BUILD A HEPTODE 60W GUITAR AMP

By Rickard Berglund

A heptode is a tube with five grids, in which the input signal is connected to grid 1, grid 3, or both. Grids 1 and 3 give different distortion spectrums, in both of which the second harmonic dominates. But for grid 1, the third harmonic dominates over the fourth, and for grid 3, the fourth harmonic dominates over the third.

Another interesting feature is that grids 1 and 3 produce second harmonics of different phase. By using both inputs simultaneously, it is possible to cancel out the second harmonic so that the third or fourth harmonic dominates.

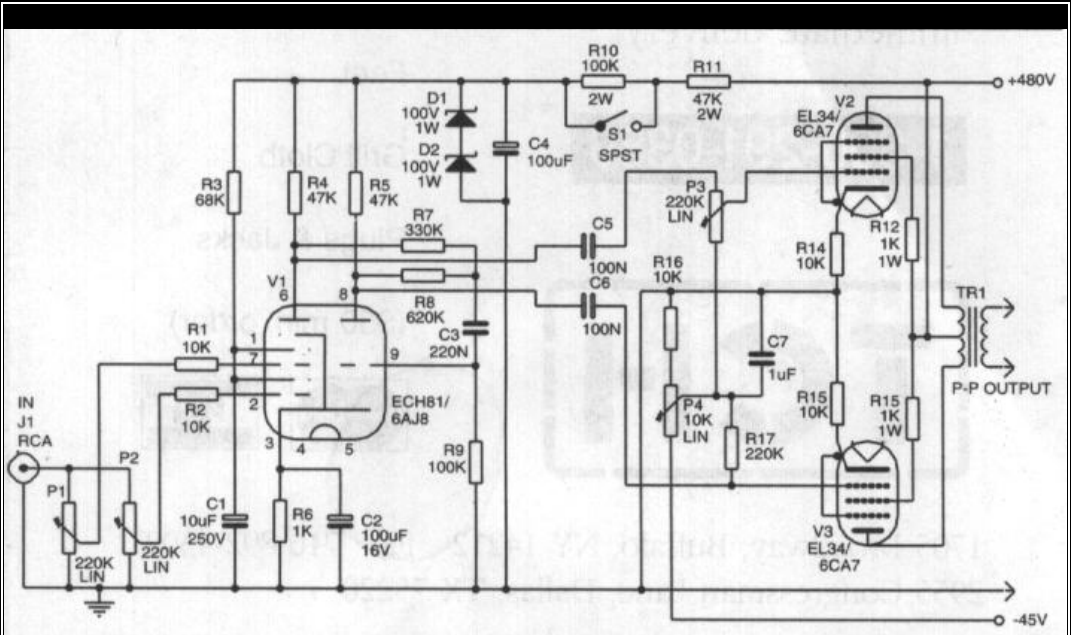

FIGURE 1: Schematic of the 60W heptode guitar amplifier.

The amplifier is shown in Fig. 1. The in put tube is a triode-heptode ECH81/6AJ8, and the output tube is EL34/6CA7. Of course, you can use other types of output tubes, such as 5881 or 6550, and you can also use the circuit to modify an existing guitar amplifier. If you use 5881 is, the primary impedance of the output transformer should not be lower than 4.5k, and a screen-grid regulator is also necessary. This tube works best with 350V at the screen grid.

Switch S1 is a distortion switch. If it is open, the distortion is 25% for full-power output. If it is closed, the distortion is 10%. Potentiometers P1 and P2 control the input signal to grids 1 and 3. Grid 1 needs 1 .5V for full output, and grid 3 needs 4V for full output, so the preamplifier must give at least 4V RMS output.

The triode part of the ECH81 works as a phase inverter. The potentiometer P3 controls the output tubes. It is possible to continuously change the amplifier characteristic from a 60W push-pull to a 4W single-ended. There are four different ways to change the distortion characteristic: potentiometers P1, P2, and P3, and the switch S1. No other guitar power amplifier is as flexible. P4 is the bias potentiometer; set the bias to 40mA (0.4V over R14 and R15).

A suitable power transformer for the amplifier is a 6.3V 4A supply, with 370V I60mA and 50V 25mA ratings. The amplifier takes 3.3A at 6.3V, so there is 0.7A left for the preamp. The power-supply arrangement for a 60W amp is shown in Fig.2; and, the corresponding parts list is presented in Table 2.

ECH8l/6AJ8 is a very common tube in Europe. In the US, it is available from Antique Electronic Supply (6221 South Maple Ave., Tempe, AZ 85283, 602-820-5411, FAX 800-706-6789).

If you don't want as much as 60W output power, you can use a lower voltage than 480V. 400V produces an output power of 37-43W, depending upon the output transformer's primary impedance. 4.5k ohms impedance offers the lowest output power (37W).

TABLE 1 GUITAR AMP PARTS LIST	
PART	DESCRIPTION
CAPACITORS	
C1	10uF 250V
C2	100 uF 16V
C3	0.22 uF
C4	100 uF
C5,C6	0.10 uF
C7	1 uF
POTENTIOMETERS	
P1-P3	220K LINEAR (250K W/1.8M Resistor in Parallel)
P4	10K LINEAR (POT,10-TURN,WWND,2W,10K ohm Jameco)
RESISTORS	
R1,R2	10K
R3	68K
R4,R5	47K
R6	1K
R7	330K
R8	620K
R9	100K
R10	100K 2W
R11	47K 2W
R12,R13	1K 1W
R14,R15	10K
R16	10K
R17	220K
MISCELLANEOUS	
D1,D2	100V 1W ZENER
V1	ECH81/6AJ8
V2,V3	EL43/6CA7
TR1	Push-pull output transformer 3.5-4.5k ohms impedance

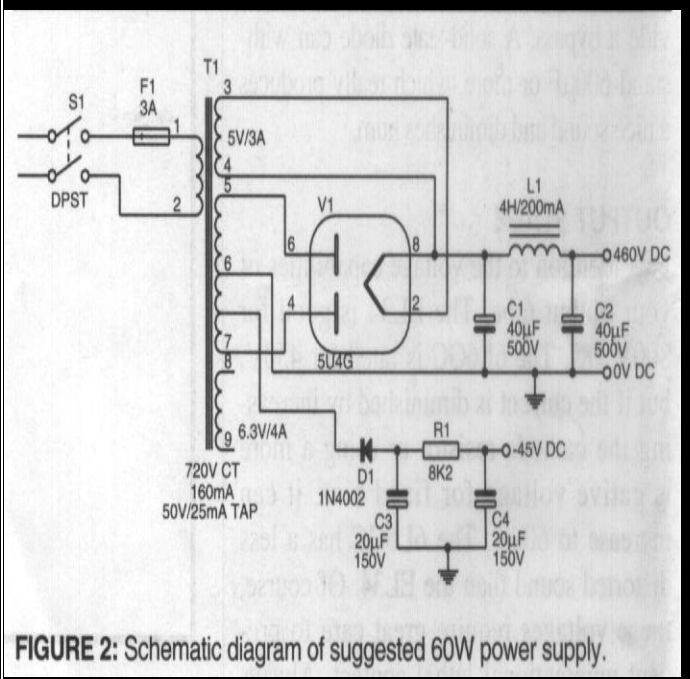

FIGURE 2: Schematic diagram of suggested 60W power supply.

TABLE 2 PARTS FOR POWER SUPPLY		
QUANTITY	PART	DESCRIPTION
C1,C2	2	40 uF
C3,C4	2	20 uF
1	D1	1N4002
1	L1	4H/200mA
1	S1	DPST
F1	1	3A
R1	1	8K2
T1	1	720V CT
SW1	1	DPST
V1	1	5U4G or GZ34/5AR4