SECTION 21

SYNC SEPARATOR UN1/521

Introduction

The Sync Separator UN1/521 provides a total of seven outputs at line, field and picture repetition rates from an input which is either a composite video signal or mixed sync pulses.

The function, and part of the circuit, of the UN1/521 is similar to that of the UN1/527 described in Part 1, Section 27 of this Instruction.

The UN1/521 is constructed on a CH1/12A chassis with index peg positions 7 and 10.

Circuit Description

The circuit of the UN1/521 is given in Fig. 21.1 and relevant waveforms are shown in Figs. 21.2, 21.3 and 21.4. The first three stages are similar to those of the UN1/527. Sync pulses are fed from the collector of transistor TR2 to a sawtooth generator. The collector supply of transistor TR4 is the d.c. component of the sync pulses. These pulses are also differentiated and fed to the base of TR4; see Fig. 21.2(c). The differentiated pulses cause TR4 to conduct on the trailing edges of both the line-sync pulses and the broad pulses. Capacitor C7 charges through transistor TR4. While the transistor is cut off, capacitor C7 discharges through resistor R12. The sawtooth during the first broad pulse of odd fields, shown in Fig. 21.2(d), is of greater duration and hence of greater amplitude than any other during the picture period. Transistor TR5 is biased beyond cutoff except at the end of this longer sawtooth. This gives a positive-going odd-field picture-frequency pulse, shown in Fig. 21.3(e), at the collector of transistor TR5 and at pin 10. This pulse is differentiated, Fig. 21.3(f), and fed to the base of transistor TR7 giving a narrower positive-going odd-field picture-frequency pulse at pin 12 as shown in Fig. 21.3(g).

Transistors TR8 and TR9 have the same collector load resistor R22. Their collectors are also connected via capacitor C13 and a low impedance to the positive rail. The time constant of this circuit is 1ms so that after either of these transistors has conducted a pulse of current, their collector supply is effectively removed for about 10 lines. This is shown in Fig. 21.4(j).

The base of transistor TR9 is fed with sync-pulses via a differentiating circuit having a time constant of 22 μs. This causes a droop in the sync-pulse wave-

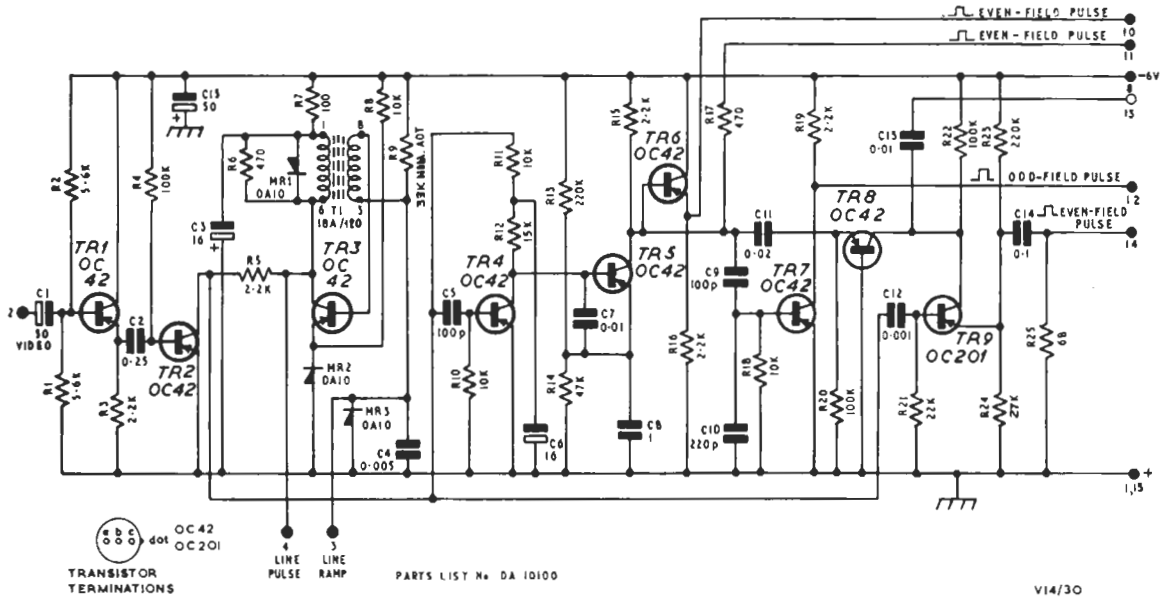

Fig. 21.1 Circuit of the UN1/521

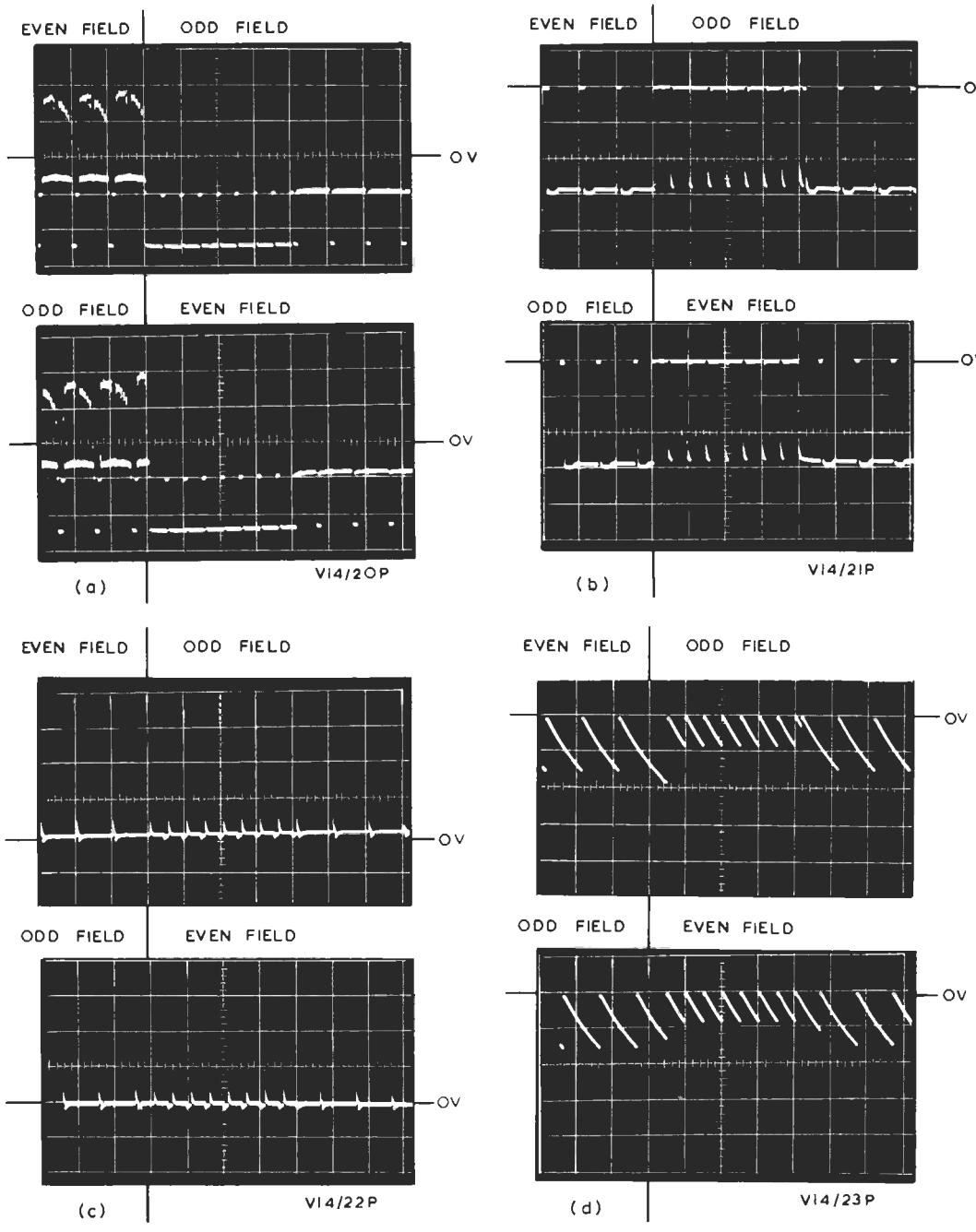

Fig. 21.2 Waveforms in the UN1/521
(a) pin 2 (b) collector TR2 (c) base TR4 (d) collector TR4
Vertical scale: (a) 0·2 volts/square
(b), (c), (d) 2·0 volts/square
Horizontal scale: 100 μs/square

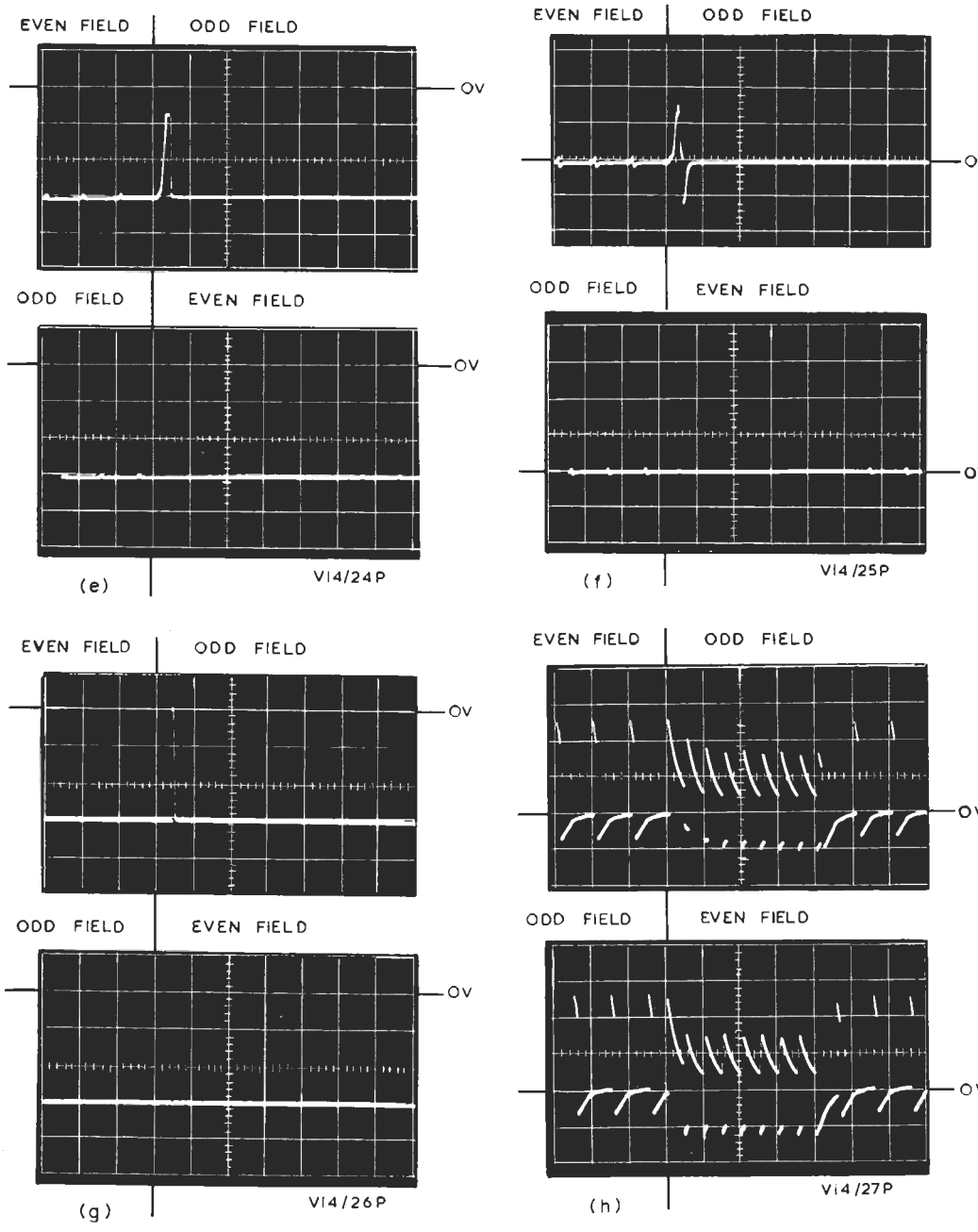

Fig. 21.3 Waveforms in the UN1/521
(e) collector TR5 (f) base TR7 (g) pin 12 (h) base TR9
Vertical scale: 2·0 volts/square
Horizontal scale: 100 μs/square

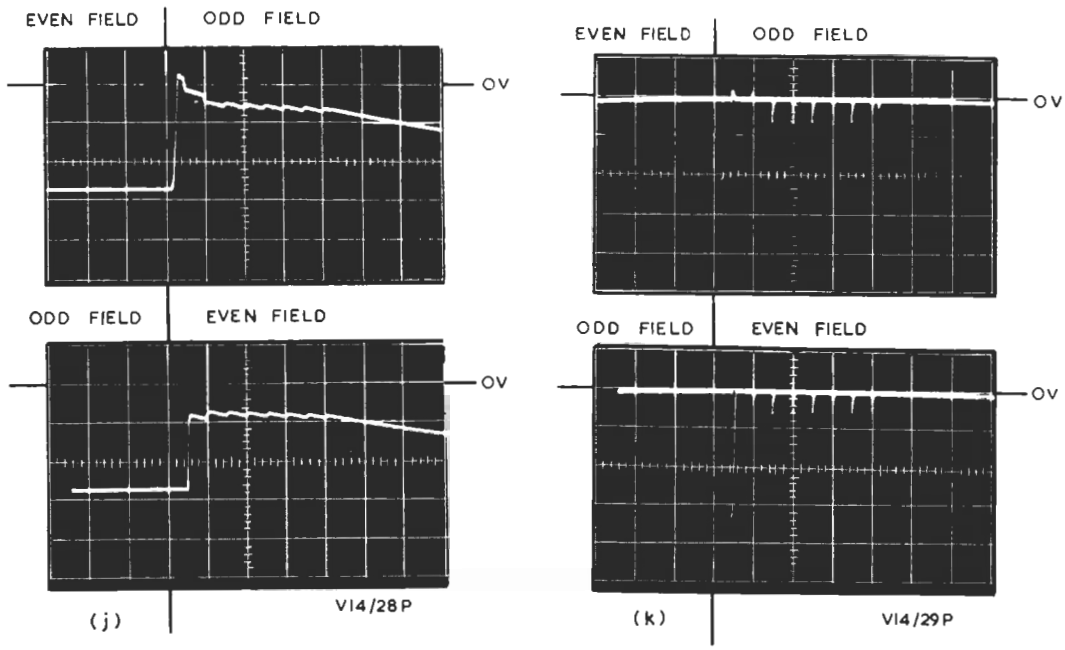

Fig. 21.4 Waveforms in the UN1/521
(j) collectors TR8, TR9 (k) pin 14
Vertical scale: 2·0 volts/square
Horizontal scale: 100 μs/square

form, shown in Fig. 21.3(h). Transistor TR9 is biased so that it can conduct only during the intervals between broad pulses. On odd fields, a pulse is fed to the emitter of transistor TR8 at the end of the first broad pulse which removes the collector supply from transistor TR9 so that it does not conduct. On even fields transistor TR9 conducts during the interval between the first and second broad pulses thereby removing its own collector supply. This gives a negative-going even-field picture-frequency pulse at pin 14 as shown in Fig. 21.4(k). Capacitor C13 differentiates the waveform at the collectors of transistors TR8 and TR9 giving a positive-going field-frequency pulse at pin 13. The slight difference in timing on alternate fields has no observable effect on the operation of the Mains Discriminator to which they are fed.

Test Schedule

A Picture Synchroniser UN1/522 may be used as a test jig and source of power for the UN1/521.

Apparatus Required

Line strobing oscilloscope Tektronix Type 524AD.
4-dB switched attenuator.
Source of 405-line composite video signal.
Extender board CH1A/1 if tests are carried out using UN1/522 as test jig.

Test Procedure

1. Short circuit pins 8 and 13.
   Feed the video signal at normal level to the terminated input of the Sync Separator.
   Externally trigger the oscilloscope at line frequency from pin 2.
2. Observe the waveform at pin 3. This should be a negative-going ramp line waveform varying between about —2 and —6 volts; see under UN1/527, Fig. 27.3(d). Measure the horizontal portion of the waveform which should be 5 to 15 μs. If the duration is outside these limits adjust the value of resistor R9.
   Measure the amplitude of the waveform which should be 6 to 7 volts. Check that the oscillator is not being double-triggered during the field-signal period.
3. Observe the waveform at pin 4. This should be a positive-going line-frequency pulse waveform of amplitude 6 ± 0·3 volts and with a duration of 1·9 ± 0·3 μs; see under UN1/527, Fig. 27.3(c).

4. Observe the waveform at pin 12 with the oscilloscope set to display the field-signal period. The waveform, shown in Fig. 21.3(g), should be a positive-going pulse very nearly coincident with the trailing edge of the first broad pulse on odd fields. Its amplitude should be 6·0 ± 0·3 volts. Spurious signals in both fields should have an amplitude less than 0·2 volts.
5. Observe the waveforms at pins 10 and 11. They should be identical positive-going even-field pulses, Fig. 21.3(e), with an amplitude of 4·7 ± 0·3 volts and a duration of not less than 10 μs.
6. Observe the waveform at pin 14. The waveform, shown in Fig. 21.4(k), should have an amplitude of 0·7 ± 0·1 volts and a duration of about 5 μs. Spurious signals on both fields should have an amplitude of less than 0·2 volts.
7. Check that a 4-dB reduction in input level does not appreciably affect the output waveforms. Remove the short circuit from between pins 8 and 13.

Further Information

Typical voltages, measured with an Avometer Model 8, with normal input are given in Table 1 to assist with fault finding.

TABLE 1

Transistor	*Emitter*	*Base*	*Collector*
TR1	−2·9	−3·1	−6·4
TR2	0	+0·2	−5·0
TR3	−0·2	+2·0	−6·2
TR4	0	0	−0·8
TR5	−1·4	−0·8	−6·3
TR6	−6·2	−6·3	−6·4
TR7	0	0	−6·4
TR8	−0·2	0	−4·0
TR9	−1·2	0	−4·0

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