Microphone preamplifier

Figure 6 shows the complete schematic diagram of the preamplifier, with all component values. The input transformer (type E-11620), which is one of the most important components for this application, is wound with a turns ratio of 1:8+8. Here it is wired for a 1:16 ratio. This provides a good compromise between signal level boosting and the noise performance of the circuit. Furthermore, this transformer can also be used for other purposes, so its price can be kept within reasonable limits by virtue of a relatively large production volume.

The input transformer can be used with an input level of around 800 mV_{eff} at 40 Hz, but that does not mean that the amplifier circuit should be fed such a strong input signal. The maximum input level depends on the maximum output level of the complete installation. The transformer is fully encased in mu-metal, since otherwise even minute amounts of coupled-in noise would be amplified to high levels by subsequent amplifier stages.

The component values have been chosen to allow a gain of around 25 to 60 dB to be used with high sound quality. The gain is essentially determined by the values of R6 and R15. A gain of 25 dB is provided by the signal level boost of the input transformer alone. A fixed minimum gain can be thus set using R6. R15 can also be replaced by a wire bridge, a selector switch with fixed dB settings, or a trimpot. Of course, only premium-quality components should be used for this purpose. The selector switch must have gold-plated contacts and make-before-break switching, since otherwise it will produce crackling noises and switching clicks.

Coupling capacitors C4 and C5 are specially marked in the schematic diagram. The marking indicates the lead connected to the outer foil of the capacitor, which should be connected to the non-critical side of the circuit. Many types of film capacitors are correspondingly marked. The result is that the capacitor screens itself, thereby reducing the susceptibility of the circuit to interference.

The printed circuit board, whose layout is shown in **Figure 7**, allows the input transformer to be used at a ratio of either 1:16 or 1:8 by means of wire bridges. This allows other types of valves with the same basing to be used, such as the ECC81, ECC82 or similar dual triodes. However, if a different type of valve is used, the component values cannot simply be used as is. It is essential to modify them as necessary to match the dc operating point of type of valve used.

Components R3, C1 and C9 attenuate the resonance peak formed by the input transformer in combination with the amplifier circuit, in order to make the frequency response of the amplifier as flat as possible. The indicated component values can be adjusted as necessary according to circumstances. With the indicated values, the overall arrangement has a slight rise in the frequency response (around 0.8 dB) at 17.7 Hz. This could be suppressed even more, but only at the expense of a lower corner frequency at the high-frequency end.

Resistor R1 provides a finite load for the input transformer. The grid of the valve has such a high impedance that the transformer would otherwise operate with practically no load on the secondary. Since this can also result in a non-linear frequency response, a finite load impedance provides a definite benefit.

High-quality power supply

Both the enclosure for the circuit and the power supply must meet demanding require-

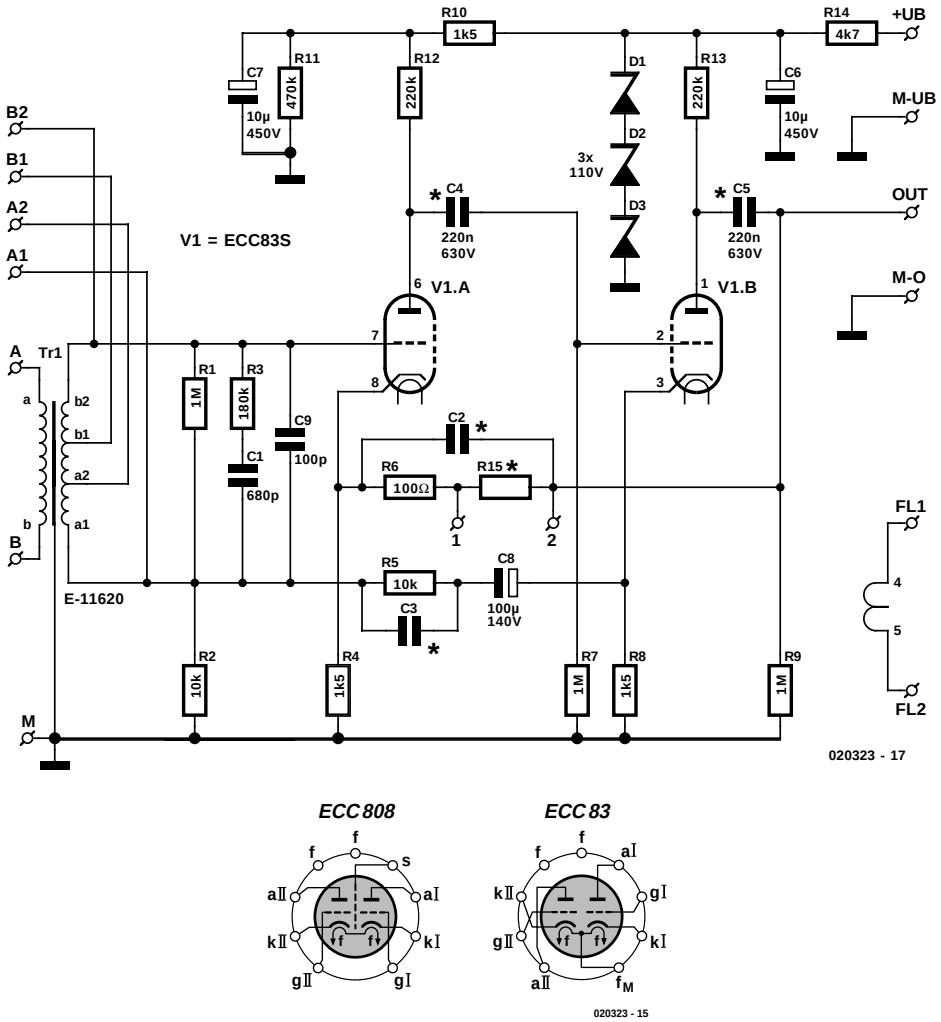

Figure 6. The final circuit of the microphone preamplifier, including the base diagrams for the two types of valves used.

f filament **aI** anode I **aII** anode 2
gI grid I **gII** grid 2 **kI** cathode I
kII cathode 2 **fM** filament tap **s** screen

(as seen from the bottom viewing the pins)

COMPONENTS LIST

Resistors:
(metal film, 1% tolerance, 0.7 watts, unless otherwise noted)

R1 = 1MΩ
R2 = 10kΩ
R3 = 180kΩ
R4 = 1kΩ5
R5 = 10k
R6 = 100Ω
R7 = 1MΩ
R8 = 1kΩ5
R9 = 1MΩ
R10 = 1kΩ5
R11 = 470kΩ, metal oxide, 2% tolerance, 2W
R12,R13 = 220kΩ, metal oxide, 2% tolerance, 2W
R14 = 4kΩ7
R15 = see text and Table 2

Capacitors:
C1 = 680pF ceramic
C2,C3 = only fitted when oscillation or RF noise is noted (approx. 10-47pF)
C4,C5 = 0.22μF 630V, MKS4, lead pitch 22.5mm
C6,C7 = 10μF 450V, lead pitch 5mm
C8 = 100μF 40V, lead pitch 5mm
C9 = 100pF ceramic

Semiconductors:
D1,D2,D3 = 110V zener diode, 1.3W

Miscellaneous:
K1 (Ü1) = E-11620
V1 (Rö1) = ECC83S, E83CC, 12AX7, ECC808 (see text)
1 valve socket, ceramic, PCB mount

Kits, special parts and PCBs available from

Experience Electronics
Weststrasse 1
D-89542 Herbrechtingen
Germany

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E-Mail: experience.electronics@t-online.de

Tel.: +49 7324 5318
Fax: +49 7324 2553

Maximum input voltage

(as a function of gain, for 1 percent total harmonic distortion)

a_u	u_i	R15
25 dB	375 mV	0 Ω
30 dB	180 mV	11 kΩ
40 dB	180 mV	62 kΩ
50 dB	85 mV	173 kΩ

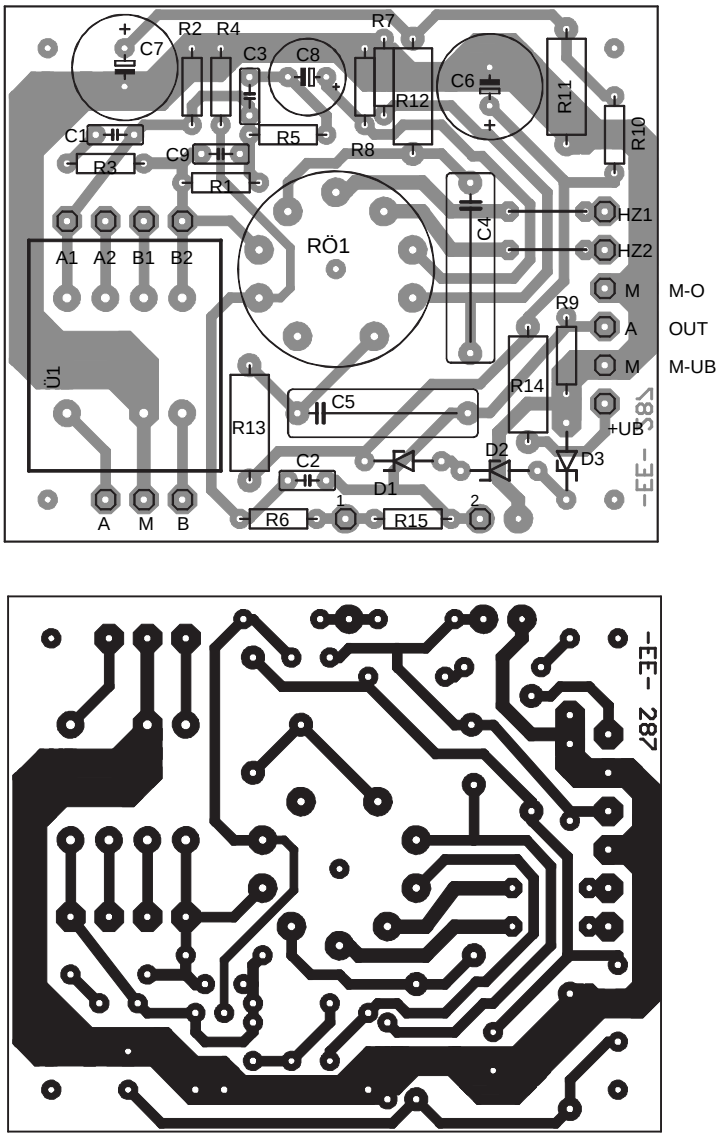

Figure 7. Circuit board layout for ECC83 (board available from Experience Electronics).