SAFE-AREA GENERATOR GE1/525

Introduction

The GE1/525 requires feeds of mixed blanking and field drive pulses. Its output is used in conjunction with a gate unit[1] to produce a rectangular black and white dotted border, on a picture monitor, that indicates the limits imposed by telerecording and by overscanning in domestic receivers. The displayed rectangle is approximately 25 per cent smaller, in both width and height, than the normal raster size and is designed to be within the tolerances set down in British Standard B.S. 2926*. The generator can be used on 405 or 625 line-standards and provision is made so that the output signal can be switched on or off.

The unit is built on a CH1/26B chassis with index-peg positions 10 and 13. The chassis includes a power supplier type PS2/22B which operates from a 240-volt mains supply. An external 50-volts d.c. supply is required for energising relays.

General Specification

Input Signals (field drive and mixed blanking)	2 volts p-p
Output Signal (across 75 ohms)	±1 volt
Input Impedance	about 3 kilohms
Output Impedance	75 ohms ±3 per cent
Power Requirements	200-250 volts, 50 Hz 50 volts d.c.
Power Consumption	50 mA at 240 volts r.m.s. 40 mA at 50 volts d.c.
Operating Temperature	5 to 45 degrees C
Weight	1·36 kg (3 lb)

General Description

Fig. 1 is a simplified block diagram of the GE1/525. In the following description the generator is assumed to be working on the 625-line standard.

The positions of the vertical edges of the border are determined by vertical timing circuits. These are monostable multivibrators arranged to provide two pulses of 400 nanosecond duration at 6·5 and 45·5 microseconds after the end of each line-blanking period.

The positions of the horizontal edges of the border, 37 active lines from the beginning and end of each field, are determined by horizontal timing circuits. These circuits comprise two sets of gates, one for the 405 and the other for the 625 line-standard. Inputs to the gates are taken from different points on a divider chain which comprises nine bistable units with a total count of 512. An additional input to the gates is taken from a horizontal corner blanking circuit.

A horizontal pattern generator produces the pulses necessary to give the black/white bars for the horizontal edges of the border. These pulses are generated in an astable multivibrator which is inhibited during the line and field blanking periods. The correct number of transitions is determined by a separate gate. The horizontal corner blanking circuit is used to remove those parts of the horizontal edges which fall outside the safe-area.

The pulses necessary to produce the black/white bars for the vertical edges of the border are derived from vertical pattern generator circuits. Those parts of the border which fall outside the safe-area are removed by a vertical corner blanking circuit.

The correct vertical and horizontal border waveforms are added to the outputs of other gates to set the d.c. level of the signals so that their waveforms have equal positive and negative excursions.

The component parts of the output signal are fed to an output amplifier and pulse shaper.

The GE1/525 normally operates on the 625-line standard and switching to 405 is achieved by relays energised from the external 50-volt supply. The integral power supplier is used together with additional components to provide supplies of +6·8 and −5·2 volts. The output can be muted by removing an earth from pin 6 of the output connector PLA.

Circuit Description

Fig. 2 is a circuit diagram of the GE1/525 and Fig. 3 illustrates certain signal waveforms which

*B.S. 2926: Picture Areas of Motion Picture Films for Television.

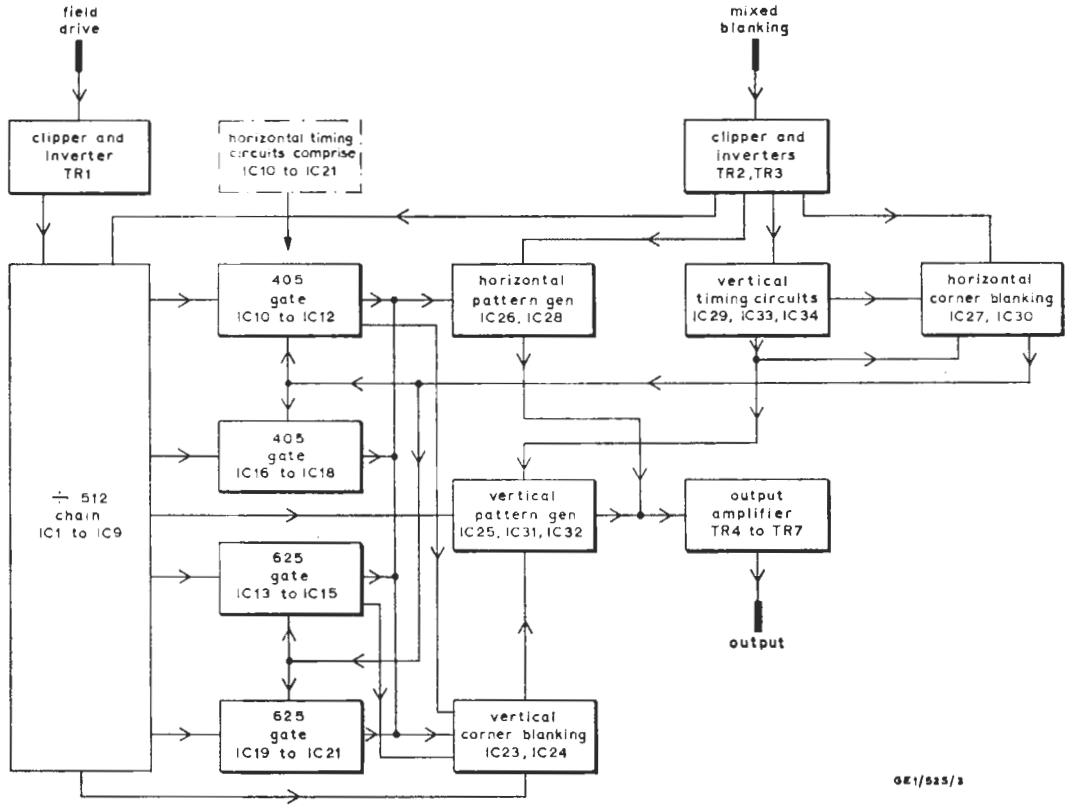


Fig. 1 Simplified Block Diagram of the Safe-area Generator GE1/525

appear in the circuit when the 625-line standard is used. In the following description the references (in parentheses) refer to the waveforms shown in Fig. 3.

Vertical Timing Circuit

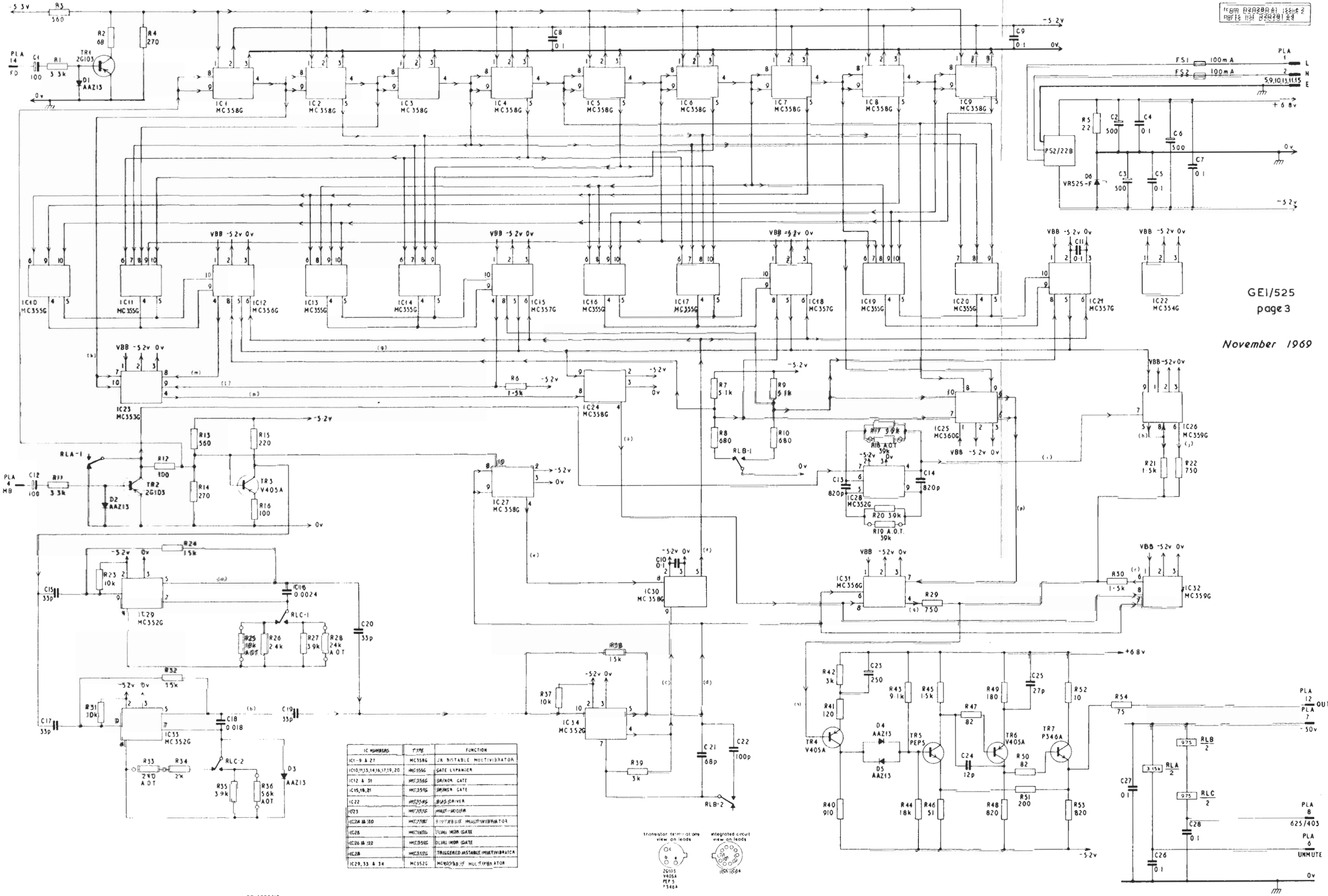
Negative going mixed blanking pulses clipped, inverted and reinverted by TR2 and TR3 respectively are differentiated and applied to the inputs of monostable multivibrators IC29 and IC33. Choice of line standard is made by selecting different values of resistance in the multivibrator timing circuits by means of relay contacts RLC-1 and RLC-2. The outputs of IC29 and IC33, (a) and (b) respectively, are differentiated and applied to the input of a monostable multivibrator IC34. The choice of line standard in this circuit is made by relay contact RLB-2 which selects different values of capacitance for the timing circuit. IC34 has both positive-going (c) and negative-going (d) outputs.

Horizontal Timing Circuit

The input to the divider chain, IC1 to IC9, is a feed of positive-going mixed blanking pulses derived from the collector of TR2. A feed of clipped and inverted field drive pulses, taken from the collector of TR1, is applied to the reset terminal of each bistable circuit. This ensures that a given output from each bistable unit is always positive at the beginning of each field.

Two gate circuits, comprising IC10 to IC12 and IC16 to IC18, are concerned with 405-line working; two gates, IC13 to IC15 and IC19 to IC21, are concerned with 625-line working. The gates not required are inhibited by means of a positive bias which is switched by relay contact RLB-1. The output from each gate is a pair of pulses, on two adjacent lines, timed to occur at the correct point in the field waveform to produce the horizontal edges of the border.

Considering only the 625-line standard, the out-



IC NUMBERS	TYPE	FUNCTION
IC1-9 & 27	MC358G	J-K BISTABLE MULTIVIBRATOR
IC10,11,13,14,16,17,19,20	MC355G	GATE EXPANDER
IC12 & 31	MC356G	3/4 NOR GATE
IC15,18,21	MC357G	3/4 NAND GATE
IC22	MC354G	GLASS DRIVER
IC23	MC353G	ASTABLE MODULE
IC24 & 30	MC358G	BISTABLE MULTIVIBRATOR
IC25	MC360G	DUAL 4 NOR GATE
IC26 & 32	MC359G	DUAL NOR GATE
IC28	MC352G	TRIGGERED ASTABLE MULTIVIBRATOR
IC29,33 & 34	MC352G	MONOSTABLE MULTIVIBRATOR

GE1/525/1T

GE1/525
page 3

November 1969

Fig 2 Circuit of Safe Area Generator GE1/525

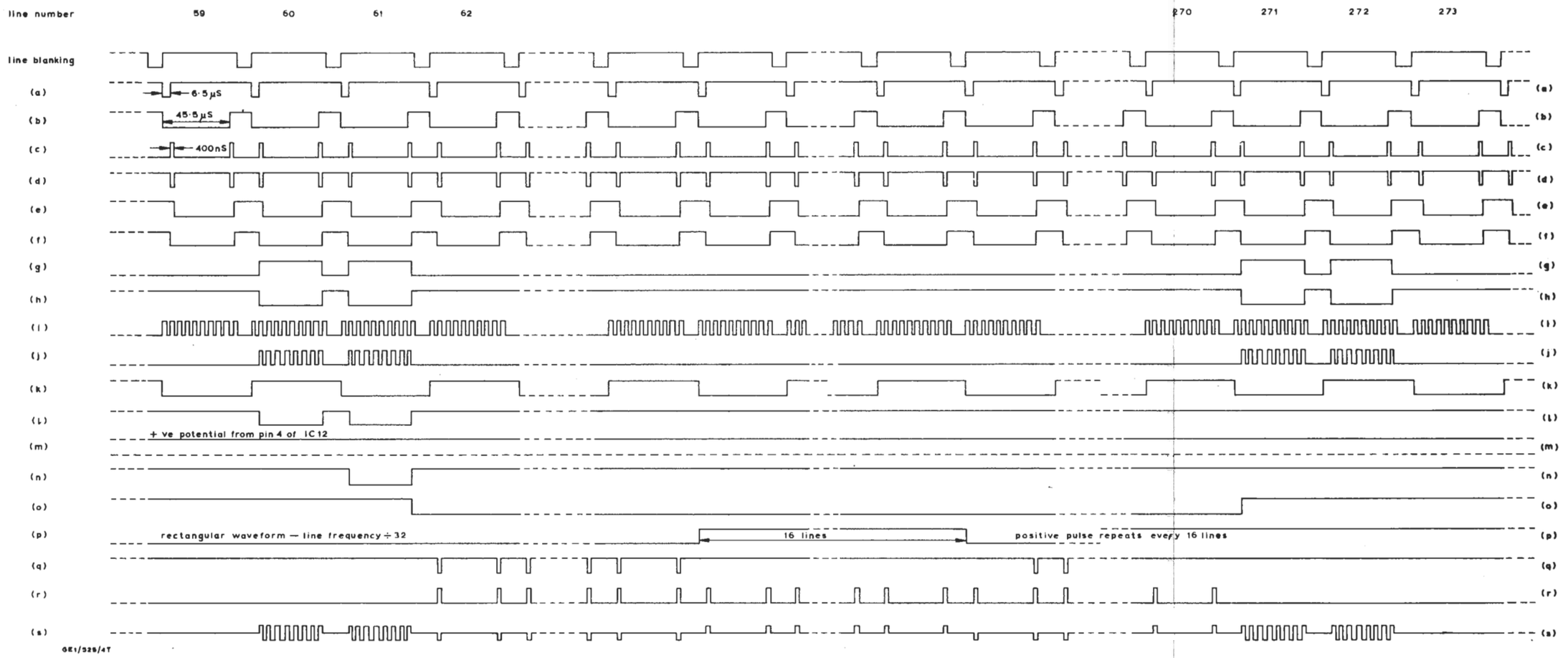


Fig 3 Typical Waveforms

put of gate IC15 is concerned with the top edge of the border and the output of IC21 with the bottom edge. Inputs to the gates are taken from various points on the divider chain and also from the output of IC30 (f), the horizontal corner blanking circuit. Gates IC15 and IC21 produce a positive-going output (g) when all their inputs are negative.

Horizontal Corner Blanking Circuit

A feed of inverted mixed blanking pulses, from the collector of TR2, and the negative going output (d) of IC34 are applied to bistable circuit IC27. The output of IC27 is shown at (e). IC30 is a bistable circuit also and is triggered by waveforms (c) and (e). Its output (f) is applied to the horizontal timing gates, IC12, IC15, IC18 and IC21, to set the duration of the horizontal edges of the border.

Horizontal Pattern Generator

The horizontal border pattern comprises eight black and eight white bars. The necessary pulses are generated by an astable multivibrator circuit IC28, and the correct number selected in a dual-gate IC26. One half of IC26 is used to invert the output of the horizontal-timing gates (g). The output of this half of IC26 (h) is fed, together with the output of the astable circuit (i), to the second half of IC26. The output of the second half is shown at (j). Waveforms (h) and (j) are added in a resistive network R21, R22 so that the resultant waveform has equal positive and negative excursions.

Vertical Corner Blanking Circuits

Circuit IC23 is known as a half-adder. It is fed with the waveforms shown at (k), (l) and (m). Waveform (m) is a positive d.c. output from circuit IC12 which is inhibited on the 625-line standard. The half-adder gives a positive output (n) when waveforms (k or m) and (k or l) are positive. Waveform (n) is applied to the input of bistable circuit IC24 which is fed on its other input with the output of the horizontal timing gates (g). The output of IC24, shown at (o), is the blanking waveform for the vertical pattern generator.

Vertical Pattern Generator

IC25 is a dual-gate each half being used separately for the two line standards. On the 625-line standard an output from IC5 in the divider chain is inverted in IC25. The output of IC25 (p) is used to provide the black/white pattern for the vertical edges of the border.

Gate IC31 is fed by the waveforms shown at (d), (o) and (p). Its output (q), is the correctly blanked waveform for producing the complete vertical edges of the border. Waveforms (d) and (o) are applied to the inputs of gate circuit IC32 and its output is shown at (r). This output, together with waveform (q), is added in the resistive network R29/R30 to give a waveform (s) which has equal positive and negative excursions.

Output Amplifier

The component parts of the output waveform are applied to a common emitter amplifier TR4. Diodes D4 and D5 suppress unwanted spikes on the waveform which is then passed to a two stage amplifier TR5 and TR6. The output is taken from an emitter follower stage TR7 to pin 12 of the output connector PLA.

Lines Standard Selection and Muting

The generator can be changed to the 405-line standard by connecting an earth to pin 8 of the output connector PLA to energise relays RLB and RLC. The actions of these relays have been noted previously.

The unit can be made operative by connecting an earth to pin 6 of the output connector. This energises relay RLA, a contact of which normally connects the collector of TR2 to earth, thereby making the inverted mixed blanking input.

Test Procedure

Apparatus Required

High-grade oscilloscope
Picture monitor
Avometer Model 8
Source of 625-line standard mixed-blanking and field-drive pulses.

Procedure

1. Adjust RV1 on the PS2/22B so that the output is 12 volts d.c.
2. Check that the voltage across zener diode D6 is between 5·0 and 5·6 volts d.c.
3. Apply 625-line standard mixed blanking and field drive pulses.
4. Check that there is no output signal at IC34 pin 4.
5. Connect pin 6 of the output connector PLA to earth.
6. Check that positive-going pulses are present at IC34 pin 4. These pulses should be of approximately 400 nanoseconds duration and 0·7 volts

in amplitude and occur approximately 6·5 microseconds before and after the end of each line blanking pulse.

7. Terminate the output of the unit with 75 ohms.
8. Check that the pulses at the output, pin 12 of PLA, are positive-going and negative-going with amplitudes between 0·8 and 1·5 volts. Any spurious signals should not exceed 80 millivolts.
9. Display the output, on an externally synchronised picture monitor; this should be approximately 25 per cent smaller, in both width and height, than the normal raster size.

References to Typical Associated Equipment
Video Gating Unit UN1/567.

LPB 5/69