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Brief 70-10476

NASA TECH BRIEF

Visual Display Panel Functions as Computer Input/Output Device

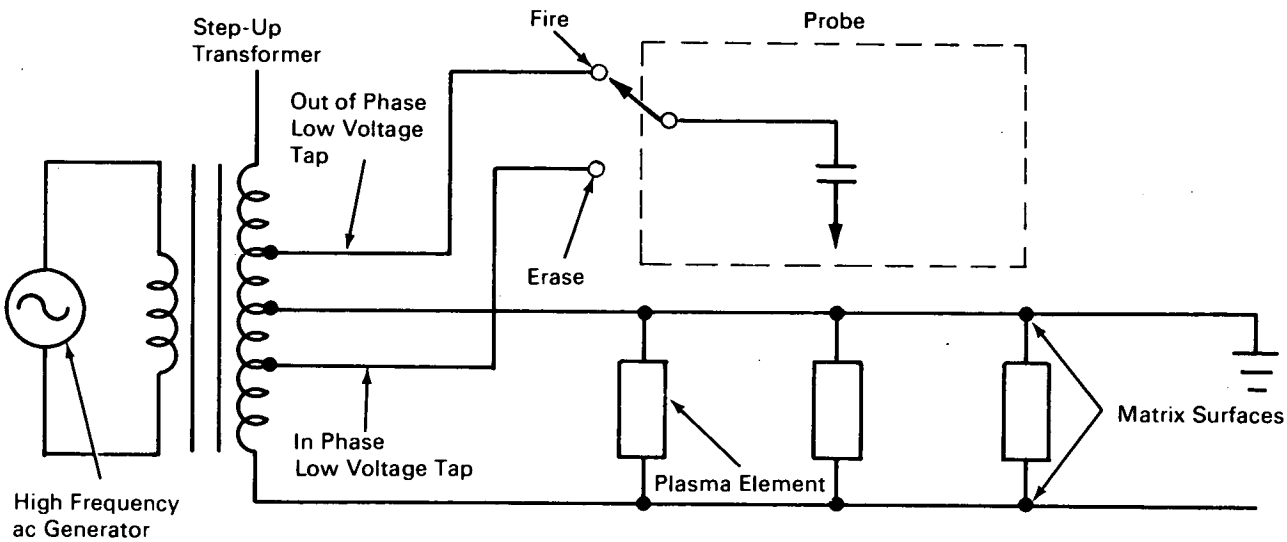

Figure 1. Probe Drive

A graphic visual display panel has been developed for computer data entry and readout. The device permits information entry and erasure using a probe, and has an inherent storage capability for use on time-shared systems. Data input need not be online. An operator can recognize and correct entry errors before introducing data into the computer. Other advantages include direct display of computer input and output, simplicity, and low fabrication cost.

Basically, the device consists of many gas filled cavities inside a glass plate with transparent covers. Ionizing the gas permits display of data read in or out of the computer. By maintaining the matrix of plasma elements at a sustaining voltage, data can be entered by supplying sufficient additional voltage to ionize selected matrix elements. An external probe fires any selected element. Once fired, the element remains ionized after removing the probe. Phase reversal of the probe current supply enables the voltage to be reduced at a selected element at a point below the sustaining voltage, thus causing selective erasure. The inherent memory features of the plasma elements permit storage of the information until required by a computer.

Figure 1 shows a method for implementing the probe drive. A high frequency ac generator and step-up transformer provide cell sustaining voltages and in-phase and out-of-phase probe drive voltages. The switch selects in-phase or out-of-phase voltage providing erase or write capabilities respectively.

Figure 2, a nonconducting substrate, contains cavities formed by etching, drilling or other suitable

(continued overleaf)

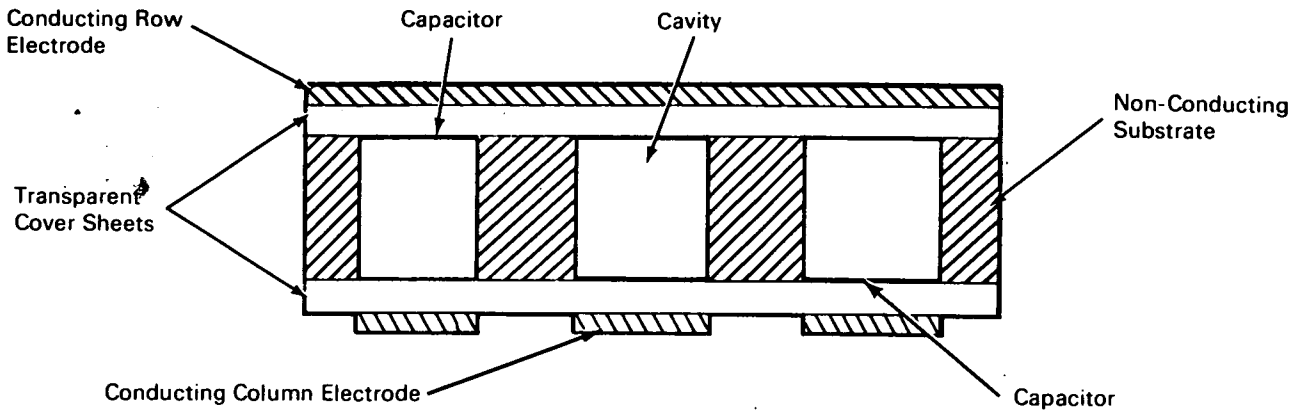

Figure 2. Cross Section of a Series of Plasma Elements

techniques. These cavities are filled with an inert gas such as neon (typically with traces of nitrogen or carbon monoxide as additives) at a pressure about 50 to 200 torr. Transparent, nonconducting cover sheets prevent escape of the gas and maintain the appropriate gas pressure. Conducting row electrodes (only one is shown) and conducting column electrodes are deposited on the exterior surfaces of the cover sheets; either or both the row and column electrodes must consist of transparent conductors to permit observation of the gas ionization in the cavities when voltage is applied.

External electrodes help to increase the cell's useful lifetime by several orders of magnitude. However, internal electrodes may be driven with direct current or low frequency alternating current. Since external electrodes are capacitively coupled to the cavity, they require high frequency alternating current on the order of several hundred kiloHertz for operation. This capability for capacitive coupling makes it possible to utilize an external probe for selective firing of the elements.

Notes:

1. Although plasma elements with external electrodes have been used, elements with internal electrodes would also be possible, providing appropriate changes were made in circuit constants. Also, while the probe used passive RC networks, the use of a probe containing a unity gain amplifier could be used and would eliminate the requirement for a dropping resistor on the "write" position of the probe. Where only single analog quantities require entry, a linear array of elements could be used rather than the crossed matrix array.
2. Requests for further information may be directed to:

   Technology Utilization Officer
   Headquarters
   National Aeronautics
   and Space Administration
   Washington, D.C. 20546
   Reference: B70-10476

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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(ERC-10223)