

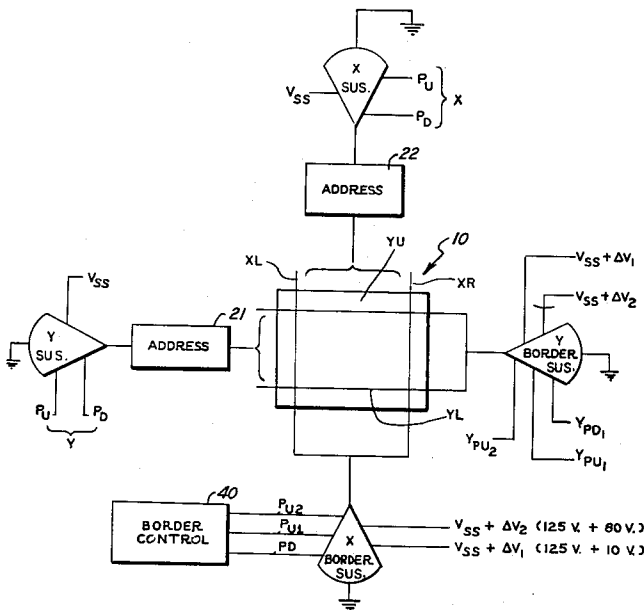
- [54] **BORDER SUSTAINER GENERATOR
SYSTEM FOR GAS DISCHARGE DISPLAY
PANELS**
- [75] Inventor: **David S. Wojcik**, Toledo, Ohio
- [73] Assignee: **Owens-Illinois, Inc.**, Toledo, Ohio
- [22] Filed: **Mar. 9, 1972**
- [21] Appl. No.: **233,122**
- [52] **U.S. Cl.** **315/169 TV**
- [51] **Int. Cl.** **G08b 5/36**
- [58] **Field of Search**..... **315/169 R, 169 TV**
- [56] **References Cited**
- UNITED STATES PATENTS**
- | | | | |
|-----------|--------|---------------|-------------|
| 3,509,408 | 4/1970 | Holz..... | 315/169 R X |
| 3,513,327 | 5/1970 | Johnson | 315/169 R X |
| 3,750,159 | 7/1973 | Wojcik..... | 315/169 R |

Primary Examiner—Ronald L. Wibert
Assistant Examiner—Richard A. Rosenberger
Attorney, Agent, or Firm—Donald Keith Wedding

[57] **ABSTRACT**

In gaseous discharge display panels of the cross conductor matrix type the conductors are non-conductively coupled to a thin gaseous discharge medium, one technique for conditioning the data or information display sites in the panel for operation of uniform potentials is to maintain the border discharge site in an on or fired condition. The invention is directed to an improved system for controlling the border sites of such panels and provides for a border sustainer generator having at least two pull-up sides or sections.

2 Claims, 3 Drawing Figures



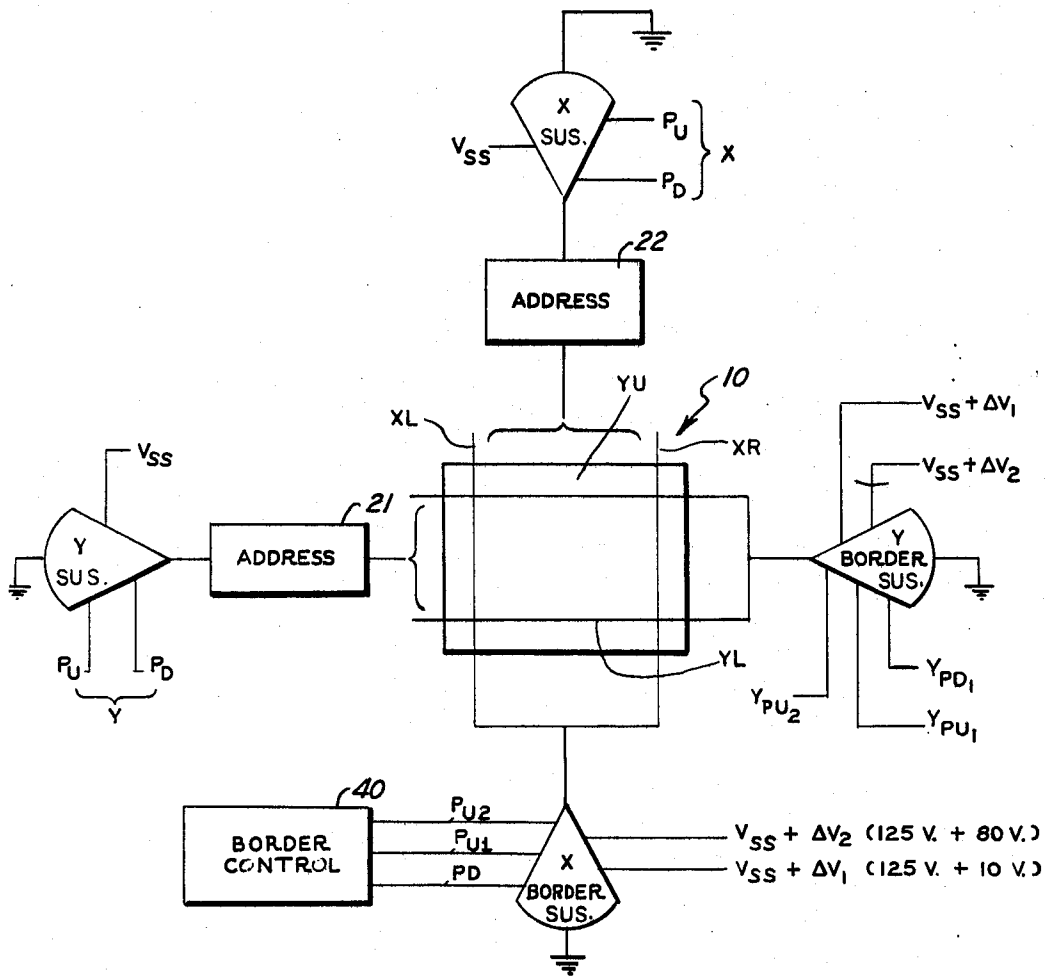


FIG. 1A

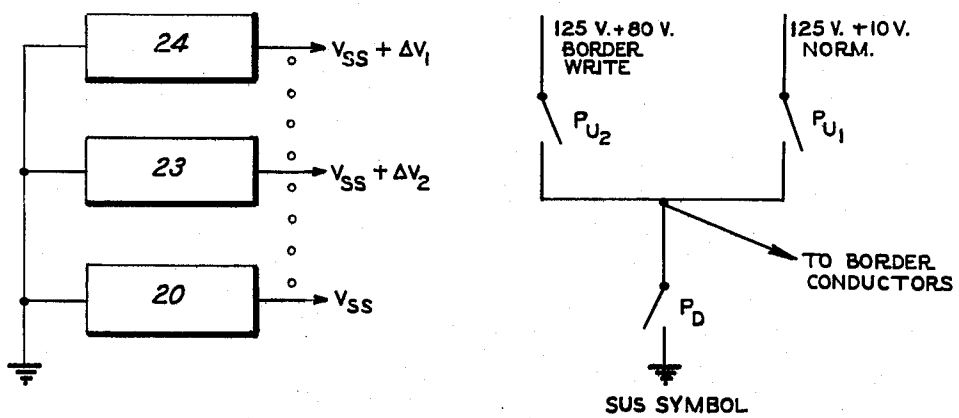


FIG. 1B

FIG. 2

BORDER SUSTAINER GENERATOR SYSTEM FOR GAS DISCHARGE DISPLAY PANELS

The present invention is directed to novel circuitry for controlling the border sites of a gaseous discharge display panel having inherent memory of the type as disclosed in, for example, U.S. Pat. No. 3,499,167 issued to Baker, et al. and is an improvement on my co-pending patent application Ser. No. 210,864, entitled "Baker Clamped Sustainer Voltage Supply Generator for Pulsing Discharge Panel" filed Dec. 22, 1971, now U.S. Pat. No. 3,786,485, said application being incorporated herein by reference in its entirety. It is also an improvement on the system shown in copending Miacvecz patent application, Ser. No. 211,371, filed Dec. 23, 1971, assigned to the same assignee as that of the instant application, and entitled "Improved Border Control System for Gas Discharge Display Panels", now U.S. Pat. No. 3,786,484.

As disclosed in the above-mentioned Baker, et al. patent, there are a number of ways for conditioning the discrete information display discharge sites in such panels for operating at substantially uniform potentials. One such technique which is currently used is photon conditioning, which, as described in said Baker, et al. patent, encompasses the maintaining in an on state of an entire row or column of the sites on the border of the panel in a fired or on condition during normal panel operation. The light from these discharge sites which are maintained on are masked or blocked from the normal viewing area or otherwise are not used for display purposes.

According to this invention a pair of pull up sections are provided to write to border; one pull up section supplies a write sustainer voltage level to the border conductors and a second pull up section is used to sustain the border sites after they have been turned on.

BRIEF DESCRIPTION OF THE DRAWINGS:

The above and other objects, advantages and features of the invention will become more apparent in light of the following specification taken in conjunction with the accompanying drawings wherein:

FIG. 1A is a block diagram of a preferred embodiment of the circuitry in accordance with the invention as applied to the gaseous discharge display panel;

FIG. 1B illustrates the power supply arrangement; and

FIG. 2 is a simplified circuit diagram of a sustainer generator.

In FIG. 1, a gaseous discharge display panel 10 preferably of the type disclosed in Baker, et al. U.S. Pat. No. 3,499,167, filled with a neon-argon gas mixture (99.9% neon and 0.1% argon) as is disclosed in copending Nolan patent application Ser. No. 764,577 filed Oct. 2, 1968, also assigned to the assignee of the instant application, and as is further modified by a dielectric or insulative overcoating (not shown) on the dielectric coatings of the aforementioned Baker, et al. patent, a lead oxide of a few hundred angstroms thick. Typically, the discharge gap distance in such panels is selected to be between 4 and 6 mils. The panel 10 is constituted by a row conductor plate and a column conductor plate joined in spaced apart relation by a spacer sealant (not shown) to provide the aforementioned discharge gap distances and a thin gas discharge chamber with the gaseous medium therein. The border conductors are diagrammatically illustrated in the panel

10 by means of left and right border conductors XL and XR and upper and lower border conductors YU and YL. As described in the aforementioned Baker et al patent, these may be constituted by one or more border conductors, the number of which depends on the physical size of the panel; the specific number of such border conductors not being a part of the present invention.

The normal sustainer generators X_{SS} and Y_{SS} are supplied with direct current from supply 20 and via address circuits 21 and 22 respectively provide periodic sustainer potentials to the X and Y matrix conductors in panel 10. Direct current supplies 23 and 24 may be referenced to the output V_{SS} from supply 20 as indicated by dotted lines so that their output voltages are $V_{SS} + \Delta V_2$ and $V_{SS} + \Delta V_1$, respectively.

These sustainer generators are adaptations of my above-identified application Ser. No. 210,864. The circuit shown in FIG. 3 of my application Ser. No. 210,864 is diagrammatically indicated in FIG. 3 of the drawings herein wherein the sections of switches labelled PU and PD are the equivalent of the Pull up and Pull down circuit of that application. Similiar pull up and pull down circuits are shown in the paper entitled "A Quarter-Million-AC Plasma Display Width Memory" by Johnson et al presented at the 1971 Society for Information Display International Symposium and Exhibition in Philadelphia, Pennsylvania May 4, 5 and 6, 1971. In accordance with the present invention, I provide a further pull up section PU₂ and supply each section desired sustainer voltage levels. Thus the border write voltage would be constituted by a normal sustainer level V_{SS} (or about 125 volts) and an additional voltage increment (ΔV_2) of about 80 volts.

The border sustain voltage is constituted by a normal sustainer level V_{SS} (or about 125 volts) and an additional voltage increment ΔV_1 (of about 10V). However, this second level may be eliminated if desired.

These two pull up sections in the border sustainer generators (there may be more, if desired to supply more levels of sustainer to the panel) are controlled by a border controller circuit 40, which provides Pull up signals PU₁ and PU₂ for normal border sustain operation, and border write sustainer operation, respectively. However, it will be noted that the single pull down section or switch P_D is operated alternately with the operation of either Pull up section or switch. The same character of control as applied to the X border sustainer is applied to the Y border sustainer at conventional phase or time displacement.

The circuitry involved is basically that of the Baker clamped sustainer as disclosed in my above-identified application. Its usefulness is extended by the fact that:

1. The circuitry can handle slightly higher sustain voltages continuously.

2. The sustainer circuitry accepts a boosted sustain voltage (80V) for a time long enough to flood the borders.

3. The option exists whether a high-current booster will be used depending on the number of border lines driven.

4. The median level is optional and can be used for normal sustain but not used during a bulk erase.

5. Circuitry can be looked at as building blocks which can be combined in other configurations for various other waveforms.

6. Due to the elimination of the storage time problem, various types of manipulations such as conditioning and border erase can be accomplished.

It will be apparent that many modifications and adaptations of the invention will become apparent to those skilled in the art and it is intended to encompass such obvious changes in the scope of the claims appended hereto.

I claim:

1. In a gaseous discharge display panel having row-column conductor arrays non-conductively coupled to a gas discharge medium in a chamber space between said row and said column conductor arrays, sustaining generator means for supplying sustaining potentials to the row-column conductors locating information display sites in the panel and border row and column conductor arrays cooperating with each other and the ends of the conductors in the row-column conductor arrays to define border sites which, for the purpose of photon conditioning of information display sites in the panel, are on during the entry of information to be displayed on said panel, separate border sustainer generator means for said border row and column conductor arrays, the improvement in said border sustainer which comprises,

direct current power supply means supplying at least a pair of separate voltage levels to a pair of output

terminals, said pair of output terminals being connected to said power supply means, one of said voltage levels being of an amplitude sufficient to initiate discharges in said panel and the other of said voltage levels being sufficient to maintain a sequence of discharges, once initiated, but of a magnitude insufficient to initiate a discharge,

each said separate sustainer generator including at least a pair of pull up switch circuits (PU_1 PU_2) and one pull down switch circuit (PD), a point in each said pull up circuits and said pull down circuit being commonly connected to supply an output border sustainer potential to the border conductors respectively of said panel.

means connecting said power supply output terminals to individual ones of said pull up circuits, and control means connected to said pull up and pull down switch circuits for individually activating said pull up and pull down circuits to first initiate a sequence of discharges in said border sites at the higher-one of said voltage levels and then to sustain said sequence of discharges at another of said voltage levels.

2. The invention defined in claim 1 wherein said other voltage level is greater than sustaining voltages supplied to row-column conductor arrays in said panel.

* * * * *

30

35

40

45

50

55

60

65