

## SECTION 28

## MODULATED PULSE GENERATOR OS2/516

**Introduction**

The OS2/516 produces an r.f.-pulse signal of sine-squared form for use in augmented pulse-and-bar generators<sup>1</sup>. This signal is obtained by modulating a 4.43-MHz sub-carrier signal with sine-squared line-frequency pulses which have a half-amplitude duration of 1  $\mu$ s. The modulated signal is then added to another sine-squared pulse waveform in which the pulses have the same duration and frequency. The unit also produces an output of unmodulated sub-carrier; it is not suitable for use at sub-carrier frequencies other than 4.43 MHz.

The sub-carrier signal can be generated internally, by a crystal-controlled oscillator, or it can be supplied to the unit from an external source. The 1- $\mu$ s pulse generator is triggered by an externally generated pulse<sup>2</sup>. Modulation is carried out in a balanced modulator and the modulated signal, which provides chrominance information, is then superimposed onto the 1- $\mu$ s sine-squared pulse signal,

which provides luminance information, as shown in Fig. 28.1. The resultant signal has a flat base-line and, at the output of the unit, is positive-going.

The unit consists of two printed-circuit boards mounted on a CH1/26A chassis with index peg positions 4 and 35. Three controls are mounted on the front panel: an *Int/Ext* oscillator switch; an *Ext Osc Amplitude* control and a *Carrier Balance* control. Power supplies of +12 volts at 70 mA and -12 volts at 40 mA are required<sup>3</sup>.

**Circuit Description**

A circuit diagram is shown in Fig. 28.2.

*Sub-carrier Generator*

Transistors TR1 and TR2 form a crystal-controlled oscillator with the crystal connected in the feedback path. Inductor L1, tuned by stray capacitance, resonates at the same frequency as the crystal; control of signal amplitude is provided by R7. From the collector of TR2 the signal is applied, via emitter-follower TR4, to the output-and-driver stage TR5. A signal taken from the collector of this transistor is fed to the sub-carrier output of the unit; a signal is developed in the emitter circuit across the primary winding of transformer T1 in the modulator stage.

If an externally generated feed of sub-carrier is used instead of the oscillator output, then the *Int/Ext* oscillator switch, SA, must be operated. SA1 interrupts the circuit of the internal oscillator and SA2 connects the collector of TR3 to the +12 volt line, via L1. The external signal is amplified by TR3 before being applied to TR4; control of amplitude is provided by R8.

*1- $\mu$ s Pulse Generator*

Negative-going trigger pulses are applied, via a differentiating circuit and inverter-driver TR12, to the base of TR13. This transistor functions as a blocking oscillator and feeds a switching pulse to TR14 which causes C32 to discharge through the transistor and R55. The amplitude of the resultant positive-going pulse is determined by the setting of R56. From the emitter of TR14 the signal is applied to a sine-squared pulse-shaping network and the output of this network is applied to the base of emitter-follower TR15.

Two outputs are taken from the emitter of TR15;

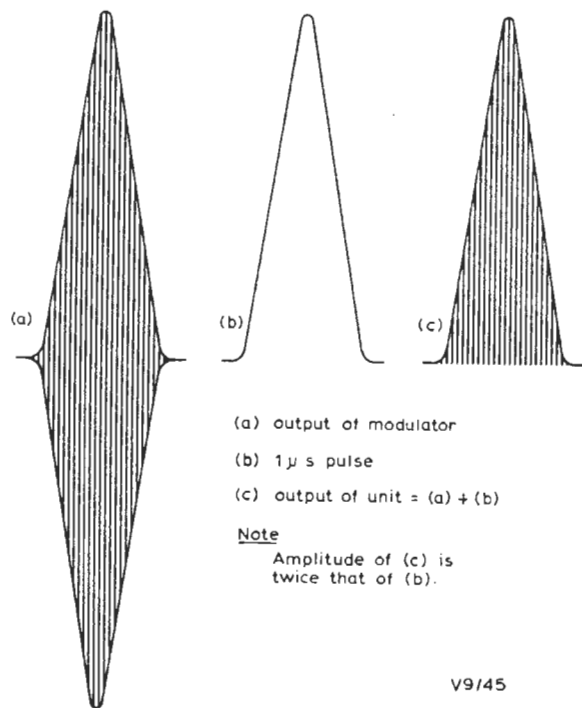


Fig. 28.1 Superimposition of Modulator Output and 1- $\mu$ s Pulse

**Instruction V.9**  
**Section 28**

one is applied via transistors TR6 to TR9 to the input of the modulator; the other is fed through a delay line to mixing stage TR16-TR17, where it is combined with the output of the modulator. Note that although TR6 and TR7 (in the amplifier preceding the modulator) are wired as a mixing stage, signals are not applied to the base of TR7 and so TR6 functions as a simple inverter and TR7 has no effect on the circuit.

*Modulator*

All the components contained in the broken-line rectangle, form a balanced suppressed-carrier amplitude modulator. The modulating signal is applied to the circuit between the centre-tapped windings of T1 and TR2 and the sub-carrier signal is applied to the circuit via the primary winding of T1. Diodes D1 to D4 act as switches and the path of the modulating wave through the circuit is reversed at sub-carrier frequency. (For a detailed description of balanced modulators see Instruction L1.) The forward resistances of D1 and D4 are equalised by R39 and the forward resistances of D2 and D3 are equalised by R38. Circuit balance is controlled by R34, R37 and C18.

*Mixing and Output Stage*

The output of the modulator is taken from the untapped winding of T2 and applied, via a notch filter which removes any second-harmonic components of the carrier frequency, to emitter-follower TR10. From TR10 the signal passes through a further network to inverter stage TR11 and from the collector of TR11 the signal is fed to the base of TR17. Transistors TR16-TR17 form a mixing stage in which the 1- $\mu$ s pulse is combined with the corresponding modulated waveform. The 1- $\mu$ s pulse is applied via a delay line to the base of TR16, as described previously, and the delay is such that the two signals applied to the mixing stage are coincident in time. The output of the stage is taken from the commoned collectors of the two transistors and fed to the inverter output stage, TR18.

**References to Typical Associated Equipment**

1. Augmented Pulse and Bar Generator GE2M/543, Instruction V.10.
2. Auxiliary Waveform and Timing Pulse Generator GE2M/547, Instruction V.10.
3. Stabilised Power Supplier PS2/13F, Instruction G.2.

TES 4/67

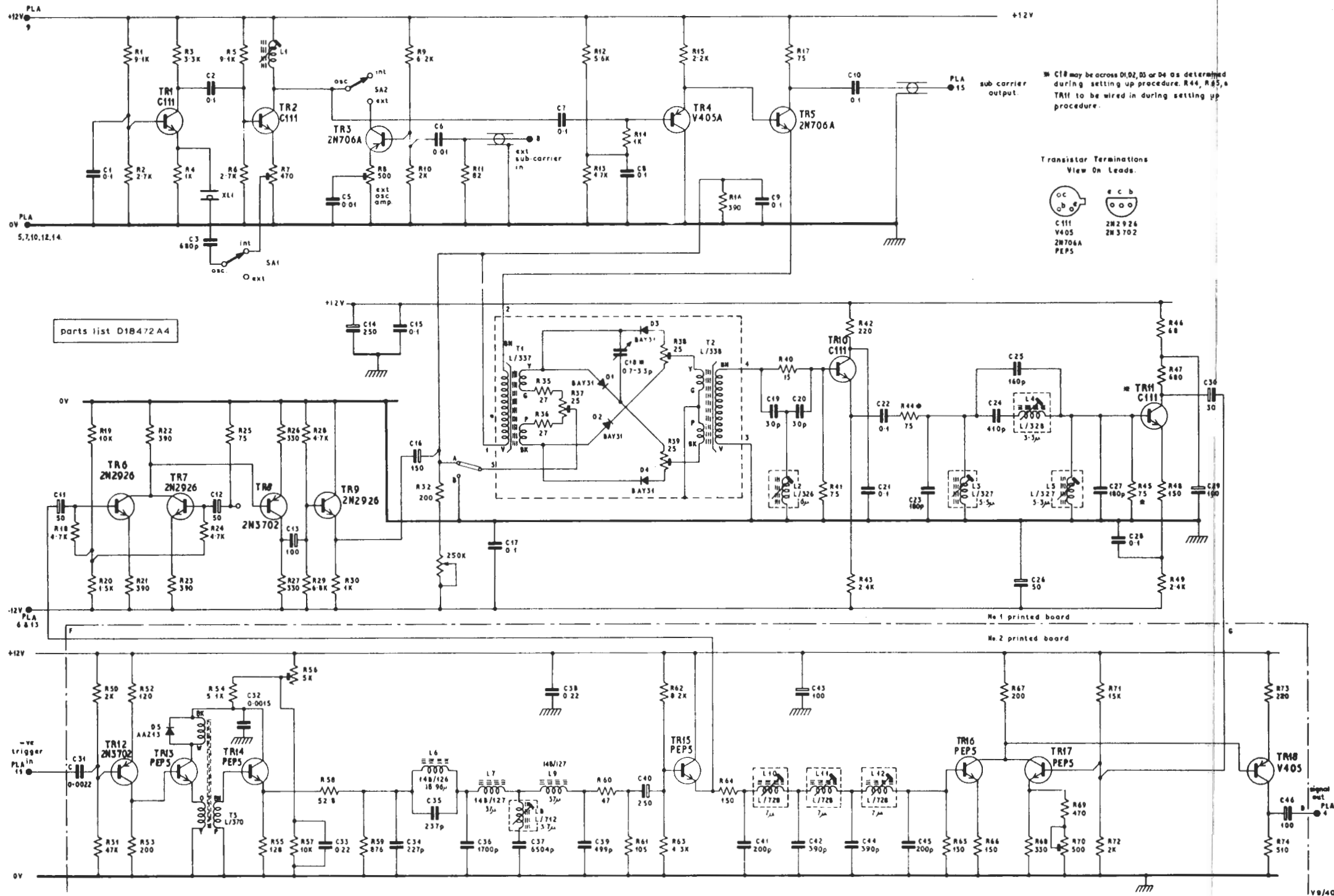


Fig. 28.2 Circuit of the OS2/516