have extended bandwidths, although the solid-state topology predictably wins in the numbers contest.

From a subjective point of view, albeit one shared by some friends who listened to the unit, the valve section tended to add a typically 'American' sound character, which was a little dulled but slightly richer than the original signal. The FET signal path was much more neutral and, with no compression taking place, sounded virtually identical to the input signal (as checked by replugging the input cable directly to the output cable). When the two amplification chains were compared to one another, the FET circuit seemed to have more 'edge' - essentially, greater detail and clarity or resolution - whilst the valve circuitry had a very slightly softer, rounder, and fuller sound. In the overall scheme of things, however, these differences were not great and, in fact, both amplifier chains shared exceptional overall fidelity. In both

cases the TCL2 reinforces the widely held view that high-voltage, Class-A circuit topologies with fully balanced circuitry, no transformers, and selected passive components provide the most accurate and transparent means of amplifying a high-quality audio signal.

The ability to select between amplifier chains whilst retaining the same dynamics processing circuitry and attributes was an eye-opener! There was seldom any doubt over which amplifier type was most complementary to a particular source, and with most it was very clear which worked better. Sometimes the valve side sounded too soft and woolly, sometimes the FET chain sounded too sharp - but the ability to compare and then select the most appropriate topology made the TCL2 a powerful production tool.

Designing the compressor around an optical gain-reducing element has provided it with a very specific sound quality and character in its dynamic control. Opto-compressors tend to have a relatively sluggish attack time, and are often rather less than linear in their gain tracking. They react to the power of the input signal rather than its instantaneous voltage, as it takes a finite time for the light source which drives the gain reduction to respond to the audio signal, allowing the initial transients of the input signal to pass through largely unaffected. Even those devices (like this) which employ LEDs as the light source suffer to some extent.

Of course, if the audio signal is sustained the bulb glows brighter, and the amount of gain reduction increases according to the predetermined threshold and ratio settings. It is this inherently sluggish reaction to changes in the audio waveform which lends the TCL2 its characteristic compression effect - and it is much more of an 'effector' than a 'controller'.

The bottom line is that the Millennia Media works extremely well when manipulating the dynamics of a wide range of instruments - something it does in a generally musical way. However, it is of little use as a precision peak

### When Is A Stage Not A Stage?

The advertising material for the TCL2 expounds about its minimalist design approach and claims that it has only one active stage in the signal path. Both of these are laudable goals, but the statement is perhaps a little misleading in the case of this compressor. The company claims that the one amplification stage in the TCL2 is optimised to perform well as the input buffer, dynamics amplifier and output driver, all at the same time! At the risk of arguing semantics, however, to me an active stage is a single active device - one FET, transistor or valve. The TCL2 employs three double triodes in the valve chain, and two JFET modules (each containing an unknown number of devices) in the solid-state path, so the single active stage is, in reality, a multi-device amplifier. This is very sensible and practical since it allows each device in the chain to be optimised for its relevant function: the first performing input buffering, the last to drive the output, and the whole circuit providing make-up gain for the signal loss through the machine!

limiter for an analogue-to-digital converter, for example, as those troublesome little transients seemed to slip straight through! At the relatively gentle ratios, up to perhaps 3:1 or so, the Millennia Media sounded nothing short of fabulous on voices (especially male voices), guitars (electric and acoustic), and most keyboards. It does a great job of controlling the dynamics of sustained, high-energy programme material, and it bestows interesting dynamic effects on more transient audio. It can be used on drums as an effect - and a range of interesting sounds can be obtained - but would not be my first choice for levelling an overly dynamic kit as its time constants (both attack and release) don't seem to lend themselves well to that particular task.

When it comes to controlling audio dynamics, the TCL2 is at its smoothest and most transparent with slower, sustained material. The valve amplification tends to produce a smooth, warm, slightly soft character which works well with the nature of the optical compression to produce that typically American sound. The FET amplification retains and enhances a lot more of the detail of the original sound and tends to emphasise the fact that the briefest transients escape the attention of the opto-compressor, lending a bright, punchy quality to the signal.

I was often surprised that sources I expected to benefit from the valve amplifier chain actually worked better with the solid-state path, and *vice versa*. This just goes to prove that you shouldn't make assumptions about equipment or the effects of a certain kind of signal processing - it really is all about

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