

An Inexpensive Ultra-Linear Output Stage

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ANY audio amplifier with a pentode output stage can be converted to the equivalent of an ultra-linear output unit without the use of a transformer. The conversion can be carried out very simply and easily by using a dual pot, a twin triode and two resistors. In addition, the flexibility of the method allows the stage performance to be optimized by a simple adjustment. Advantages not present in the conventional U.L. output stage are also presented. The outstanding advantage is that no screen current

need be drawn through the output transformer. This makes possible a relaxing of some difficult requirements on the transformer.

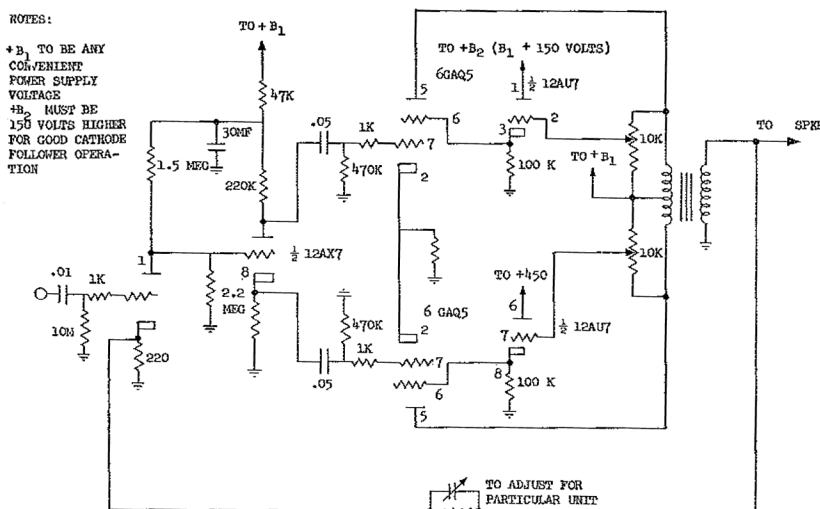
Examination of the diagram (Fig. 1) shows that for tubes V_1 and V_2 the two cathode follower grids are fed from the variable arms of the two 10,000 ohm pots which each shunt the plate windings of the output transformer. By setting the pot arms at the end furthest from the plate either full pentode operation with an extremely low impedance screen feed

is obtained or by going to the other extremity of the pots full triode-type operation is obtained; at some mid-point a position of best ultra-linear type performance occurs. This will vary with the tube type. A circuit using this drive circuit is shown in Fig. 1. However, the basic modification can be used in any output stage if proper adjustment of other feedback loops present are made for the altered characteristics of the new output stage. The circuit shown was adapted from an available unit at hand and was to determine the feasibility of the method.

Basically, this circuit introduces a local feedback in the output stage thereby altering its characteristics. Performance-wise it allows setting the screen feedback signal to the point of optimum performance. Used as a full pentode output stage, the cathode follower makes an ideal screen voltage source.

This modification is much cheaper than buying a new special transformer.

Fig. 1: The addition of a twin triode, dual pot and 2 resistors will convert any audio amplifier using pentode output into an ultra-linear output stage.



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