FIVE WATTS ON FORTY

USING ONE TRANSISTOR

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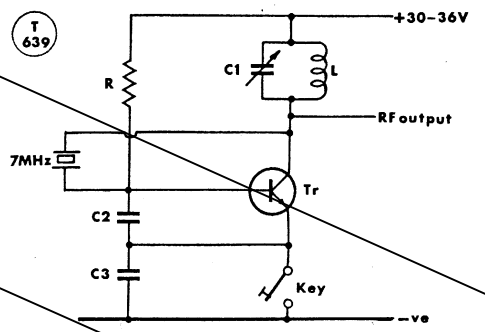
THIS little transmitter is about the simplest possible, costing little in money and time, and its very simplicity makes it a worthwhile experimental project. No soldering was used in the construction, the parts being assembled on a screw-together terminal block.

First experiments were with BFY51 transistors, but these were dropped in favour of the BD124, which gives a much higher RF output. The BD124 is supplied from a series of PP9 batteries, and works quite well on 30-36v., giving a collector current of about 150 mA, *i.e.* about five watts power input.

Results on 40m. CW, using a vertical aerial, have been surprisingly good. To date, eleven EU countries have been worked, with reports varying from RST-549 to 589 from UQ. There is no doubt that given patience, time and reasonable conditions all Europe could be worked with this light-weight pocket portable.

The transistor Tx is directly coupled to the aerial feeder through an SWR meter, adjusted for maximum forward reading. Tuning and loading should be such that the crystal "follows" the keying smoothly and accurately.



Circuit of the Transistor Transmitter for Forty. Values can be: C1, 500 pF, variable; C2, 250 pF; C3, 500 pF; R, 20K; L, 30 turns 26g. (or heavier) on ½-in. former, or as required to tune band. Transistor is BD124 (see text) and crystal for 7 MHz CW.

For setting up, a flash-lamp bulb across a length of twin-feeder or coax plugged into the output of the SWR meter is a very satisfactory way of checking what is happening—if the TTx is functioning as it should the bulb will glow brightly when the Tx is correctly tuned.

FREQUENCY MODULATOR FOR VHF TRANSMITTERS

SUITABLE FOR CAMBRIDGE AND VANGUARD TYPES

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MANY VHF operators run surplus "Vanguard" or "Cambridge" transmitters modified for two metres. However, most of these use low-level amplitude modulation. While suitable for local contacts, it is not very efficient for DX work. Though it is possible to produce, by preamplifiers, the 90% or so modulation needed, this increases the risk of TVI and hi-fi interference.

The solution is to use frequency modulation of one form or another. It has been found that one of the best ways of modulating these transmitters is to amplify the audio to some 20-30 volts peak and feed this into the screen grid of the crystal oscillator, as in Fig. 1. An ECC83 valve amplifier was first tried, but trouble arose due to hum pickup, and insufficient gain. Although these problems could eventually be overcome, it was decided to build a transistorised version of this circuit, this being less prone to hum pickup.

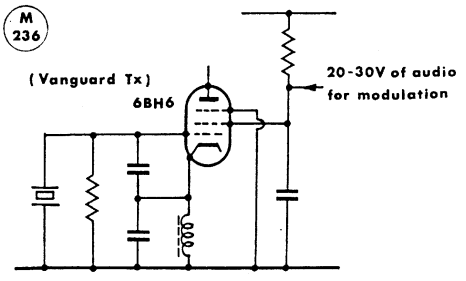

Fig. 1 Method of frequency modulation employed

Circuit Operation

The modulator circuit is shown in Fig. 2. It consists of a straightforward three-transistor amplifier, the third transistor being a high-voltage BF258. These transistors are designed for video output stages of television receivers and work happily at up to 200 volts. The amplification of the modulator is quite high and the deviation control, RV1, need only be about a quarter way from the earthy end of the track. The function of C1 is to prevent RF from entering the first stage of the modulator and causing oscillation and distortion. The upper frequencies are reduced by the feedback loop formed by C9 and R10, plus the 180 $\mu\mu$F capacitor C3. This capacitor also reduces the possibility of RF feedback.

Construction

Layout is not critical and either *Veroboard* or printed circuit construction can be employed. A suitable PC layout is shown in Fig. 3. If the transmitter is used off a twelve-volt supply then the unit can be run off this, taking precautions against noise from the inverter. If a mains power supply is used then the circuit of Fig. 4 may be used. In both cases, the 300v. feed can be taken from the HT supply to the crystal oscillator.

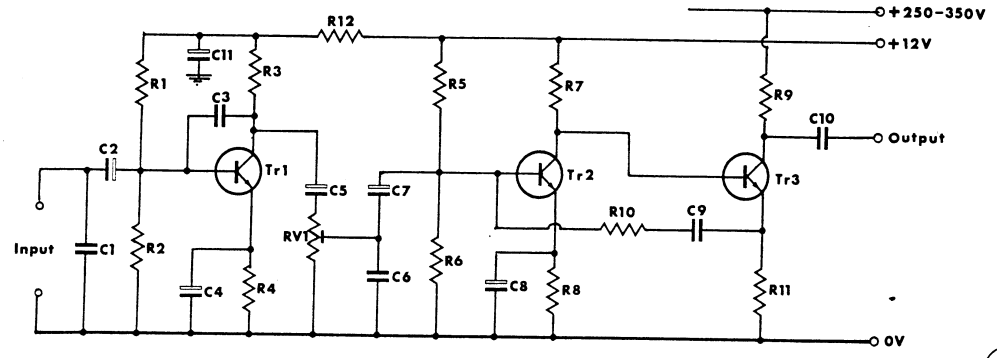

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Fig. 2 Circuit diagram of Modulator

Table of Values

Fig. 2. Circuit and Fig. 4, PSU

C1	= 20 $\mu\mu$F	R5, R10	= 100,000 ohms
C2, C5,		R6	= 15,000 ohms
C7	= 5 $\mu\mu$F	R7, R11	= 5,600 ohms
C3	= 180 $\mu\mu$F	R8	= 1,000 ohms
C4, C8	= 20 μF	R9	= 150,000 ohms
C6	= 0·22 μF	R13	= 100 ohms
C9, C10	= 0·1 μF	RV1	= 10K pre-set
C11	= 100 μF	D1, D2,	
C12	= ·001 μF	D3, D4	= 1N4001, or similar
R1	= 220,000 ohms	Tr1, Tr2	= BC108 or BC148
R2	= 33,000 ohms	Tr3	= BF258 (*see text*)
R3	= 10,000 ohms		
R4, R12	= 1,500 ohms		

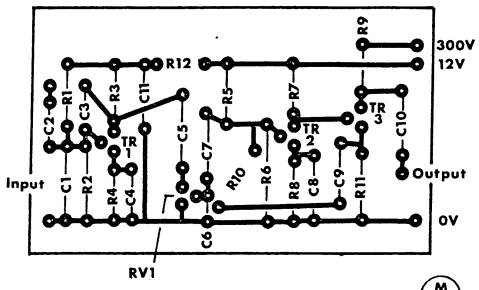

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Fig. 3 Suitable printed circuit layout

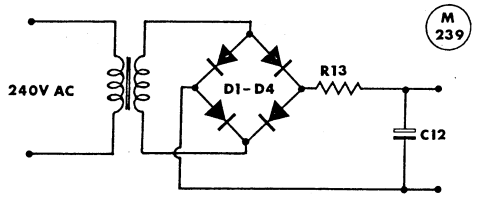

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Fig. 4 Suitable power supply

Performance

This modulator has been in operation in the author's transmitter, a Vanguard, for several months and all reports of modulation have been excellent. (One operator even wished that his commercial rig could sound as good!) A point to note is that if the output is displayed on an oscilloscope a slight asymmetry of modulation may be noticed. This is normal for this type of modulation and introduces only 1% or so distortion. The microphone used is a 300-ohm dynamic insert, obtainable from advertisers in this *Magazine*, but any low to medium impedance dynamic type is suitable.

Some Practical Points—

—— A centre-fed aerial of the dipole or doublet variety can be quickly contrived from a suitable length of flat twin lighting flex, of the sort having a clear plastic covering. The aerial is formed by separating the flex into two arms to give the correct roof-length, *e.g.* 8 feet each arm for 10 metres, and the feeder is then the remaining length of twin flex. The T-point is bound with polythene cord, or whatever, to prevent further separation when the aerial is hoisted. To make a 28 mc aerial, Tx or Rx, having a 30ft. feeder, and allowing for end insulators, about 13 yards of flex would be required. The impedance of the feeder can be taken as "low"—anyway, not more than about 100 ohms. Such an aerial is light, strong, cheap and virtually Wx proof.

—— Very neat plug-in coils of the two-terminal type, ideal for GDO's and similar circuits, can be made by filing the lugs off a ¼in. Aladdin former (*ex* junk TV set) to make a snug fit in the thimble of a coax plug. One end of the coil winding is soldered to the plug body and the other to the centre pin.

—— High-voltage type silicon diodes can be used for speech-clipping by inserting the diode in the PA HT lead, in the direction to prevent the anode going negative. One 800v. p.i.v. diode is sufficient for normal high-level AM modulators. You still need the filter (see *Handbook* circuits) for harmonic suppression.

—— The plastic spools from *Kodak* 126 "Instamatic" film are ideal for coil formers, these being about 1¾in. by ⅝in., with a hollow centre and flange