High Performance Stereo AGC based on the THAT 4301

Automatic gain control is widely used throughout the electronics industry in a variety of applications. Amplitude stabilized oscillators are common in instrumentation, and the AGC circuits in every TV help produce clean, appealing pictures.

The demands for an audio AGC are somewhat different than those for the more straightforward AGCs previously mentioned. Infinite compression alone is rarely desirable for most systems. This would cause movie sound tracks and many kinds of music to sound unnatural, with sounds that we know should be loud, along with those that we know should sound soft, all at equal volume. This situation might disorient our psycho-acoustic perception of distance in movie soundtracks. In stereo systems, independent control of channel amplitude can cause stereo image shifting that, in addition to causing signals to wander relative to their location in the mix, often result in the mis-tracking of surround encoded material.

It is also desirable for an audio AGC to have a limiter that keeps sudden volume spikes from overdriving amplifiers or transmission mediums, or over-modulating a broadcast channel. Conversely, one doesn't want the gain of an AGC to increase dramatically during pauses in the source material, since subsequent material will be too loud. At best, this situation results in music and sound tracks sounding unnatural, and at worst, loud sounds following a pause drive the sound system into limiting.

Although it would be difficult to specify an "ideal" audio AGC, since the total of the requirements for each application are often unique, a good, general purpose audio AGC should include:

1. A compressor, compressing at between 2:1 and 8:1, that slowly levels out variations in source material
2. A limiter that serves to protect signal integrity and keep the signal within the systems specified operational boundaries, while allowing the AGC'ed signal sufficient dynamic range to sound natural.
3. A hold feature that keeps the AGC from raising its gain, along with the noise floor, during pauses in source material.

The attached schematic shows the complete circuit. The left and right signals are each fed into a VCA and its respective level detector. These detectors are configured for true power summing, to derive a control signal that best represents the audible power of the source material. This signal drives both the soft-knee limiter and the AGC portions of the side-chain. The limiter 's threshold is set to limit signals that are 12 dB in excess of the average level set by the AGC. The AGC derives a signal that compresses the audio level by a 4:1 ratio, but "holds" during pauses in the source material. This signal is summed into the remainder of the side chain which nullifies its effect when the limiter is above threshold. The combined signal, VCTRL-STEREO, drives the Ec- control ports of both VCAs thus implementing the AGC/limiter with hold function.

Listening tests show that this AGC does a good job of slowly leveling out variations in source material, while the hold feature keeps the gain from rising during pauses. The limiter limits, but leaves sufficient dynamic range above the AGC for the source material to sound natural.

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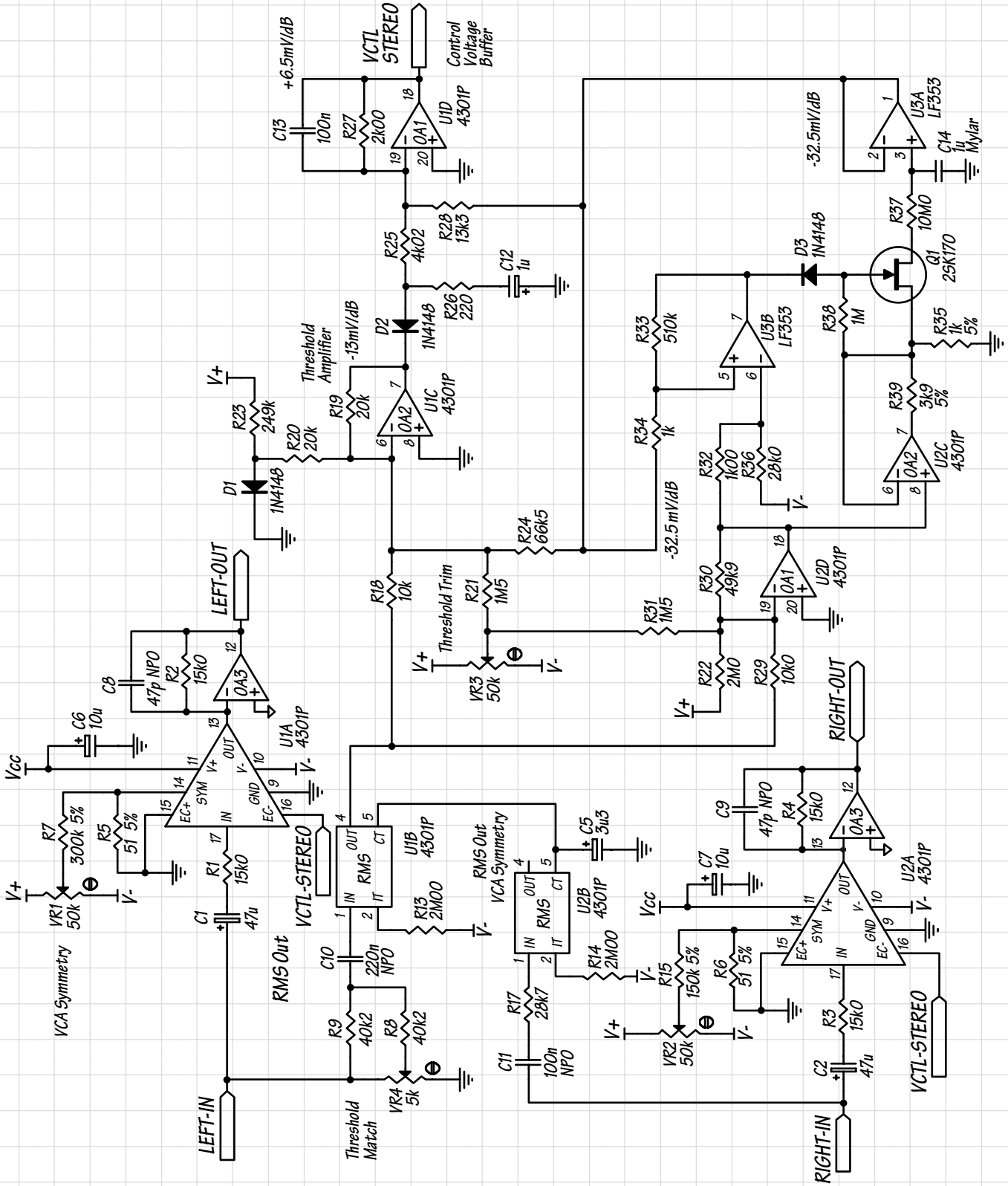

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