FIXED FREQUENCY MODULATED OSCILLATOR OS2/517

Introduction

The OS2/517, which includes a Modulator MD2/506, produces the chrominance components of the Chrominance/Luminance Pulse-and-Bar test waveform and normally forms part of a Pulse-and-Bar Generator[1]. It consists of two printed boards mounted in a CH1/46A chassis with index pegs 15 and 32. There are four front panel controls, an *External/Internal Oscillator* switch, an *External Oscillator* amplitude control, a *Carrier Balance* control and a switch which gives a 6 dB reduction in output level.

An external power supply is required, usually obtained from the parent unit.

General Description

The chrominance components are formed by modulating a 4·43 MHz sub-carrier with a sin-squared pulse having a half-amplitude duration of 1 μs and with an 8-μs bar waveform. If external burst-gating pulses are applied, a burst component is available without phase alternation and which is not affected by the half amplitude switch. An external source of 4·43 MHz sub-carrier may be used, but the unit is not suitable for any other sub-carrier frequency.

The timing of the pulse-and-bar with respect to syncs, is set by external trigger pulses[2].

Circuit Description

The circuit diagram is given in Fig. 1. The various waveforms through the unit with their approximate timings with respect to the line sync pulse are shown in Fig. 2.

Sub-carrier Generator

TR1 and TR2 form a crystal-controlled oscillator, with the inductor L1 tuned approximately to resonance at 4·43 MHz by stray capacitance. R7 provides control of amplitude. From the collector of TR2 the signal passes via two emitter followers to the carrier input of the ring-type modulator[3] MD2/506. R18 is the modulator balance control.

When an external source of sub-carrier is to be used, the *Int/Ext Oscillator* switch SA1 is operated. The signal is then passed through TR3 to the modulator. R11 controls the amplitude.

1 μs Pulse Generator

A negative-going trigger pulse[2], Fig. 2(b), delayed with respect to syncs by approximately 32 μs, is applied to the base of TR21. This transistor, normally almost cut-off, conducts heavily during the period of the input pulse and supplies a switching pulse to TR22. TR22, with its associated transformer, forms a monostable blocking-oscillator which produces one output pulse for each input pulse. The pulse output from the blocking oscillator is passed by TR23 to the input of a 1-μs sine-squared shaping filter, the amplitude being controlled by R88, Fig. 2(c).

Chrominance Bar Generator

A negative-going trigger pulse[2] having a delay of approximately 15 μs, Fig. 2(d) is differentiated and then applied to the base of TR8. This transistor conducts heavily during the period of the pulse and triggers the monostable multivibrator TR9/TR10 which has an unstable period of about 12 μs. Two outputs are taken from the collector of TR10, Fig. 2(e), one feeding the bar-driver circuit TR11/TR12 and the other feeding the delay multivibrator IC1. The bar-driver circuit delivers across the input of the sin-squared shaping filter an amplified pulse 12 μs in duration and delayed with respect to syncs by 15 μs, Fig. 2(e). R46 provides some control of amplitude.

1 μs Shaping Filter and Luminance Delay Network

The signal appearing across the input of the shaping filter, Fig. 2(f), has its edges shaped to sine-squared form and is then fed to TR24, an emitter follower feeding the first mixing amplifier TR17/TR18 direct, and the second mixing amplifier TR25/TR26 via the luminance signal delay line. The delay line is required to ensure coincidence of the luminance pulses with the modulated pulses from CM1 when mixed in the second mixing amplifier.

Delay and Inverted Bar Generator

The second output from TR10 is differentiated and the positive-going edge, Fig. 2(g), triggers a delay multivibrator formed by IC1 and its associated components. The unstable period is about

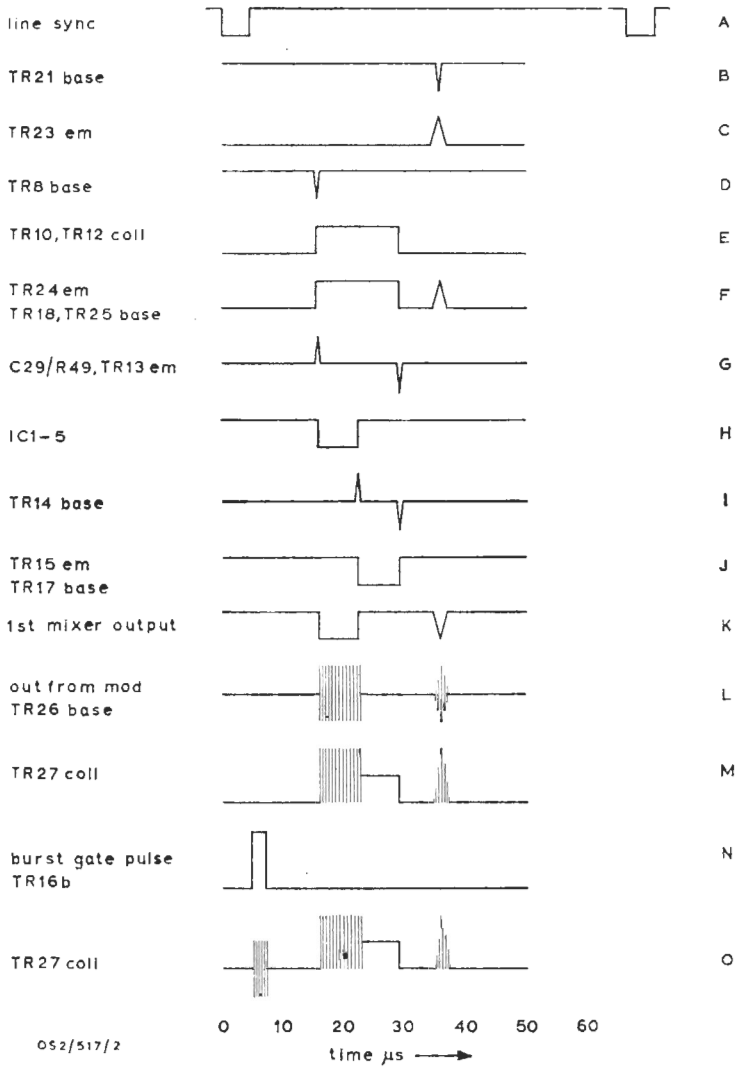

Fig. 2. Waveforms in the OS2/517

7 μs, Fig. 2(h). The positive-going edge of the pulse from IC1, Fig. 2(l) triggers the cascode multivibrator TR14/TR15. This has an unstable period of about 15 μs but it is reset after approximately 6 μs by the negative-going edge of the pulse from TR10, Fig. 2(g), via TR13. Thus the negative-going pulse output from TR15, Fig. 2 (j), has a delay with respect to syncs of 23 μs and a duration of about 5 μs. The output pulse is limited in amplitude to about 6 volts negative by D4 and, after passing through a 1 μs sine-squared shaping filter, is applied to the base of TR17 in the first mixing amplifier.

Mixing Amplifiers and Modulator Output Circuits

The inputs to the first mixing amplifier, Figs. 2(f) and 2(j), are added in the common-collector circuit of TR17/TR18 in Fig. 2(k) and, after inversion by TR19, are passed by TR20 to the modulator input. The output from the modulator passes through a filter designed to remove second harmonic of the carrier frequency and is then fed by TR6 to a band-pass filter centred on 4·43 MHz. TR7 amplifies the modulated signals which are then applied to the base of TR26 in Fig. 2(b) in the second mixing circuit. The two waveforms applied to the second mixer, Fig. 2(f) and 2(l),

from D21277 A1 iss 4
parts list D21278 A4

sub-carrier oscillator

ext. sub-carrier amplifier

modulator driver

modulator

2nd harmonic notch filter

band—pass filter

ext. sub-carrier input 10

bar trigger amplifier chroma bar generator

bar driver

bar trig input 6

inverted bar generator

1μs sin² shaping filter

delay generator

input burst blanking 4

burst blanking amplifier

1st mixing amplifier

sin² trigger amplifier

chroma pulse generator

1μs sin² shaping filter

luminance delay network

2nd mixing amplifier

output stage

sin² trig input 15

composite signal output 12

transistor terminations view on leads

2N2926 2N3702 BSX20 BCY71

MC3526 pin 1 pin 2

OS2/517/1T

add in the collector circuit of TR25/TR26, Fig. 2(m), and pass via TR27 to the output terminal. Switches SB1 and SB2 allow the amplitude of the output signal, excluding the burst, to be reduced by 6 dB.

If a burst-gating pulse is present (external syncs only) it occurs immediately following the line-sync pulse, Fig. 2(n), and is applied as a positive-going pulse to the base of TR16 which has a common-emitter resistor with TR17. With respect to the input from TR16, TR17 operates in the common-base mode and hence a positive pulse appears in the collector circuit. The output from the second mixing amplifier, including the burst pulse, is shown in Fig. 2(o).

Maintenance

Routine maintenance is not required and no adjustments should be made to the band-pass and shaping filters.

To set the amplitude of the external sub-carrier input, the front panel control (R11) is adjusted while observing the output waveform at PLA12 and at the same time switching between internal and external sub-carrier supplies by operating SA1. The amplitude of the sub-carrier components should be the same in both instances.

To check the waveform components of the output signal, the unit is best mounted in its parent unit[1], the other units of which have been properly adjusted. The procedure is as follows and the tests should be done in the order indicated.

Connect an oscilloscope, e.g. a Hewlett Packard 180A, to the output of the parent unit, set the *half amplitude* switch on the OS2/517 in the full amplitude position, and the oscillator switch to the *ext* position (no input of sub-carrier connected:

1. The indicated waveform should be as Fig. 3(a).
2. The duration of the pedestal bar should be 12 to 13 μs; this is controlled by C26.
3. The amplitude of the pedestal bar should be 0·35 volts; R46 provides adjustment.
4. The sin-squared pulse should be equal in amplitude to the pedestal bar; R88 provides adjustment.
5. With the oscillator switched to *int* and no burst-gating pulses connected, and assuming a properly adjusted MN2/506 sub-unit, the residual carrier at black level should be less than 3 mV; R18, the modulator balance control, provides adjustment and should be about 1/3 clockwise rotation. At the same setting of R18 the residual carrier on the luminance part of the pedestal bar should be less than 2 mV; R61 sets this condition.
6. The duration of the composite component of the pedestal bar should be 7 μs $\pm$0·2 μs; this is set by by C31.
7. With the oscilloscope connected by a probe unit to the collector of TR17 the waveform should be as shown in Fig. 3(b). The amplitude of the residual pulse which occurs approximately midway between the end of the bar and the centre of the pulse should be less than 20 mV.
8. With the oscilloscope connected to the output terminal of the OS2/517, PLA12, the burst amplitude should be 0·3 V p-p with an input of standard level burst-gating pulses (2 V p-p) at PLA4. The sub-carrier peaks at the base of the composite bar should be at black level. R106 provides adjustment.
9. The amplitudes of the composite pulse-and-bar signals are set by R88 and R46 respectively; they should be the same as that of the main luminance bar. Adjustments are made while observing the waveform present at the output terminal of the parent unit. Fig. 3(c), Fig. 3(d) and Fig. 3(e) show the output waveforms to be expected.

References

1. Chrominance/Luminance Pulse and Bar Generator GE2/559.
2. Pulse Timing and Auxiliary Waveform Generator GE2/561.
3. Technical Instruction L1.
4. Designs Department Specification No. 9.96(68)

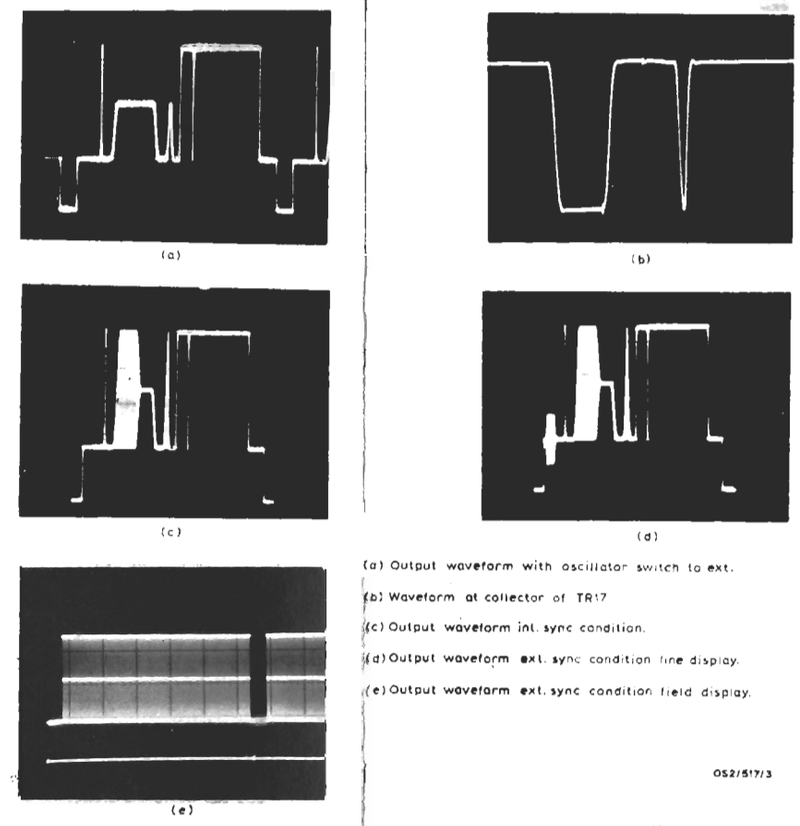

Fig. 3. Waveforms Observed in Testing the OS2/517