

TABLE 3

COMMON PENTODE EQUIVALENTS

TUBE	EQUIVALENTS
EF86	6CF8, 6267, CV2901, CV8068, EF806, Z729, M8195
EF94/6AU6	6136, 7543, 8425A, CV8210, CV2524
EF95/6AK5	403B, 5591, 5654, 6096, 6968, CV2020, CV2877, CV4010, CV5216, CV5893, CV8225, CV8246, CV850, M8100
6BH6/E90F	6265, 6661, 7693, CV3908
6CB6A	6CF6, 7732, 6676
6SJ7	5693
EF184	6EJ7, 6F30
12AU6/HF94	8426A, CV1961
6U8A	ECF82, 6678, 7731
6AN8A	8489

The older Lock-in 7T7 and Octal 6SH7GT can be replaced by the miniature EF94/6AU6.

TABLE 4

PENTODE DISTORTION*

PENTODE	GAIN	HARMONIC %	
		SECOND	THIRD
EF86	98	0.5	0.01
EF94/6AU6	148	1.3	0.045
EF95/6AK5	158	1.2	0.01
6BH6	141	1.5	0.03
6CB6	189	1.5	0.03
6DK6	200	1.8	0.02
6DT6	79	1.8	0.08

*At V_B 250V, V_A 100V, V_G^2 100V, R_A 50k Ω , I_A 3mA, V_{OUT} 10V RMS

pentode, as are some brands of EF95/6AK5/5654. Table 5 lists those you should use.

The EF86 is also a good choice if you wish to use AC filament supply to a low-level amplifier. The EF95/6AK5 has lower noise than the EF86, as a result of higher plate current. I recommend an EF95/6AK5 operated at a plate current of 7mA for preamp input stages. If you use a 22k Ω plate resistor, the gain will be 110.

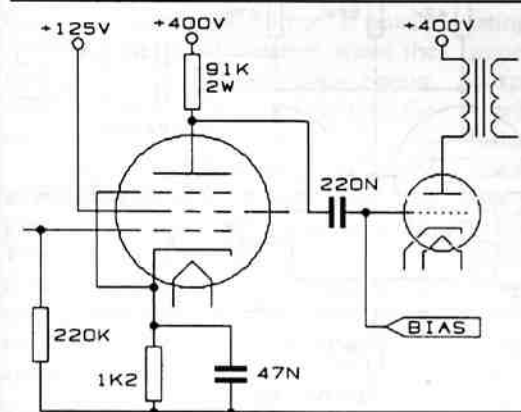


FIGURE 10: 6SJ7 as a driver for 300B.

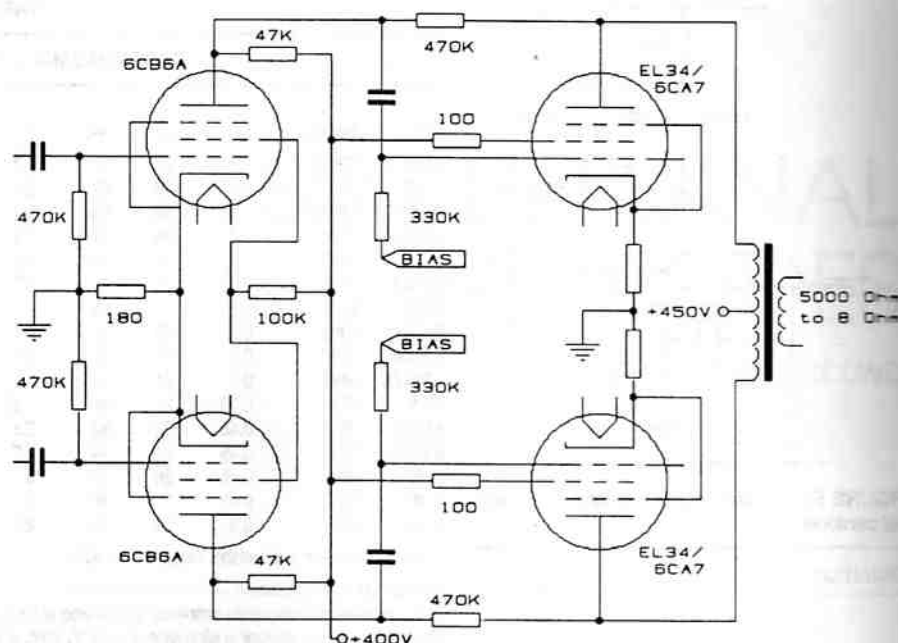


FIGURE 9: Power amplifier driver stage with local feedback.

Pentode Applications

Pentodes are often used in power amplifier input stages (Fig. 7). Sometimes they are triode pentodes, such as 7199 or 6AN8A. You can use pentodes as differential input stages for direct drive of output tubes. A high-gm pentode (e.g., EF184) operated at 200V screen and plate voltage is a good choice. The gain is 200, distortion is low, and second harmonic is canceled. The circuit is shown in Fig. 8.

In power amplifiers with no screen taps on the transformer, local feedback around the output tubes contributes to amplifier stability (lowering the open-loop output impedance). The best choice is a pair of 6CB6A pentodes (Fig. 9).

You can use a pentode as a driver for the 300B, as in Fig. 10. The 6SJ7 generates a second harmonic in opposite phase of the 300B, canceling the second harmonic.

A pentode in a mu follower will function as a top tube to increase the circuit's CMRR, as in Fig. 11. If you use the same filament supply for both tubes, heater-to-cathode voltage can be a problem. Most pentodes have only 90 or 100V ratings. Use these three small-signal pentodes with 150V ratings: EF80/6BX6/CV1376, EF91/Z77/6AM6, and EF184/6EJ7.

TABLE 5

LOW-MICROPHONY TUBES FOR PREAMPS

TUBE	BRAND
Excellent	
EF86	Philips
EF95	Philips
Good	
EF 86	all other
EF 95	Mullard
5654	GEC
5654	Sylvania

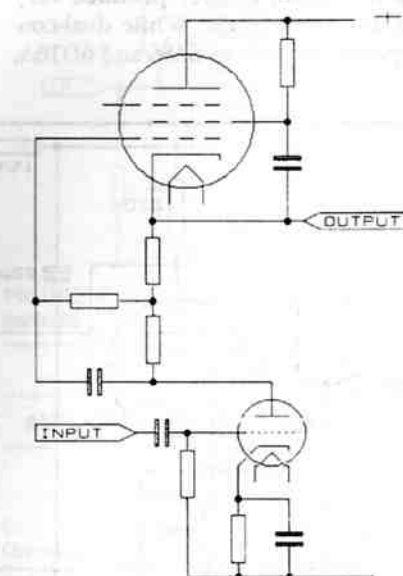


FIGURE 11: Pentode as a top tube in a mu follower.