

# An Inexpensive Modulator for the "Tabletop Transmitter"

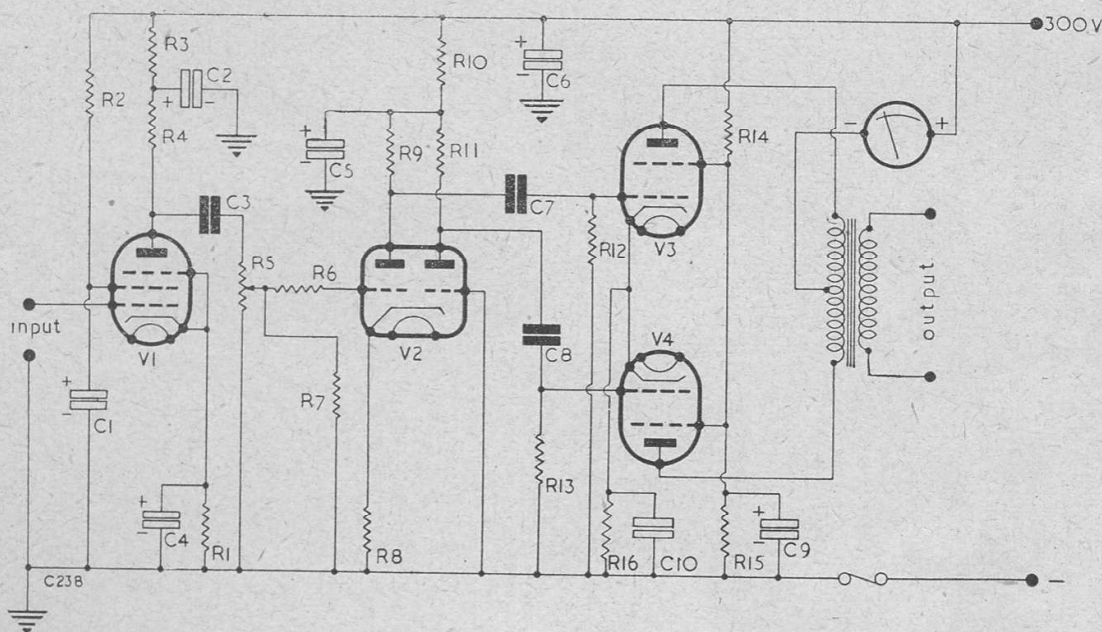
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The amplifier described will be found well suited for use as a Modulator or as a small Public Address unit capable of giving a high quality output at a minimum of expense. The output will be found ample to fully modulate a 25-watt transmitter even from a crystal microphone, and, by substituting a heavy duty output transformer for the modulation transformer, will, without further alteration serve admirably for medium power PA work.

Until recently it has been more usual to see audio amplifiers using a pushpull input transformer to obtain the 180° out-of-phase voltages

required for the grids of the output valves. These however, have three main disadvantages. Firstly, good quality push-pull input transformers are expensive, secondly, they have a tendency to pick up inductive hum, and finally, they are bulky.

By using a twin triode such as the 6SN7 instead of separate valves we can obtain still further economy of space as well as of expense. This end was in view when it was designed, particularly as this valve is readily obtainable in the surplus market being widely used in Service gear.



## Component Values

### Capacitors

C1, 2.0μF, 250V wkg.  
C2, 8.0μF, 350V wkg.  
C3, 0.05μF  
C4, 25μF, 25V wkg.  
C5, 2.0μF  
C6, 8.0μF, 350V wkg.  
C7, 8, 0.02μF  
C9, 8.0μF, 350V wkg.  
C10, 25μF, 25V wkg. (optional).

### Resistors

R1, 15,000 Ω  
R2, 1.5 M Ω  
R3, 47,000 Ω  
R4, 22,000 Ω  
R5, 1 M Ω, Potentiometer.  
R6, 47,000 w

R7, 470,000 Ω  
R8, 1,000 Ω  
R9, 27,000 Ω  
R10, 10,000 Ω, 1 watt.  
R11, 100,000 Ω  
R12, 220,000 Ω  
R13, 220,000 Ω  
R14, 1,500 Ω, 1 watt.  
R15, 50,000 Ω, 10 watt.  
R16, 300 Ω, 5 watt.

(All resistors are half watt rating, unless otherwise stated).

### Valves

V1, 6J7  
V2, 6SN7  
V3, 4, 6V6

### Power Supply

HT necessary is 300V at 150mA and 6.3V at 3A.  
Meter in anode circuit is 0-150mA.

## Simplicity and Excellent Characteristics.

A system of "phase inversion" is required to excite the grids of the output valves with voltages of equal amplitude and opposite polarity, and of the many phase inverters which have been developed, the cathode coupled inverter has proved one of the most popular. Not only does it possess excellent characteristics but it is very simple in construction. It further demands a minimum number of components and because of this a very compact construction becomes possible—indeed the circuit is ideally suited to self-contained transmitter design.

The 6SN7 will be found to hold the amplitude of the two out-of-phase voltages with comparatively wide changes of the voltage applied or changes in the output valves employed.

## Construction.

Regarding the practical side, the 6V6's will give an output of 13 watts with the anode voltages at 300 but bigger output valves with increased HT may be used if desired. As will be seen by the circuit diagram the wiring is quite straightforward and calls for little comment except perhaps the usual warning that grid leads, etc., must be kept short. If these are of any length they should be screened and the shielding connected to chassis potential. The input lead, whether from a pick-up or microphone, should be adequately shielded and if a crystal microphone is used the grid leak too, is better screened.

Actually no economy is effected by using the 6SN7 other than compactness and the saving of a valveholder. It is, in fact, two 6J5's in one envelope, and a pair of the latter can be used if already on hand and space economy no object. For the convenience of the constructor the valve base pin numbers are shown in the circuit. The accompanying photographs show the circuit built up as a separate unit which is fitted in a well ventilated metal case, and it will be noted that the power unit is built in. The latter, by the way, takes up more than two thirds of the chassis space so the possibilities of compact design if using GT type valves is self-evident.

The photographs also illustrate how one of the golden rules of speech-amplifier design is observed—all wiring is kept below the chassis to take advantage of the shielding afforded. Regarding the 6J7—it is always recommended to use a valve of this type with the grid connection brought out to the top cap rather than have it down by the heater pins and leads—the screening of the grid cap is a necessity and of increasing importance when low-level microphones are used. This lead is incidentally the only one above chassis. If a microphone transformer is fitted it is best accommodated above chassis and must, it need hardly be added, be fully screened.

**N.B.**—The "Tabletop Transmitter" appeared in the December, 1948, issue. (*Out of print*)

## AC/DC AMPLIFIER—(contd. from page 493).

non-conductive when the polarity of its anode and cathode is thus reversed.

On AC mains, there may be a noticeable difference in hum-level according to which way round the plug is connected. Normally, the hum is less when the chassis connects through to the neutral conductor.

If a sharp rise in hum-level is experienced when handling the pick-up, the leads to the input terminals should be reversed.

The output from a crystal or magnetic type pick-up is usually sufficient to overload a small amplifier of this type, and the maximum undistorted output of some 3 watts will normally be obtained with the volume control set well below its maximum. For normal domestic listening, the reserve of output power is sufficient to permit the use of fibre needles, if desired.

The following voltage and current readings were obtained with a low-resistance (200  $\Omega$  per volt) moving-coil meter, voltages being measured, from the points indicated, to chassis. Supply voltage was 240V, RMS.

	V1	V2	V3
Anode Volts ..	30*	150	—
Cathode Volts ..	1	8	—
Screen Volts ..	—	180	—
Anode mA ..	2	38	—
Screen mA ..	—	5	—
Volts across C9	200		
" " C8	180		
" " C4	100*		

\*These abnormally low figures are due to the relatively heavy current taken by the meter.

## BRITISH RADIO TELEPHONES FOR NETHERLANDS

### PYE GET £10,000 CONTRACT

Another triumph for British radio technique abroad has been achieved by one of the leading British radio manufacturing firms, who have obtained and are carrying out a £10,000 order for VHF mobile radio telephone equipment for the Netherlands Government.

The firm concerned is Pye Telecommunications, of Cambridge, whose apparatus now so widely used by police, ambulance and fire services, as well as many industrial organisations.

Already a considerable part of the contract has been fulfilled, and the familiar whip aerial such as is seen on police and other vehicles equipped with mobile 2-way VHF radio telephones, is to be observed in the streets of Amsterdam, where, in the two cities, some sixty vehicles are already using their British radio telephone sets. These are in communication with a number of official fixed base stations.