

* ORIGIN *

ZNA234E

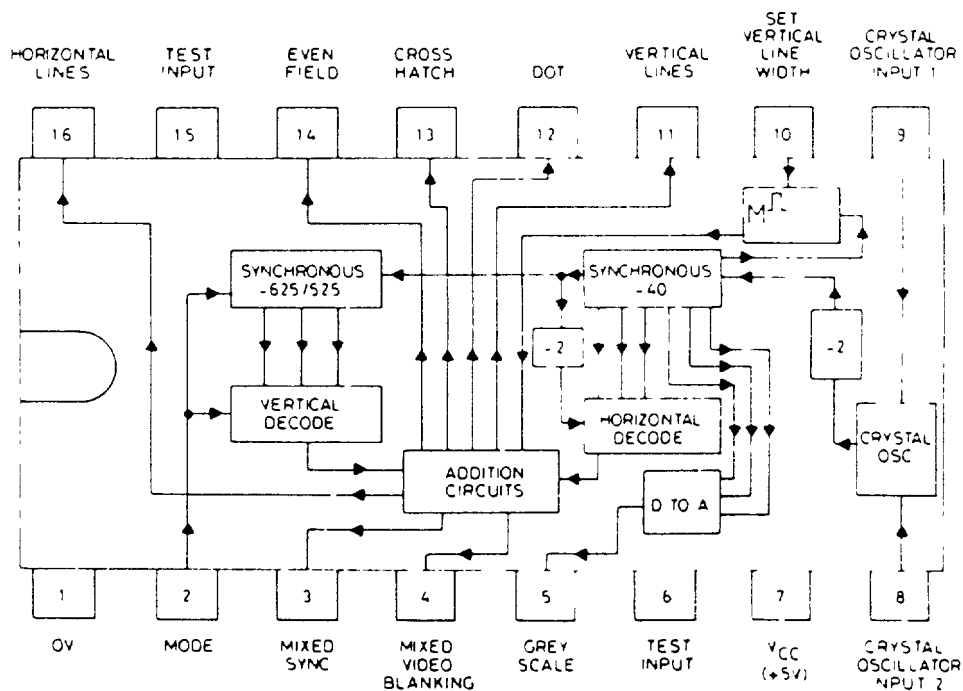
TV PATTERN GENERATOR

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 MAXIMUM 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).

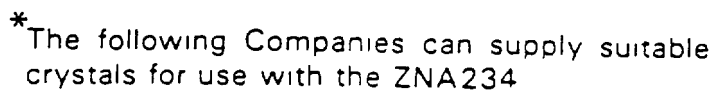
Parameter	Symbol	Min.	Typ	Max	Units	Test Conditions
Supply Voltage	V_{CC}	4.75	5.0	5.25	Volts	
Supply Current	I_S	—	135	—	mA	
High-level Input Voltage	V_{IH}	2.4	—	—	Volts	
Low-level Input Voltage	V_{IL}	—	—	0.8	Volts	
High-level Input Current	I_{IH}	—	—	40	μA	$V_{CC} = 5V$, $V_I = 2.4V$ (See Note 1)
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	$V_{CC} = 5V$, $I_{Source} \leq 250 \mu A$ (See Note 2)
Low-level Output Voltage	V_{OL}	—	—	0.5	Volts	$V_{CC} = 5V$, $I_{Sink} \leq 5.0 mA$ (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 k Ω



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

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

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

OUTPUT INFORMATION AND WAVEFORMS

(a) 625 Lines CCIR Timing (Mode=1)

Crystal Frequency = 2.50MHz
 Line Frequency = 15.625kHz,
 Line Period = 64 μ s
 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" $\times$ 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 = 63.5 μ s
 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.

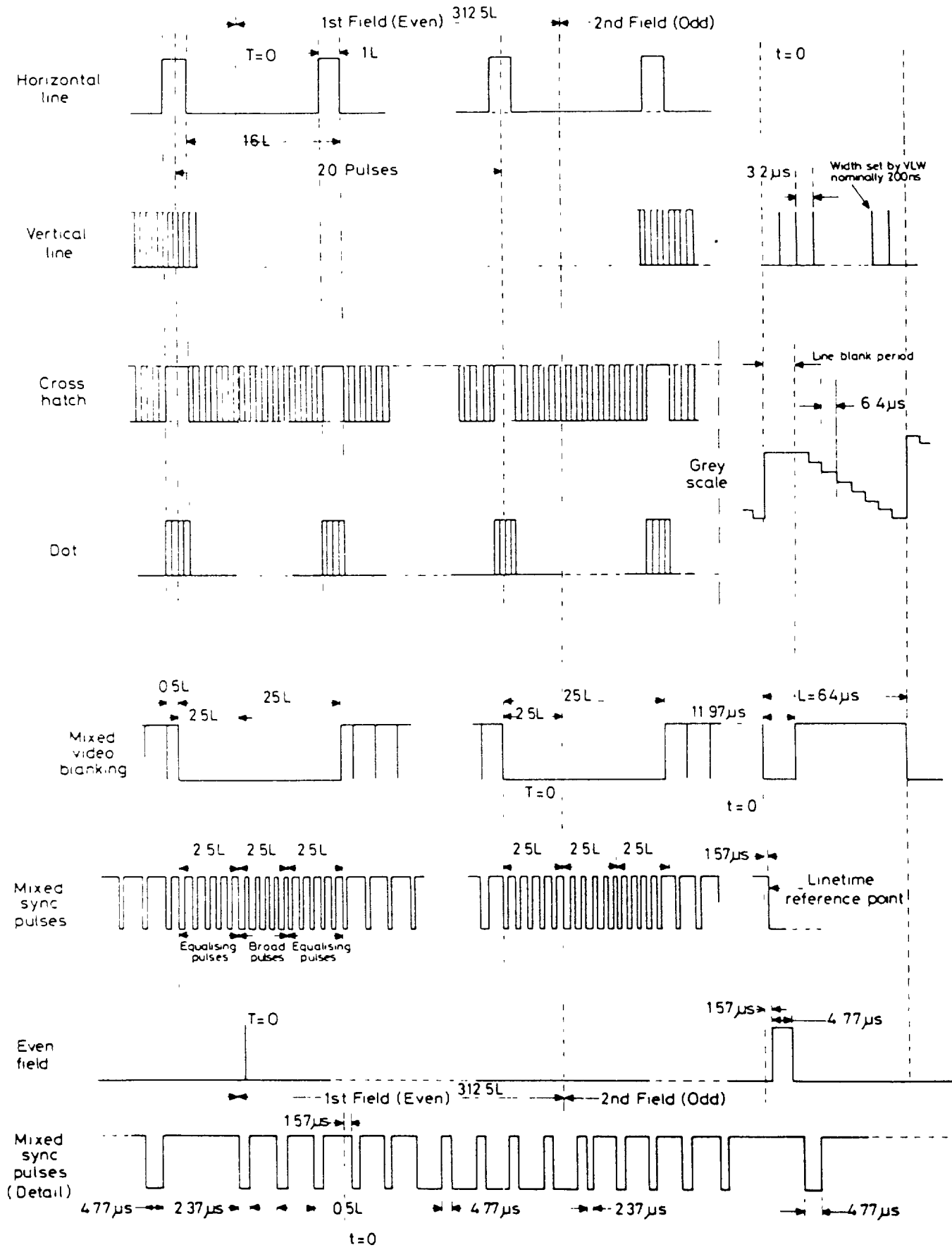
Crosshatch squares have approx 1.2:1 aspect
 ratio (0.97" $\times$ 0.79" on 20" screen.)

For timing diagrams see page 6.

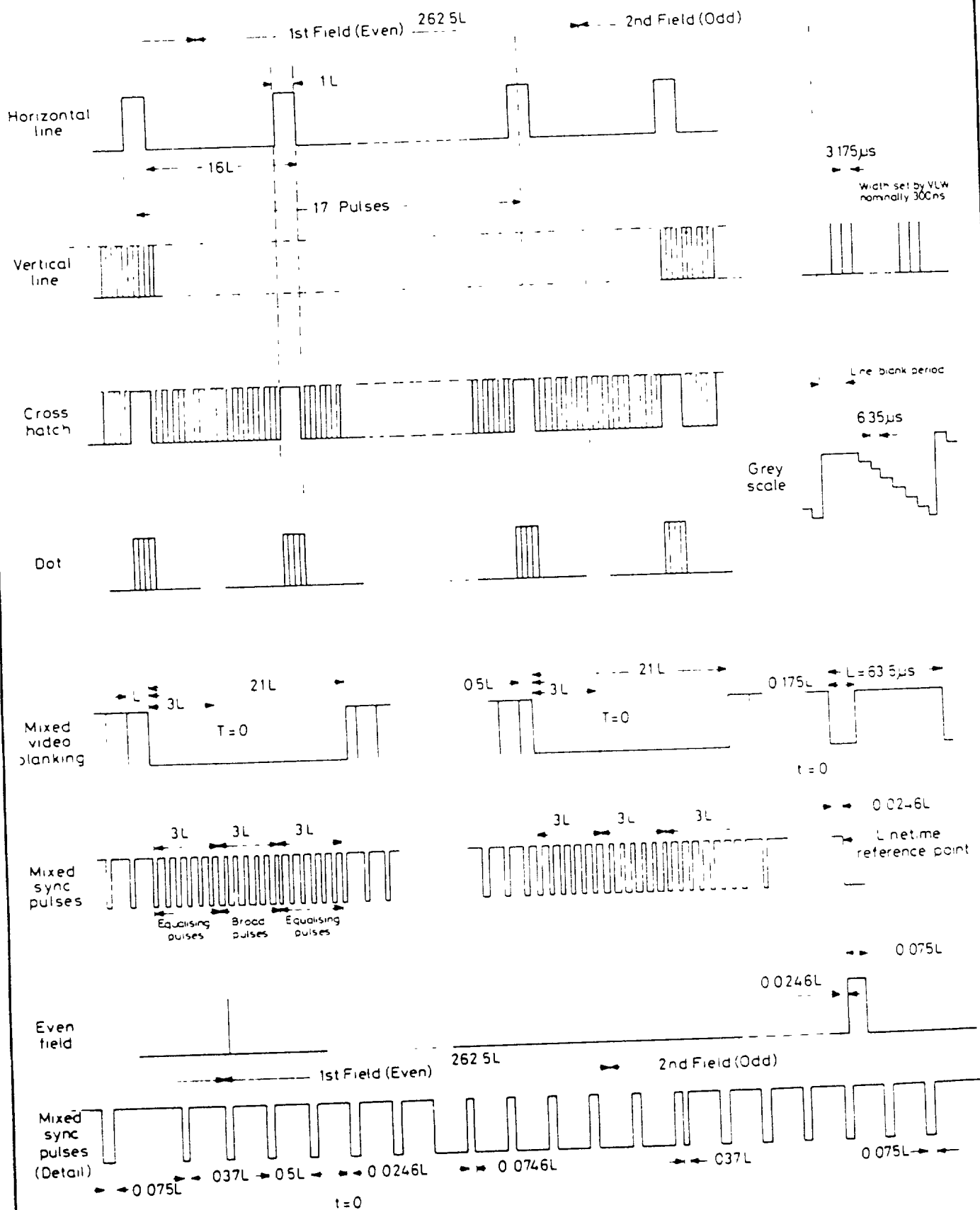
The horizontal line waveform consists of
 pulses 1 line wide occurring every 16 lines,
 producing horizontal lines 2 lines wide (owing
 to interlacing) on the screen. The vertical line
 waveform is a continuous series of pulses
 nominally 300ns wide occurring every 3 μ s
 (approximately). As these pulses 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

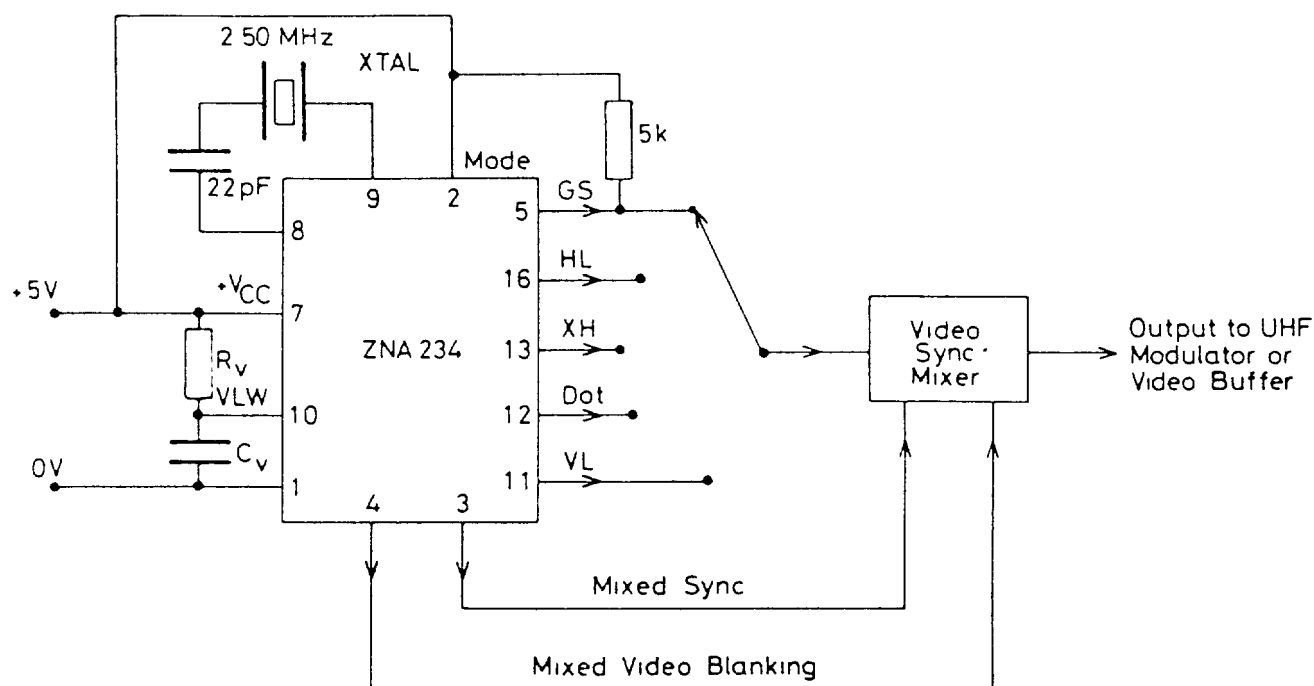
OUTPUT WAVEFORMS — 625 LINES



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

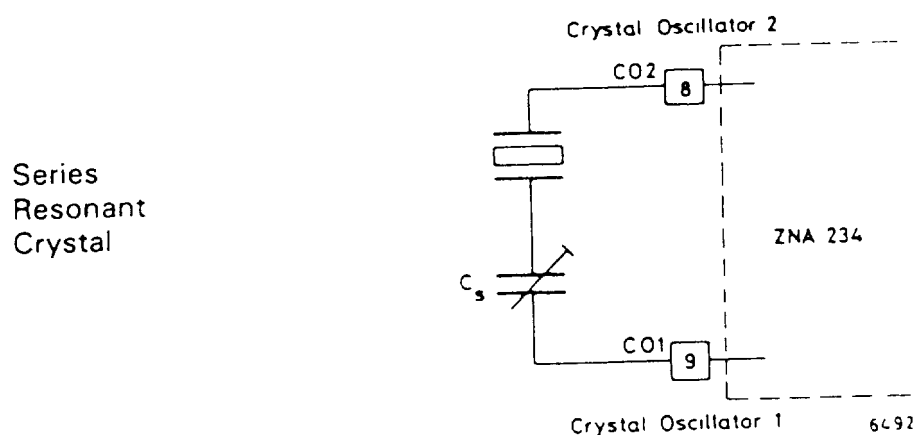
The greyscale output is produced by a D to A converter from the horizontal counter. The D to

A converter is effectively a switched current sink providing 8 equal current steps of approx $60\mu\text{A}/\text{step}$. When used with an external pull-up resistor, 8 voltage steps are produced (approx $0.3\text{V}/\text{step}$ with $R_L = 5\text{K}$). 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.

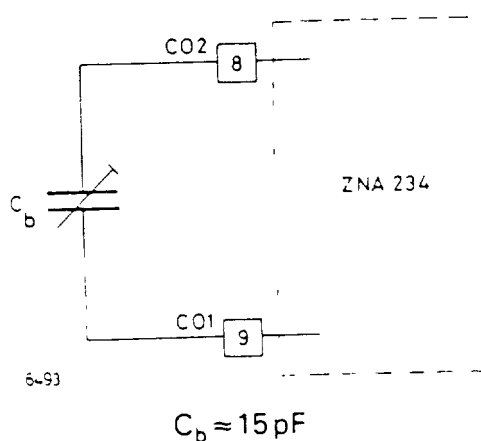
The ZNA234 oscillator can be driven in several ways, depending on the application

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

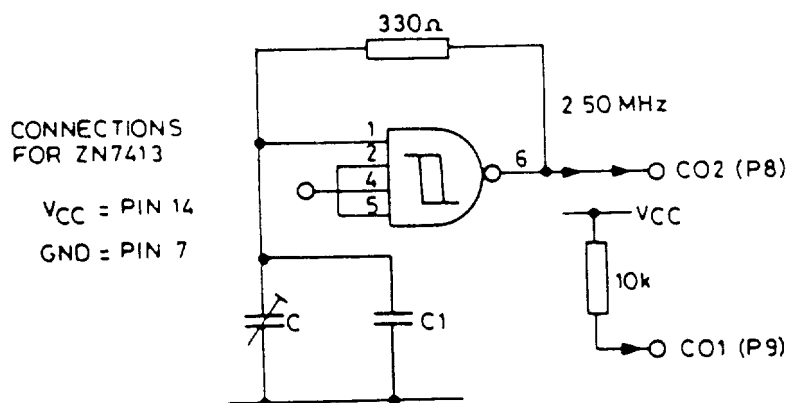


C_s is normally about 22 pF

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



(c) Alternative oscillator circuits.



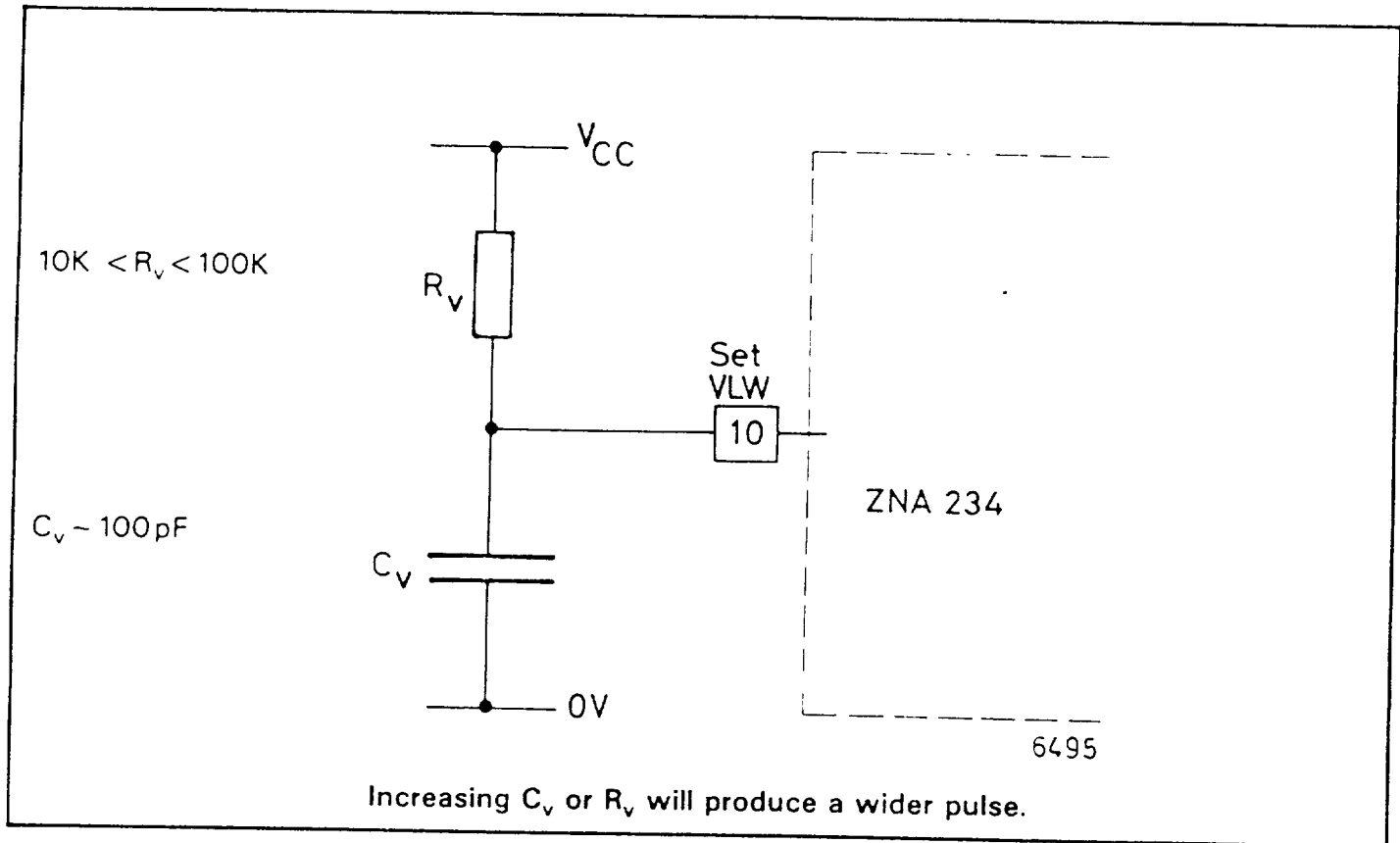
The external oscillator pulse width t_w , must be within the range shown in the table on page 2.

ZNA234E

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 $1\mu\text{s}$ by connecting a capacitor and resistor to pin 10 as shown below



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 pcb 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

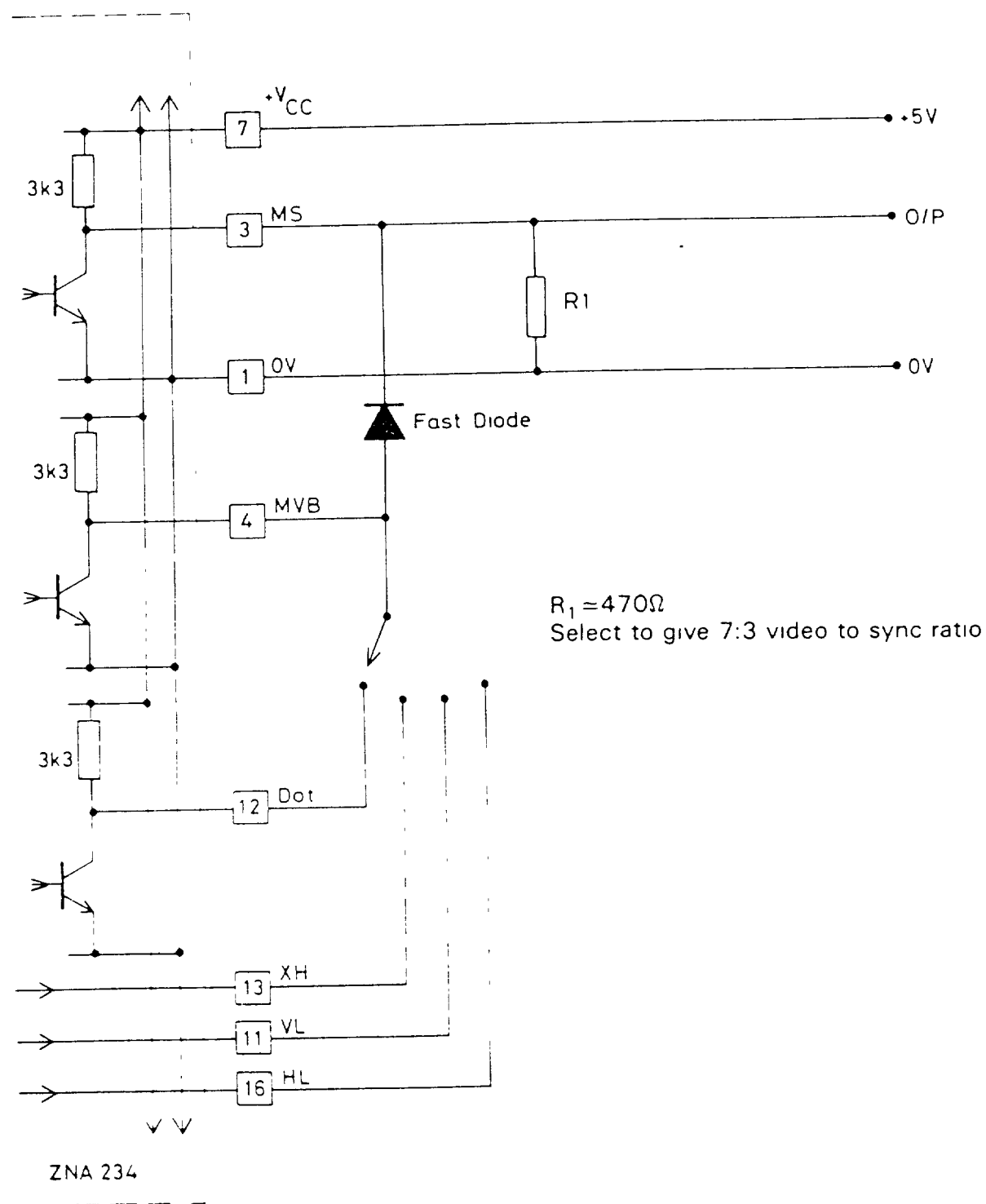
These should be connected to 0V.

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)



CIRCUIT FOR VIDEO/SYNC MIXER ALLOWING USE OF GREYSCALE

