DECODER LINE-UP GENERATOR GE4M/524

Introduction

The GE4M/524, sometimes known as Deluge, accepts an input signal which must contain mixed sync pulses and preferably should include colour bursts: it produces a colour decoder line-up waveform for use in areas where coded colour-bar signals are not normally available. The picture produced by the Deluge waveform comprises three vertical bars which are, from left to right, white yellow and red. These are followed by a fourth area of black. Fig. 1 shows the Deluge waveform which is built up from gated portions of subcarrier signals and luminance pulses, rather than being a coded combination of the corresponding red blue and green signals, also shown in Fig. 1.

The GE4M/524 comprises the following units:

Sync Separator UN1/540
Burst Locked Oscillator OS1/502
Pulse Generator GE2/553
Subcarrier Switch UN9/545
Bar Generator GE6/505 (two)
Output Amplifier AM1/554
Power Supplier PS3/34

The PS3/34 is mounted at the rear of the GE4M/524 and the remainder are plug-in units fitted from left to right in the order given above in a panel PN3/23.

General Description

Production of the Deluge waveform is illustrated in a simplified sequence diagram shown in Fig. 2. Mixed sync pulses of the output waveform are derived from the input signal.

The luminance signal comprises three components corresponding to the white, yellow and red bars. These components are blanked by a field pulse. The red luminance component is derived from the yellow component; the yellow component is derived from the white component and the white component is derived from mixed syncs.

The chrominance signal comprises components corresponding to the yellow and red bars together with colour bursts and a reference subcarrier signal. The first three of these are each made up of two subcarrier signals in phase quadrature gated by a low-frequency pulse. The subcarrier signal is derived from the colour bursts of the video input signal by gating this with pulses derived from mixed syncs. These bursts control the phase and frequency of the output of a crystal oscillator.

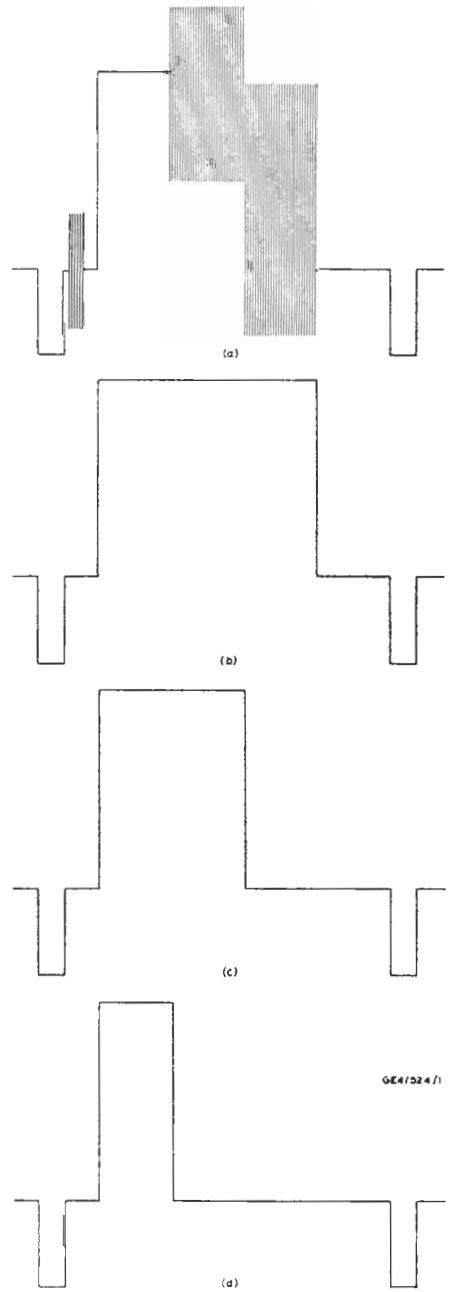

Fig. 1 Deluge Waveform and its Components
(a) output waveform
(b) red waveform
(c) green waveform
(d) blue waveform

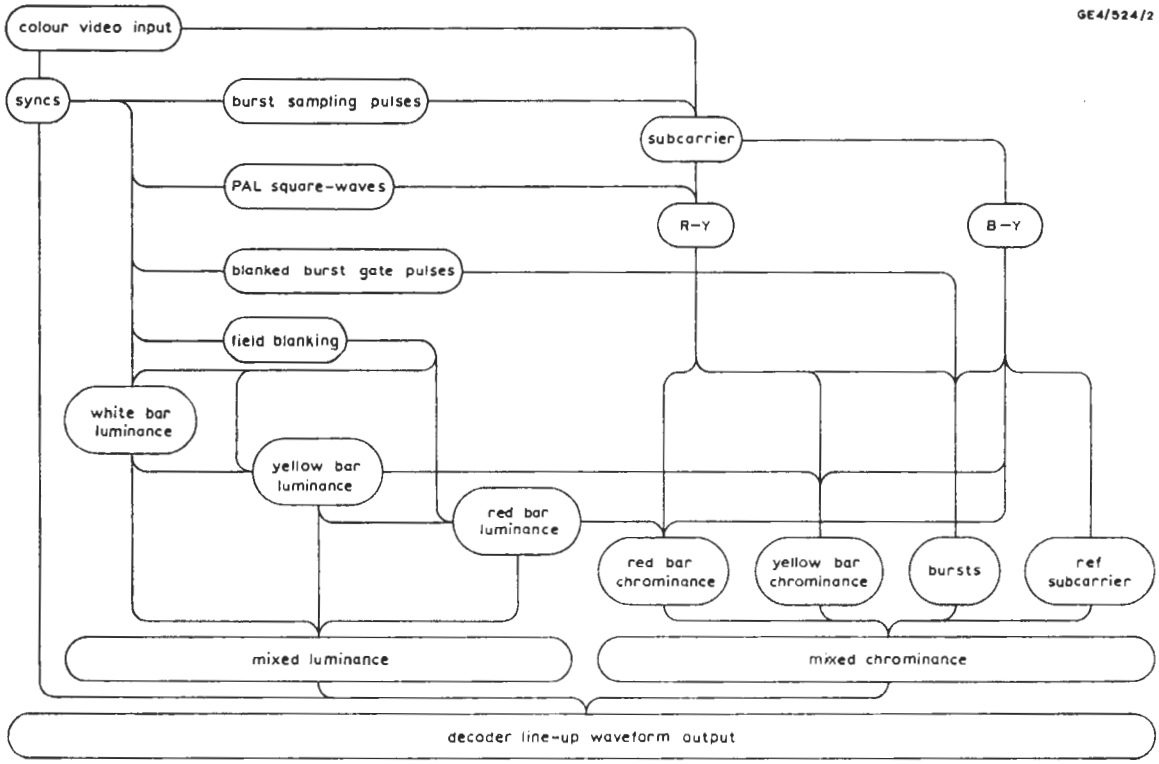

Fig. 2 Simplified Sequence Diagram

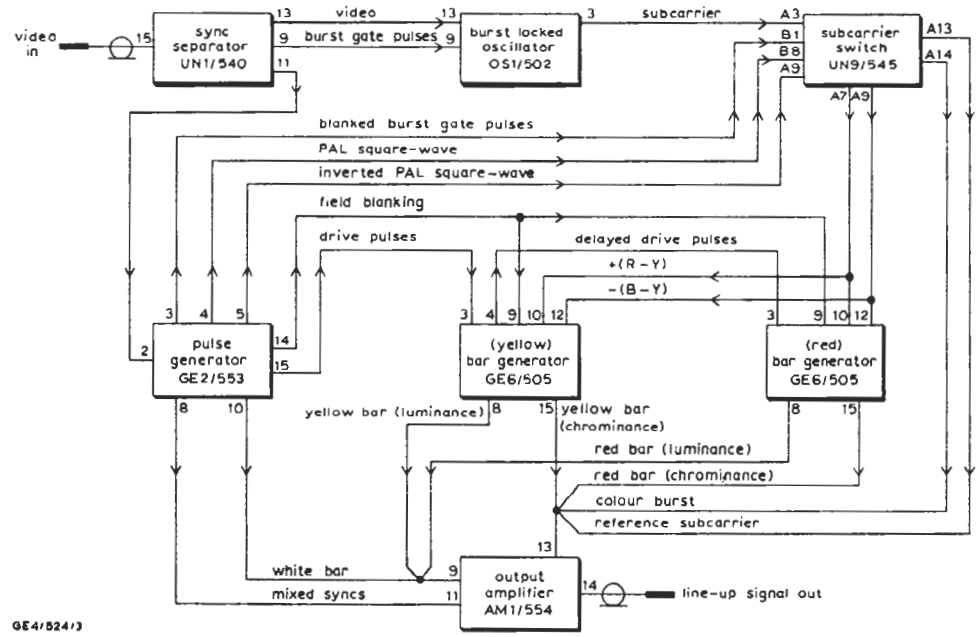

Fig. 3 Block Diagram of the GE4/524

The oscillator gives an output even if bursts are not present in the input signal but under these conditions the phase and frequency of the oscillator output are uncontrolled. One feed of subcarrier (B—Y) is changed in phase by 90 degrees and a second feed (R—Y) is inverted on alternate lines by PAL square-waves derived from mixed syncs.

A block diagram of the GE4M/524 is given in Fig. 3. Operation of the generator closely follows that outlined in the sequence diagram although the following points should be noted.

Drive Pulses

Separate drive pulses corresponding to the bars are used to trigger the succeeding bars. By varying the duration of the bars independently of the start of the following bar, the transients in the transitions from one bar to the next can be minimised.

Blanking

Both the burst blanking and the field blanking components of the Deluge waveform are non-standard in that they both start at the end of the first equalising pulse in each field interval. Also a four-field component is not present in the burst blanking waveform (see Instruction P, Colour Natlock).

Subcarrier Phase Adjustments

The phase of the six subcarrier components in the burst, the yellow and the red bars, is individually adjustable in either the subcarrier switch or in the appropriate bar generator.

Relay Switching

The switching circuit of the GE4M/524 is given in Fig. 4 and its behaviour is described in Table 1. With the switches in their *Normal* positions, the relay circuits can be extended for remote control via a socket at the rear of the GE4M/524.

TABLE 1

Unit	*Relay*	*Effect of relay operation on output signal*
GE2/553	RLF	Removes the phase alternation of the (R—Y) component.
UN9/545	RLB RLD	Remove the colour burst component if the corresponding component of the chrominance signal is absent.
	RLA	Removes the (B—Y) components of the chrominance signal.
	RLC	Removes the (R—Y) components of the chrominance signal.
	RLE	Adds reference subcarrier to output signal.
AM1/544	RLG	Removes the luminance component of the output signal.

Alignment Schedule

Apparatus required

Tektronix oscilloscope Type 533 with Type H plug-in unit.

Colour calibrator UN2/503.

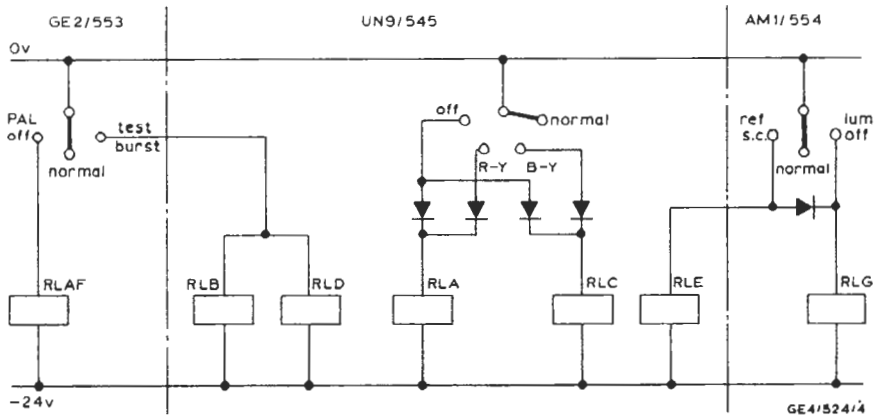

Fig. 4 Switching Circuit in the GE4/524

Oscilloscope equaliser EQ1/510.
Set of 75-ohm attenuators to give 0 dB to 20 dB in 0·1 dB steps.
75-ohm 1% delta-connected mixing pad.
Chassis extenders CH1A/1 and CH1A/2 modified as a mating pair (see Instruction G.1).

Alignment Procedure

Items 1 to 3 of this procedure form a check on the alignment of the GE4M/524. Items 4 to 7 form the adjustments required if the GE4M/524 is out of alignment.

1. Set up the apparatus as shown in Fig. 5.
   Switch the GE4M/524 to chrominance *Off* and *Lum Off*.
   Switch the attenuators to 0 dB.
   Switch the UN2/503 to *Lum* + *Chrom*.
   Switch the oscilloscope Y-gain to 0·02 volt/cm. This is the range on which amplitude measurements are to be carried out.
   Adjust the EQ1/510 to correct any luminance-chrominance gain inequality of the oscilloscope.
   Switch the UN2/503 to *Lum*.

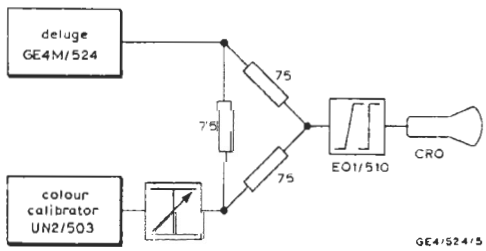

Fig. 5 Test Arrangement

2. Check the amplitude of each of the components of the Deluge waveform by comparing them against the attenuated output of the UN2/503. Table 2 gives the correct value of attenuation of this 1 volt p-p signal together with the correct values of the amplitudes of the components. Errors of up to ± 0·2 dB can be ignored.
3. Switch the GE4M/524 to (*R*—*Y*) and *Ref S.C.* Adjust the oscilloscope time-base until a slight amplitude twitter is visible. This twitter is a slight difference in amplitude in the combined subcarrier signal on alternate lines due to an error in the phase quadrature.
   Check that the amplitude of the twitter is less than 2 per cent.
   Switch the GE4M/524 to chrominance *Normal* and *Lum Off*.

TABLE 2

Part of waveform	*Attenuation in dB (amplitude in mV)*			
	Lum	*R—Y*	*B—Y*	*Chrom*
Syncs	10·5 (300)	—	—	—
Burst	—	13·5 (212)	13·5 (212)	10·5 (300)
White bar	3·1 (700)	— —	— —	— —
Yellow bar	4·2 (620)	17·1 (140)	4·3 (612)	4·1 (627)
Red bar	13·6 (209)	1·3 (861)	13·7 (206)	1·1 (885)

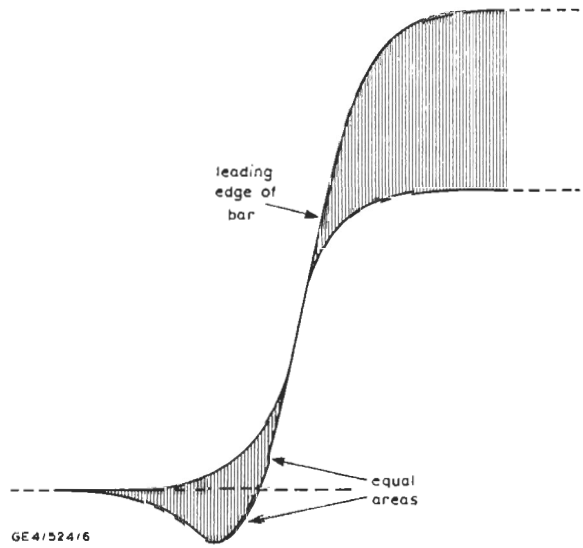

Fig. 6 Illustrating Adjustment for Minimum Chrominance Transients

Check that the amplitude of any twitter is less than 2 per cent.

4. If there are either amplitude errors of more than 0·2 dB or any amplitude twitter of 2 per cent or more, the adjustments outlined in Table 3 are to be carried out using the extender boards on the units shown in the Table.

TABLE 3

Unit	*Switch positions on:*			*Control*	*Adjustment*	*See item No.*
	GE2/553	*UN9/545*	*AM1/554*			
GE2/553	Normal	Off	Normal	R10	Sync amplitude	2
				R105	White-bar amplitude	
				R94	White-bar duration	a
GE6/505 (yellow)	Normal	B—Y	Normal	R69	Chrominance duration	b
				R70	Chrominance timing	
		Off		R71	Bar amplitude	2
				R42	Bar duration	a
GE6/505 (red)	Normal	B—Y	Normal	R69	Chrominance duration	b
				R70	Chrominance timing	
		Off		R71	Bar amplitude	2
				R42	Bar duration	c
UN9/545	Test burst	R—Y	Ref S.C.	C30	Burst (R—Y) phase	3
		Normal	Normal	C26	Burst (B—Y) phase	
		R—Y		R111	Burst (R—Y) amplitude	2
		B—Y		R108	Burst (B—Y) amplitude	
	Normal	Normal		—	Check burst amplitude	
GE6/505 (yellow)	Normal	R—Y	Ref S.C.	C8	Bar (R—Y) phase	3
		Normal	Normal	C4	Bar (B—Y) phase	
		R—Y		R24	Bar (R—Y) amplitude	2
		B—Y		R26	Bar (B—Y) amplitude	
		Normal		—	Check bar chrominance amplitude	

continued overleaf

Unit	*Switch positions on:*			*Control*	*Adjustment*	*See item No.*
	GE2/553	*UN9/545*	*AM1/554*			
GE6/505 (red)	Normal	R—Y	Ref S.C.	C8	Bar (R—Y) phase	3
		Normal	Normal	C4	Bar (B—Y) phase	
		R—Y		R24	Bar (R—Y) amplitude	2
		B—Y		R26	Bar (B—Y) amplitude	
		Normal		—	Check bar chrominance amplitude	

Notes to Table 3

(a). Adjust bar duration to minimise the transients in the transition following the bar being adjusted.

(b). Adjust the bar duration control to separate the bars.
Adjust the chrominance duration and timing controls to minimise the amount of subcarrier at the base of the bar and to balance the residual subcarrier about blanking level as shown in Fig. 6.

(c). Set the red bar duration control to give a bar 13 μs in duration.

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