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(12) # EUROPEAN PATENT APPLICATION

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(71) Applicant: **SELECO S.p.A.**
Viale Treviso, 15
I-33170 Pordenone(IT)

(72) Inventor: **Zuliani, Fabio**
via Caravel 1
I-33030 Forgaria nel Friuli (UD)(IT)

(74) Representative: **Dini, Roberto**
S.I.SV.EL. S.p.A. Società Italiana per lo Sviluppo dell'Elettronica ViaCastagnole, 59
I-10060 None (Torino)(IT)

(54) **Circuit generating driving signals for display.**

(57) The present invention relates to a circuit generating signal for a matrix display of elements, in particular a display employing ferroelectric elements, the characterising principle of the invention consists in the fact that the generator comprises a digital memory (R) for a muliplicity of signals apt to build up a driving signal of a predetermined form and a selection device (C) of said signals.

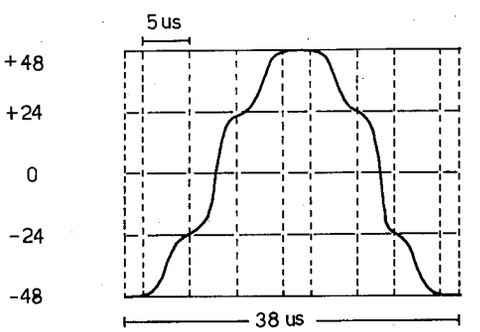

FIG. 1

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The present invention relates to a circuit generating signal for a matrix display of elements, in particular a display employing elements of a ferroelectric type.

Dispays based on ferroelectric crystals present interesting characteristics, such as high resolution and memory (infact these elements are of a flip-flop type).

The driving of such types of display do however present several problems; one must take into account that ferroelectric crystals represent a particular state of liquid crystal, obtained through a particular manufacture; the characteristics of the relative driving signals must be strongly correlated to the actual structure of the crystals; the form of the signals must be of a complex type and in addition the actual characteristics vary generally with a change in temperature.

The aim of the present invention is therefore that of indicating a circuit generating driving signals for a matrix display of elements, particularly of a ferroelectric crystal type, that is both simple and flexible, and therefore easy to modify.

A further aim of the invention is to indicate a circuit generating signal for a display that easily permits to be compensated in temperature.

To allow for such aims the present invention has as its object a circuit generating driving signals for a matrix display of elements, particularly a display of ferroelectric elements, characterised by the fact that the generator comprises a digital memory for a multiplicity of signals apt of creatinging a driving signal of a predetermined form and a selection device of said signals.

Further aims and advantages of the present invention will become clear from the following description and annexed drawings, provided as a non limiting example, wherein:

Figure 1 represents an example of driving signal obtainable with a signal generator according to the invention;

Figure 2 represents a block diagram of the signal generator according to the invention;

Figure 3 represents the principle diagram of a compensation system for the temperature according to the invention.

Figure 1 represents an example of driving signals obtainable with the signal generator according to the invention: Such signal has as its base a fundamental sinusoid, to which waves of a higher frequency and lower amplitude are superimposed.

In a preferred realisation of the present invention, said driving signal presents a range of 2x48 volt and a period of 38 microseconds, and a fundamental frequency of 100Khz; as can be observed the slope varies; the interval of maximum slope lasts 5 microseconds.

The form of the signal represented in figure 1 is of a typical type, adapt for the driving of the various lines of the display; although the type of form and the optimum frequency may vary, as has already been said; for this reason an easily flexible and adaptable generator for eventual variations is needed.

The originality of the solution consists in having provided means for obtaining a digital synthesis of the signal in such a way that allows for a simple and rapid arrangement of the signal to various needs. Figure 2 schematically represents a signal generator according to the invention.

The reference letter C represents a meter; this supplies the memory R (preferably of the type ROM or EPROM) with the increasing addresses (for example from 0 to N-1); the meter C is naturally driven by a clock generator CK.

The memory R supplies the signals apt to reestablish the desired form of driving wave to a digital/analogic convertor D at its output, that in turn drives an amplifyer A1, at the output of which the driving OUT signal for the display is available.

An example of a parametric calculation here follows:

signal period 38 microseconds;
signal range 48 volt;
number of numbers N = 256.

Result:

frequency clock: N/38 = 6,73 Mhz;
variation of signal range: 96/256 = 0,375 volt;
percentage variation: 0,375/96 = 0,39%;
time unit: 38/256 = 148 nanoseconds.

A number of 256 samples, taken in relation to the range and the frequency of the signal to be reproduced, is satisfying; if necessary a higher number may be chosen.

As research into the material ferrocrystal reveals a dependence on the behaviour temperature of the same, a compensation becomes necessary; this may easily be obtained by modifying the frequency of the signal thus generated, more precisely interlocking the frequency to the variation of temperature.

Figure 3 schematically represents the interlocking circuit.

The reference letter F indicates a temperature sensor placed in the display; it controls, through an amplyfyer A2, an oscillator 0, of the voltage control type (V.C.O.), whose frequence varies with the variation of the temperature, for example if the temperature increases, the frequency of the oscillator also increases and vice versa. The signal generated by the oscillator 0, amplified by the amplifyer A3 supplies the clock signal for the gener-

ator.

The characteristics of the described device become clear from the enclosed description and annexed drawings.

From the enclosed description the advantages of the signal generator object of the present invention also become clear.

In particular they are represented by the fact that they consent, in an easy way, to generate driving signals in an easily variable form modifying the data contained in the memory R and automatically compensated for the variations in temperature.

It is clear that numerous variations are possible by the man skilled in the art, to the device described as an example, without however departing from the novelty principles inherent to the invention.

Claims

1. Circuit generating signal for a matrix display of elements, in particular a display employing ferroelectric elements, characterised by the fact that the generator comprises a digital memory (R) for a multiplicity of signals apt to build up a driving signal of a predetermined form and a selection device (C) of said signals.

2. Circuit generating signal device for a matrix display of elements, according to claim 1, characterised by the fact that said selectioning device comprises a meter (C) that supplies the addresses to said memory (R) and in turn is controlled by a clock signal (CK).

3. Circuit generating signal for a matrix display of elements, according to claim 2, characterised by the fact that said clock signal (CK) is of variable frequency in function of the temperature.

4. Circuit generating signal for a matrix display of elements, according to claim 3, characterised by the fact that said clock signal (CK) is generated by an oscillator (O), controlled voltage by a temperature sensor (S) situated inside the display.

5. Circuit generating signal for a matrix display of elements, according to claim 1, characterised by the fact that said memory (R) contains a multiplicity of digital values (for example 256), having different values according to the form of waves predetermined by the driving signal to be generated.

6. Circuit generating signals for a matrix display of elements, according to claim 5, characterised by the fact that said multiplicity of digital values is such to create a multisinusoid signal, in particular a signal that has as its base a sinusoid foundation, to which waves of a higher frequency and lower amplitude are superimposed.

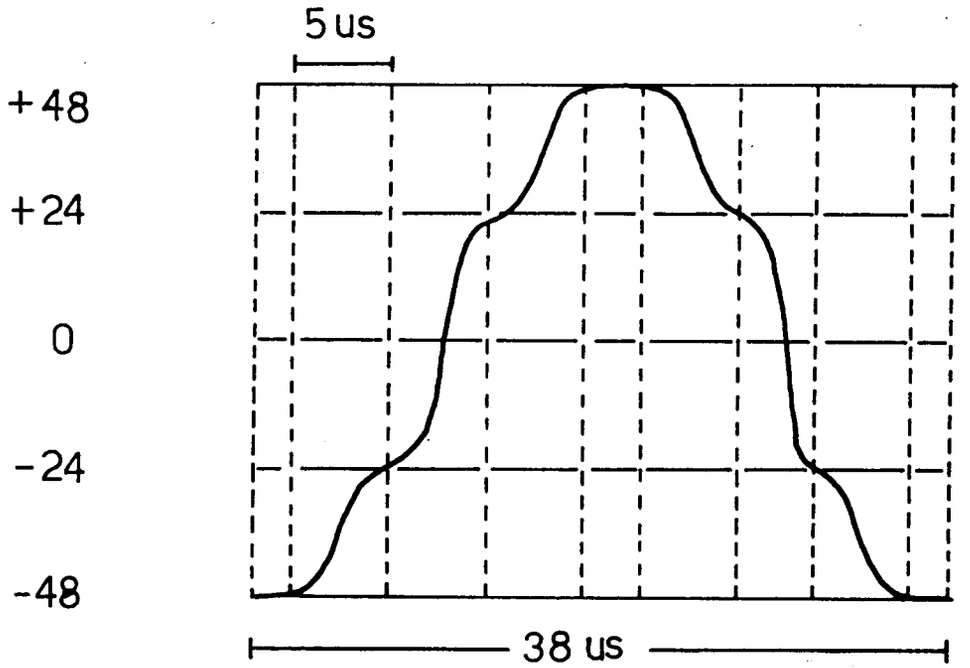

FIG. 1

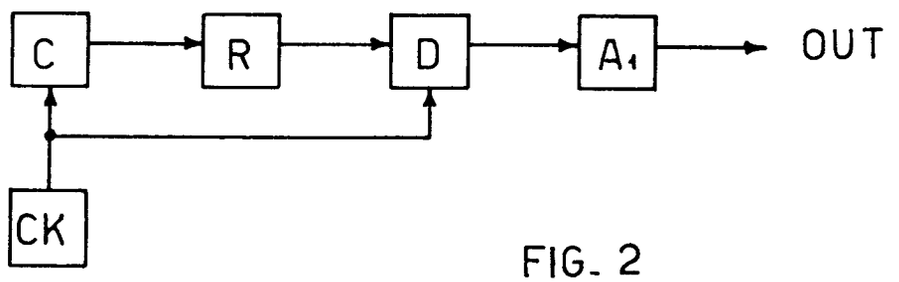

FIG. 2

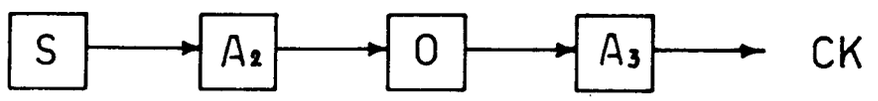

FIG. 3