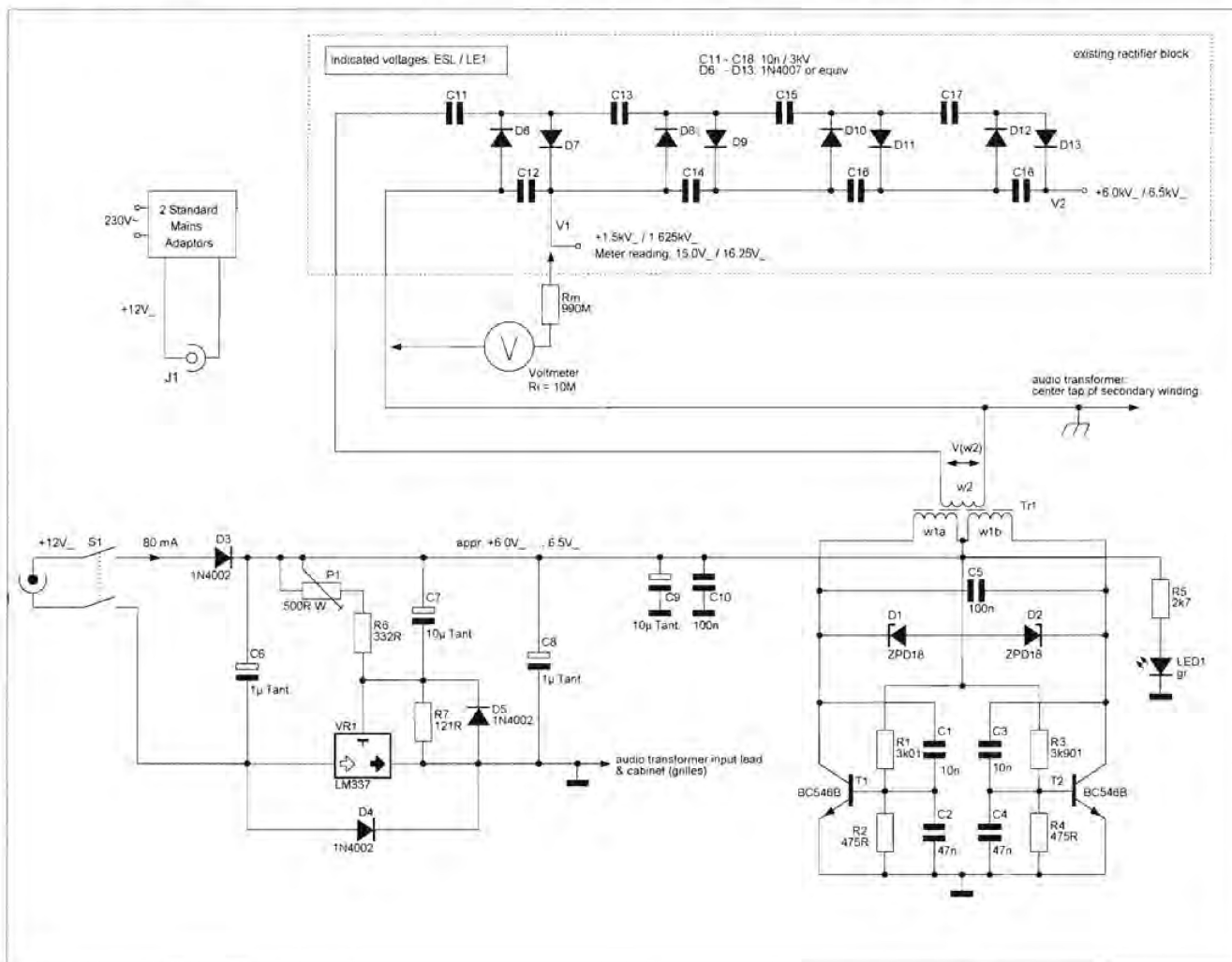


Improved Electrostatic Loudspeaker Power Supply for Quad ESL57 and Braun LE1



These are real old-timers but, when kept in good shape, still sound excellent: the famous Quad ESL, from the late 50s and its sister model called LE1, which is the German version manufactured by Braun under license of Quad. The main difference between the two: in contrast to the ESL the LE1 cabinet is a typical Bauhaus design by Braun's chief designer, Mr. Rams.

One of the few things that affects the ears is the fact that the loudspeaker's high direct

voltage (a must for the function of electrostatic loudspeakers) is generated by the mains voltage and frequency via a transformer, followed by several rectifying voltage doublers. When listening to quiet music, sensitive ears can easily identify the rather disturbing 50Hz or 60Hz hum (or higher orders of these frequencies) through the loudspeaker panels.

Replacing the existing 230V/110V - 50/60Hz power supply by a voltage generator that produces the required

alternating voltage with a much higher frequency can solve this special noise problem. This frequency should be located far outside the human listening bandwidth (approximately 50kHz). To avoid reinventing the wheel, a nearly perfect solution could be found.

Several light adaptations to H. Bonekamp's Ionisation Circuit, (printed in *Elektor Electronics*, March 1998, p. 46-49), as seen in Figure 1, make the original circuit fit for

service in a different environment. A Meissner oscillator (T1, T2) and a centre tapped transformer (TR1) generate $V(w2) = 530V_{rms}$ for the ESL or $V(w2) = 574V_{rms}$ for the LE1, both at 50kHz, set by C5 and w1a+w1b. This new block replaces the mains transformer and, in the case of the ESL only, it's 330k/2.2M network between transformer and rectifying block.

This high alternating voltage feeds the existing rectifier and voltage doubler block to gen-

erate the high direct voltages for the treble and bass panels (1.5kV (ESL)/1.625kV (LE1) and 6.0kV (ESL)/6.5kV (LE1)). The high direct voltages can be measured with a 10M Ω input resistance voltmeter in series with a 990M Ω resistor network (see figure left). Meter reading will be 1/100 of the desired value. Extreme care should be taken when working with such high voltages!

The oscillator is powered by a voltage regulation circuit around VR1. Trimming of P1 sets the output voltage of the oscillator at w2: V(w2). After removing the mains transformers inside the cabinets of both types of loudspeaker, there is enough space to fix the circuit boards of the oscillator and its internal voltage regulation.

Two standard mains adaptors (one for each loudspeaker, e.g. Egston 12V/6W) feed the loudspeaker's new internal power supply with the required direct voltage (min 10V) and current (min 80mA). The existing mains input sockets have to be replaced by low voltage types (B1). D3 prevents the circuit from wrong input polarisation.

I've been testing the LE1 with a 2 x 30W valve amp (Braun CSV60, power valves: PL504) and a 2x30W transistor power amp (Douglas Self blameless type – Self on Audio, p. 223 – with output stages formed by a pair of multi emitter transistors – 2SC2565Y / 2SA1095Y – driven by BD139/BD140). Both amps did an excellent job, no hum could be heard at all, the overall sound was and still is excellent – but better than before.

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PIC-based metronome

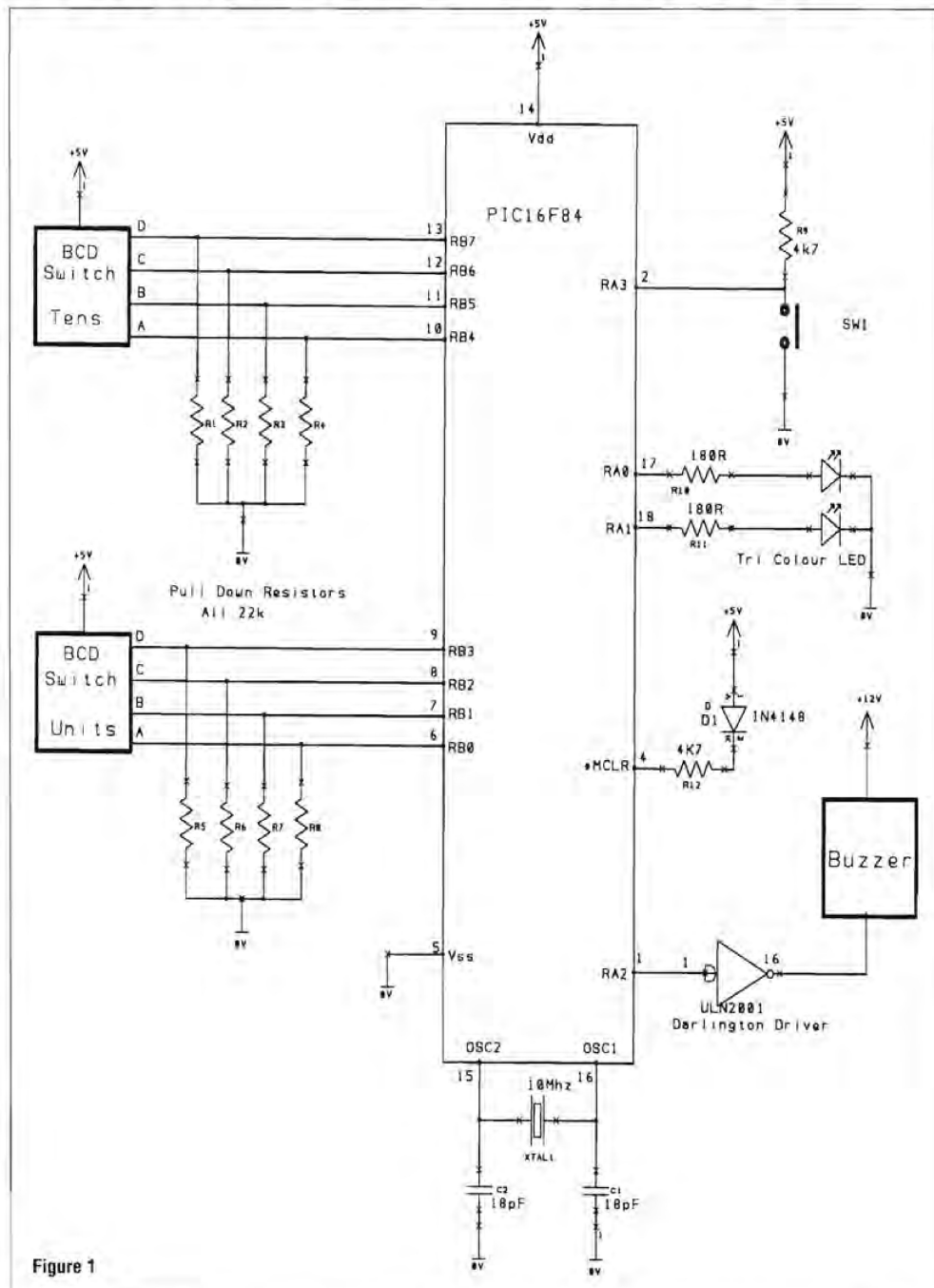


Figure 1

Part of a research study being conducted into athletic performance required athletes to perform shuttle runs between the front and back walls of a squash court. An adjustable timing system

was required, which could be altered by the researcher to provide a beep denoting the start time for each run. Since each of the athletes being tested was allocated a specific time interval between each

shuttle run, the timer had to be variable between 2.5 seconds and 4.5 seconds. Being unable to find a suitable off-the-shelf product to achieve this, a PIC-based metronome system that was