3105-1.0

ZNA234E

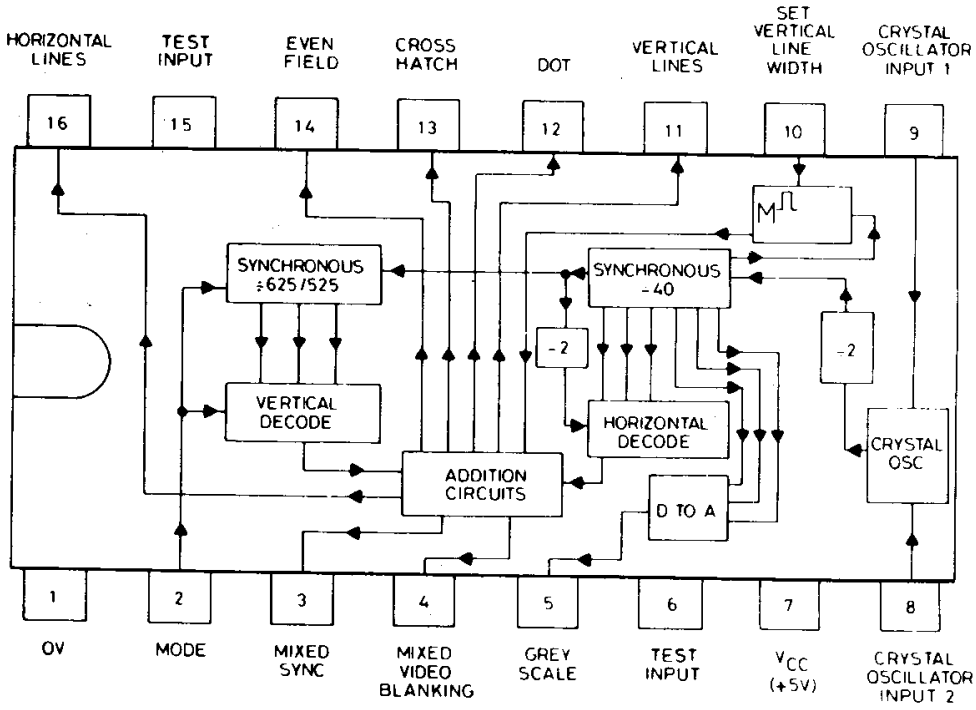
TV PATTERN GENERATOR

FEATURES

- Single 5V supply.
- 625 or 525 line operation.
- Sync and Blanking outputs to CCIR or EIA Standard.
- Field Reference output.
- Separate outputs for:
  - Crosshatch
  - Dot
  - Vertical Lines
  - Horizontal Lines
  - Greyscale
  - Mixed Sync
  - Mixed Video Blanking
- Adjustable vertical line width.

DESCRIPTION

The ZNA234E integrated circuit makes available all the waveforms necessary to produce cross-hatch, dot and greyscale test patterns on a television screen. All that is required is a 2.50 MHz crystal (or external oscillator) and a minimum number of external components for mixing video, sync and blanking pulses to give a composite video signal. This can be either injected directly into the video stages of a receiver, or used to drive a UHF modulator/oscillator for connection to the aerial socket. The device is contained in a 16 pin DIL package.



System Diagram DP16

ABSOLUTE MAXIUMUM RATINGS

Supply Voltage	7 volts
Input Voltage	5 volts
Operating Temperature Range	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

OPERATING CHARACTERISTICS (over recommended temperature range).

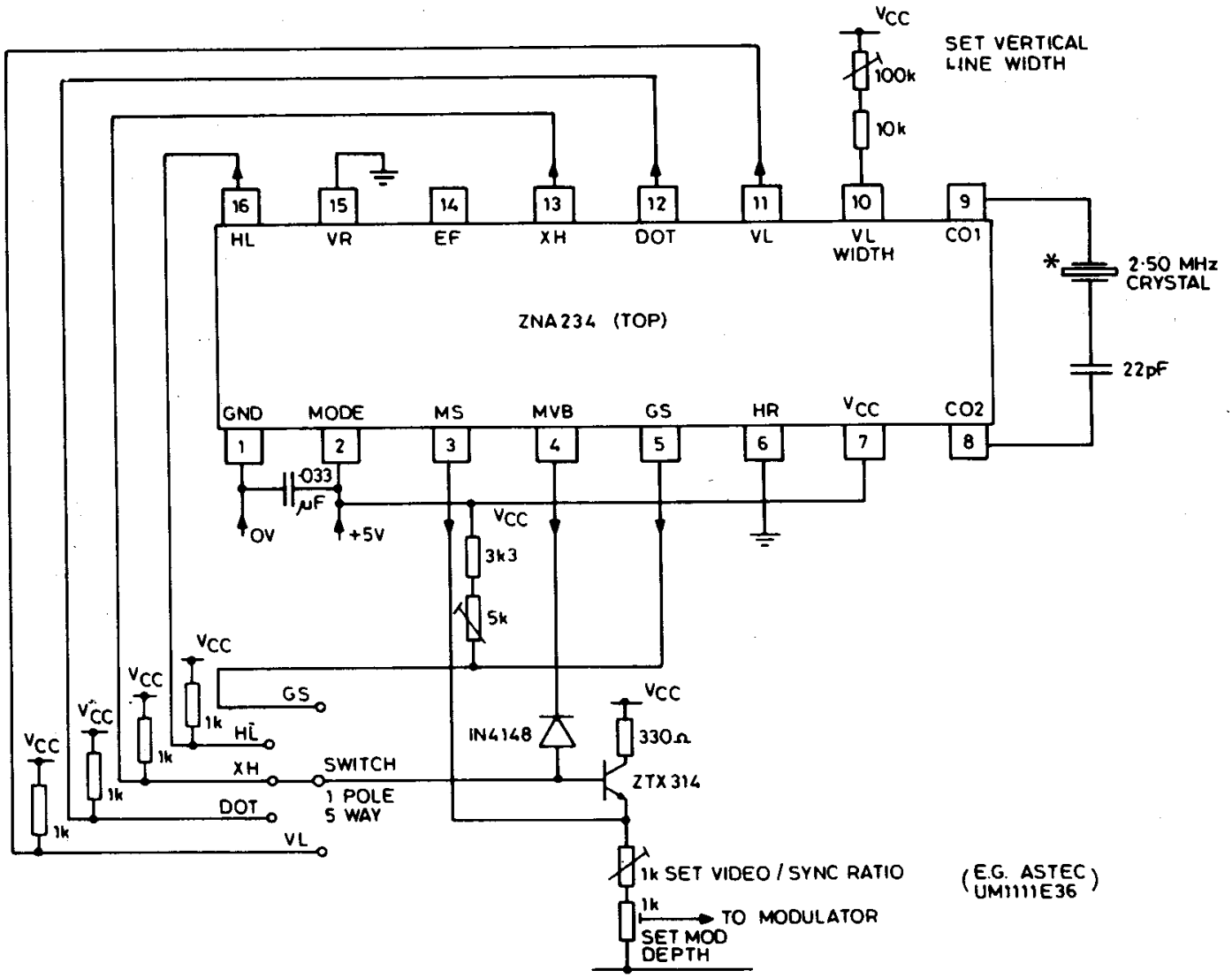
Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Supply Voltage	V_{CC}	4.75	5.0	5.25	Volts	
Supply Current	I_S	—	135	—	mA	
High-level Input Voltage	V_{IH}	2.4	—	—	Volts	
Low-level Input Voltage	V_{IL}	—	—	0.8	Volts	
High-level Input Current	I_{IH}	—	—	40	μA	$V_{CC}=5V$, $V_I=2.4V$ (See Note 1)
Low-level Input Current	I_{IL}	−40	—	—	μA	$V_{CC}=5V$, $V_I=0V$ (See Note 1)
High-level Output Voltage	V_{OH}	2.4	—	—	Volts	$V_{CC}=5V$, $I_{Source}\leqslant 250\mu A$ (See Note 2)
Low-level Output Voltage	V_{OL}	—	—	0.5	Volts	$V_{CC}=5V$, $I_{Sink}\leqslant 5.0mA$ (See Note 2)
Clock Frequency	f_{clock}	— —	2.500 2.520	— —	MHz MHz	625 lines, Mode = '1' 525 lines, Mode = '0'
External Oscillator Pulse Width	t_w	150	200	250	ns	−ve going pulse, 625/525 lines

Note 1:
Input conditions only apply to mode input. For input conditions of oscillator inputs C01, C02, see applications section.

Note 2:
All outputs except greyscale, i.e. mixed sync, mixed video blanking, vertical lines, dots, crosshatch, even field and horizontal lines have internal 3k3 pull-up resistors. Edge speeds and sourcing capability can be increased, if required, by the addition of external pull-up resistors, These should have a minimum value of 1 kΩ.

COMPLETE PATTERN GENERATOR USING THE ZNA234

(for detailed information see applications section)



*The following Companies can supply suitable crystals for use with the ZNA234

IQD
(Interface Quartz Devices Limited),
Crewkerne,
Somerset.
Tel: 0460 74433 Telex: 46283
Contact: Mr. Jarvis

McKnight Crystal Company,
Hardley Industrial Estate,
Hythe, Southampton.
Tel: 0703 848961 Telex: 47506
Contact: Mr. Carpenter

SEI
(Salford Electrical Instruments Limited),
Times Mill,
Heywood, Lancashire OL10 4NE
Tel: 0706 67501 Telex: 635106
Contact: Mr. P. Kenyon or Mr. D. Standring

OUTPUT INFORMATION AND WAVEFORMS

(a) **625 Lines** CCIR Timing (Mode=1)
Crystal Frequency = 2.50MHz
Line Frequency = 15.625kHz,
Line Period = 64μs
Field Frequency = 50Hz,
Field Period = 20ms.

Outputs
20 Horizontal Lines; 18 visible, 2 during Field blanking.
20 Vertical Lines; 16 visible, 4 during Line blanking.

Crosshatch squares have approx. 1.4:1 aspect ratio (0.98" ×0.67" on 20" screen).

For timing diagrams see page 5.

(b) **525 Lines** EIA Timing (Mode=0)
Crystal Frequency = 2.520MHz
Line Frequency = 15.750kHz,
Line Period = 63.5μs
Field Frequency = 60Hz,
Field Period = 16.66ms.

Outputs
17 Horizontal Lines; 15 visible, 2 during Field blanking.
20 Vertical Lines; 16 visible, 4 during Line blanking.

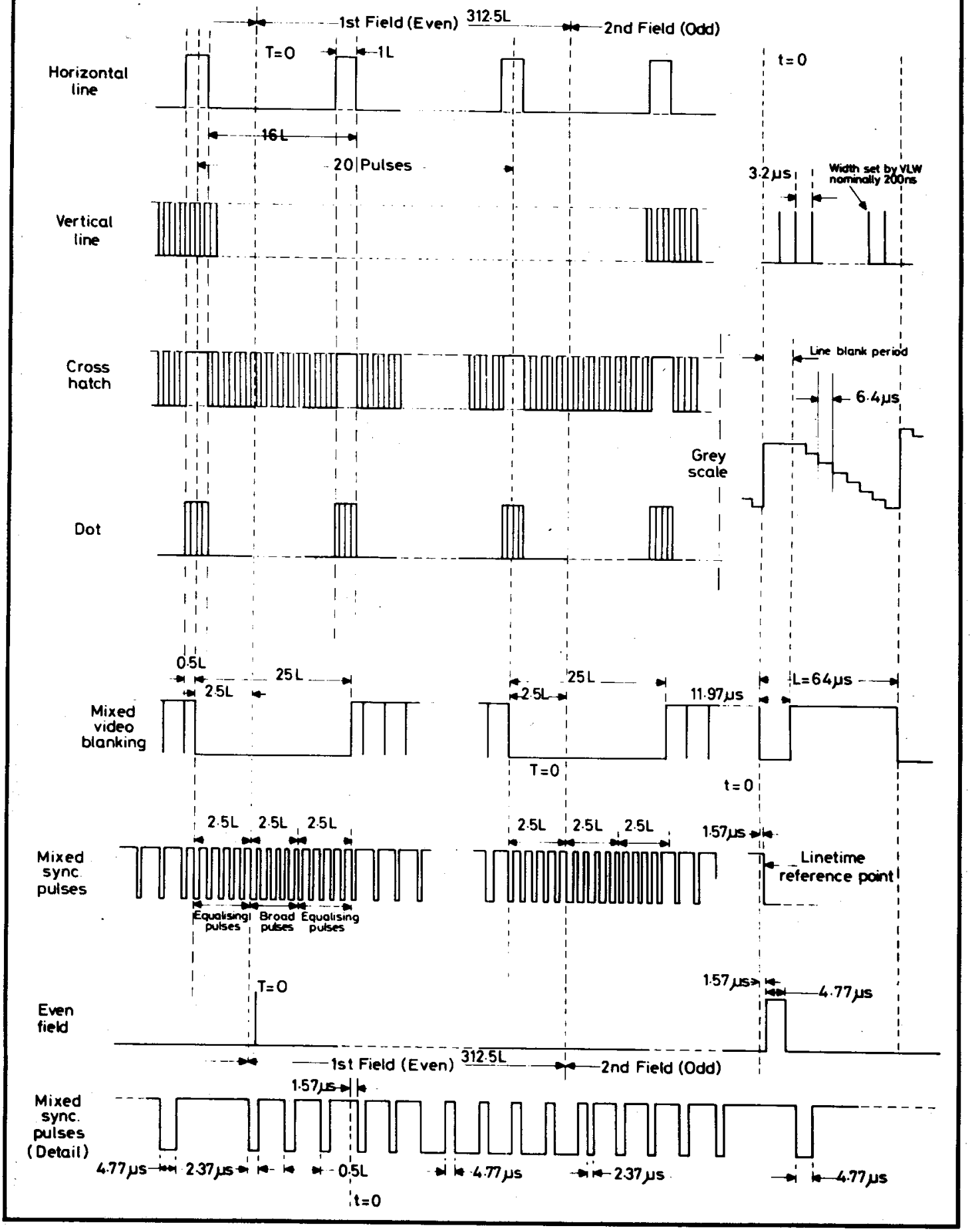
Crosshatch squares have approx 1. 2:1 aspect ratio (0.97" ×0.79" on 20" screen.)

For timing diagrams see page 6.

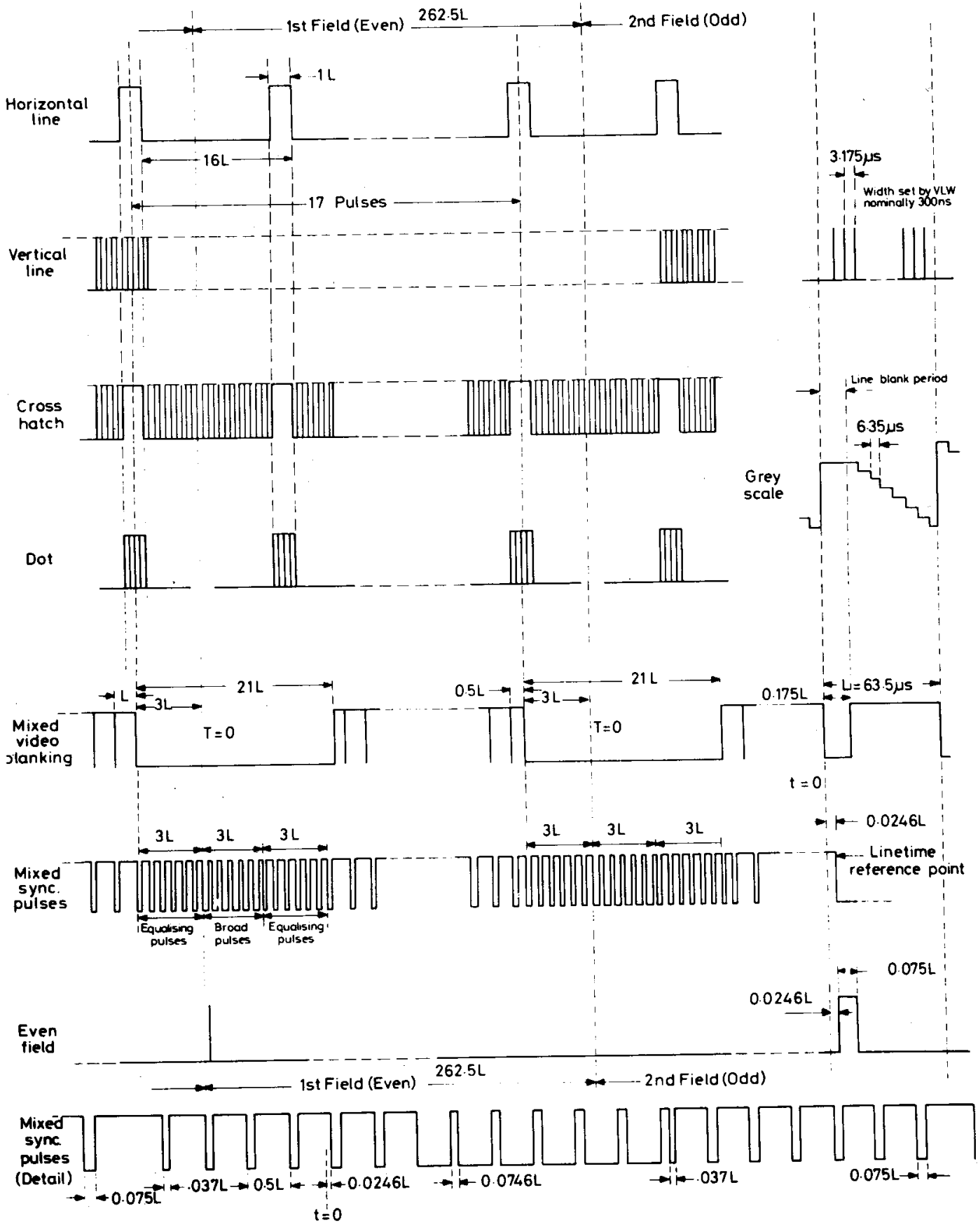
The horizontal line waveform consists of pulses 1 line wide occuring every 16 lines, producing horizontal lines 2 lines wide (owing to interlacing) on the screen. The vertical line waveform is a continuous series of pulses nominally 300ns wide occuring every 3μs (approximately). As these pulses occur in the same position in every line period the result is a series of vertical lines on the screen.

The two waveforms are fed to internal AND and OR gates to produce dot and crosshatch outputs respectively.

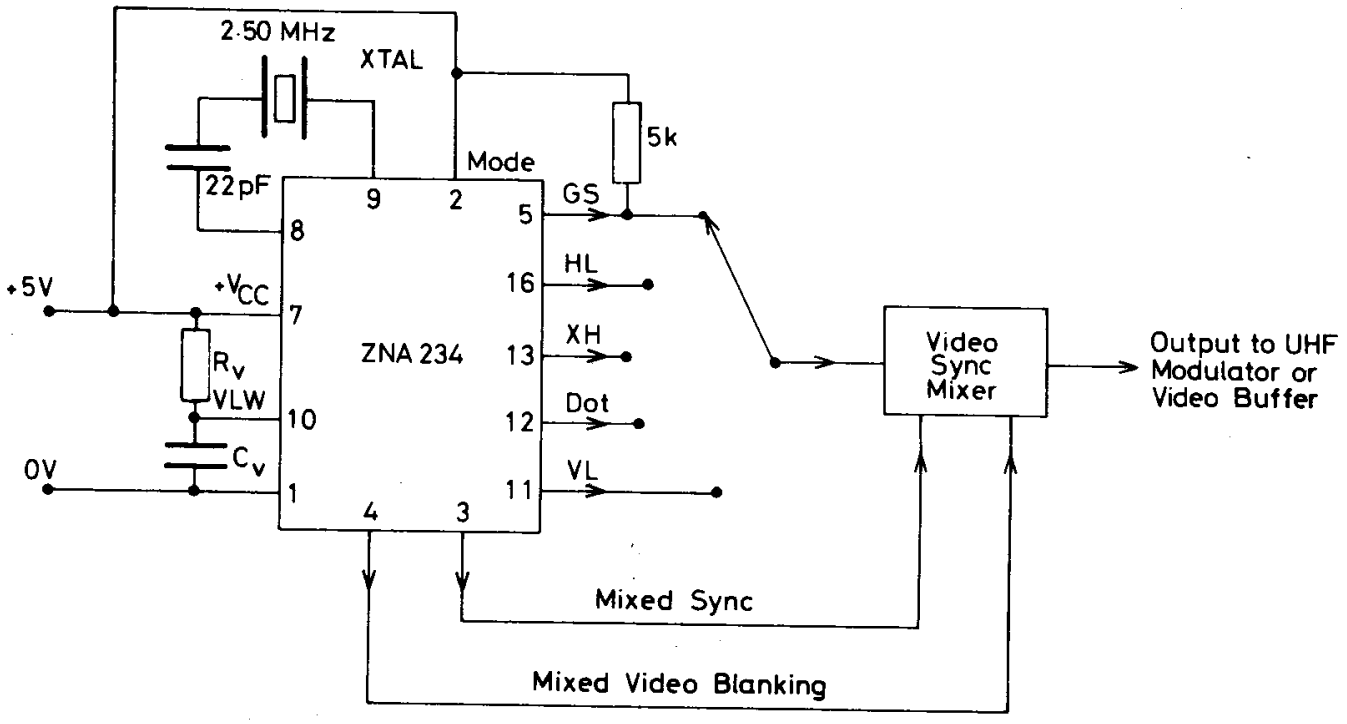
OUTPUT WAVEFORMS — 625 LINES



OUTPUT WAVEFORMS — 525 LINES



APPLICATION INFORMATION



T.V. Pattern Generator Using the ZNA234 (625 lines)

NOTES:

Mode, Pin 2

The mode input should be connected to V_{CC} for 625 lines or to 0V for 525 line operation.

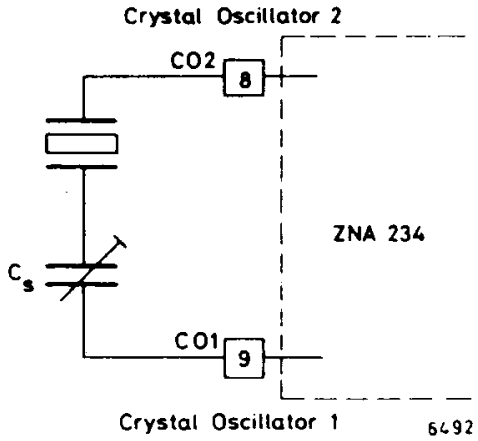
Greyscale, Pin 5

The greyscale output is produced by a D to A converter from the horizontal counter. The D to A converter is effectively a switched current sink providing 8 equal current steps of approx 60μA/step. When used with an external pull-up resistor, 8 voltage steps are produced (approx 0.3V/step with $R_L = 5K$). The output has a saturation level of approximately +2V and requires a buffer stage (emitter follower) to match into the video/sync mixer.

Oscillator. Pins 8 and 9.
The ZNA234 oscillator can be driven in several ways, depending on the application.

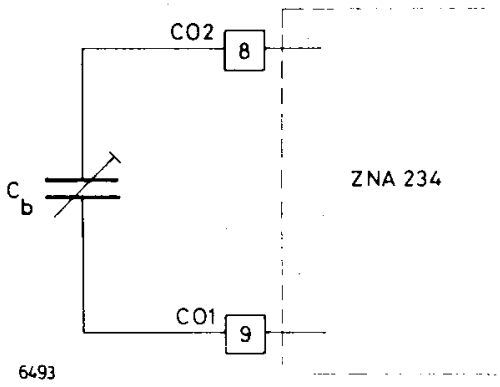
(a) Using external 2.50MHz crystal (625 lines mode)

Series Resonant Crystal



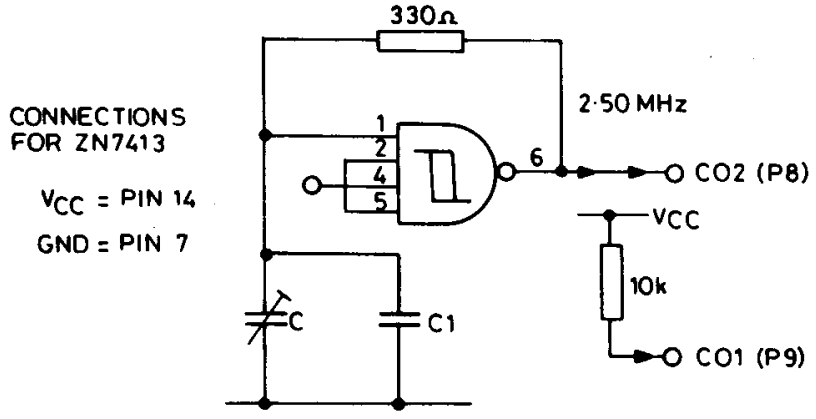
C_s is normally about 22pF

(b) If stability is not important, a capacitor may be used instead of the crystal.



$C_b \approx 15pF$

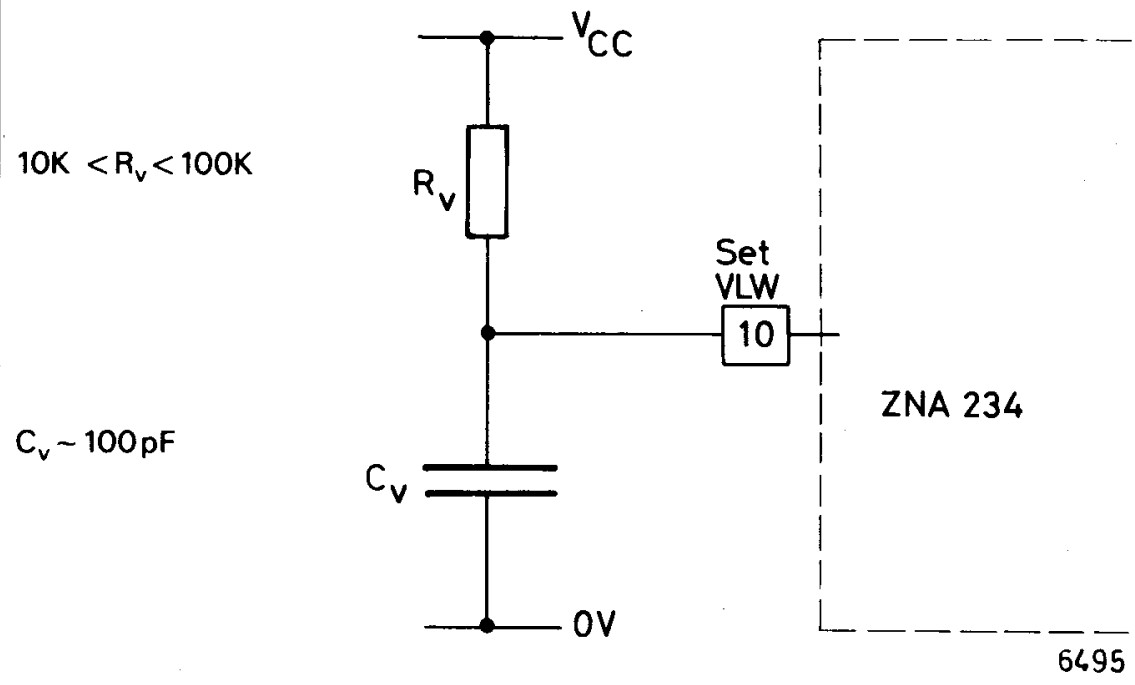
(c) Alternative oscillator circuits.



The external oscillator pulse width t_w, must be within the range shown in the table on page 2.

Vertical Line Width, Pin 10

Provision has been made for the width of the vertical lines to be varied if required. With pin 10 open circuit, the width of the vertical line pulses generated by the device is approximately 300ns. The pulse width may be varied from 100ns to 1μs by connecting a capacitor and resistor to pin 10 as shown below.



Increasing C_v or R_v will produce a wider pulse.

N.B. If pin 10 is left open circuit to give a 300ns pulse width, any external capacitance on the pin (e.g. from long lead or p.c.b track) will affect the timing. It is, therefore, recommended that if pin 10 is to be left open circuit then no connection at all is made to it.

Test Inputs, Pins 6 and 15

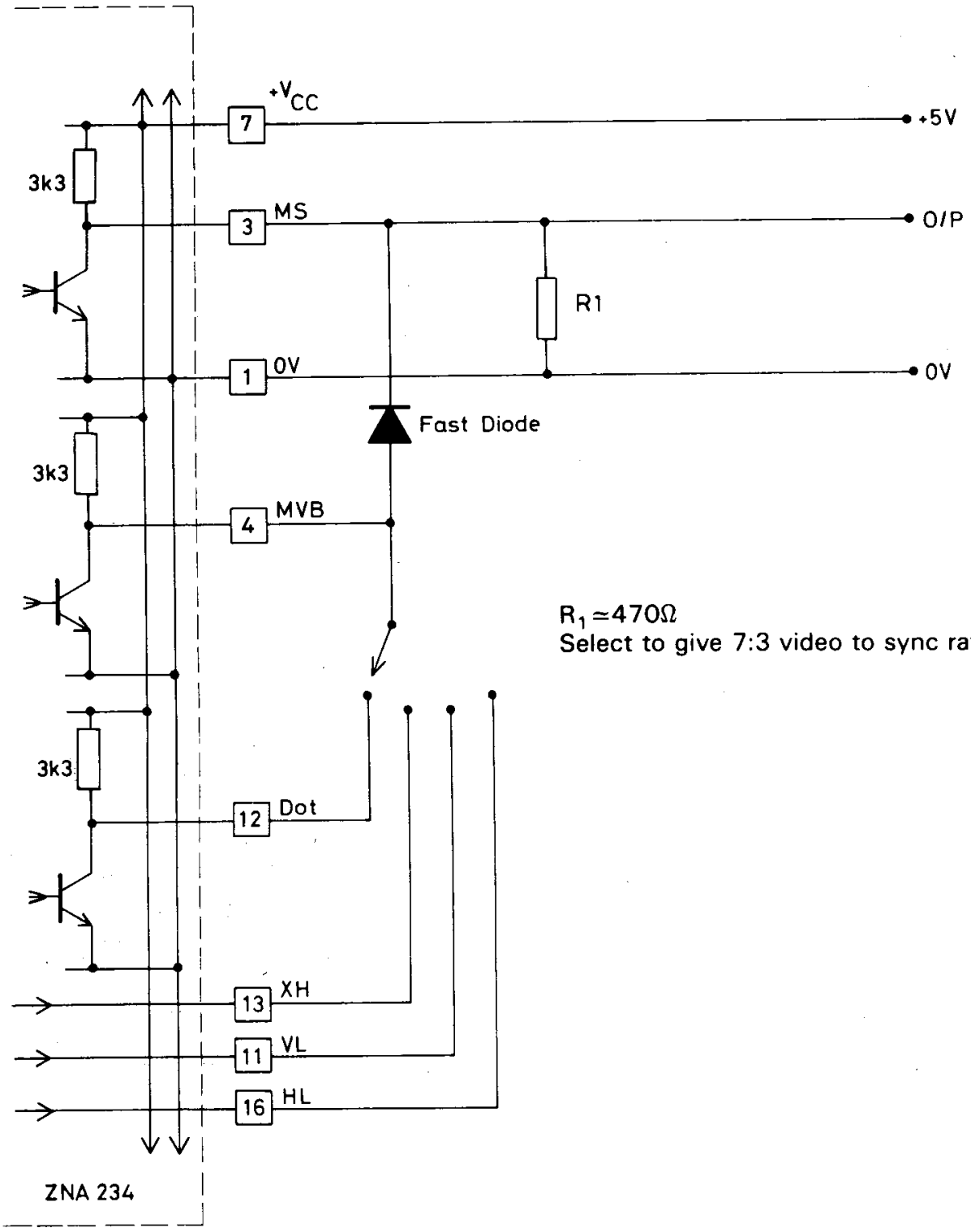
These should be connected to 0V.

Circuits for Video/Sync Mixer

The following two circuits on pages 10 and 11 for the video/sync mixer are suggested as starting points only. They have been found to work on the bench, but no detailed applications work has been carried out to date.

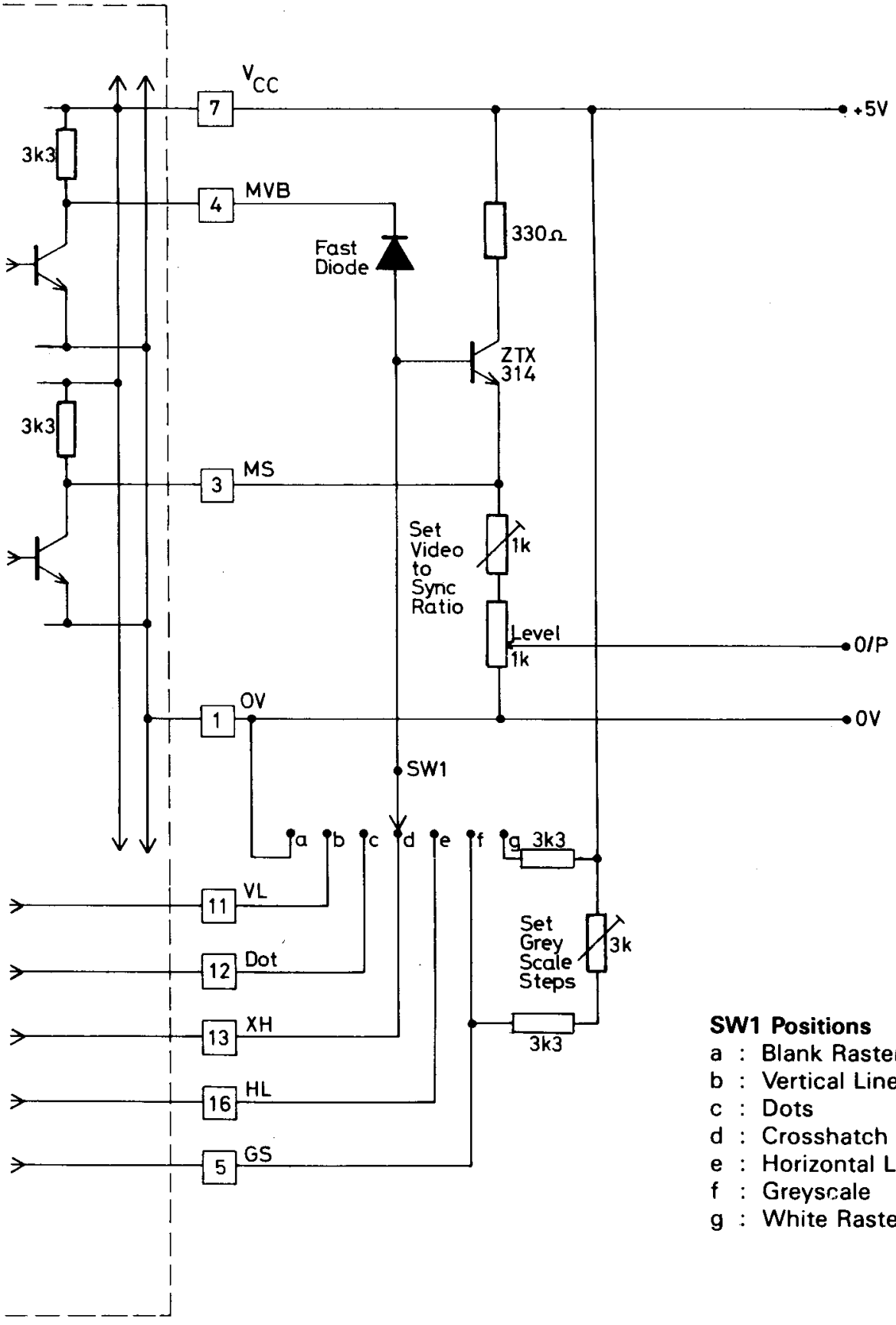
The circuit on page 10 is probably the simplest possible method, but it does have the disadvantage that the Greyscale output cannot be used owing to its different d.c. levels compared with the other video outputs. The second circuit, page 11, is hardly any more complex, and does allow the use of the Greyscale output.

SIMPLE CIRCUIT FOR VIDEO/SYNC MIXER (NO GREYSCALE)



$R_1 \simeq 470\Omega$
Select to give 7:3 video to sync ratio.

CIRCUIT FOR VIDEO/SYNC MIXER ALLOWING USE OF GREYSCALE



SW1 Positions

a : Blank Raster
b : Vertical Lines
c : Dots
d : Crosshatch
e : Horizontal Lines
f : Greyscale
g : White Raster