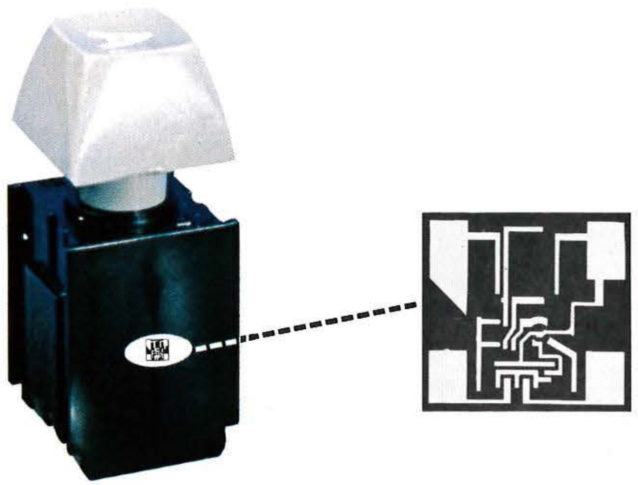
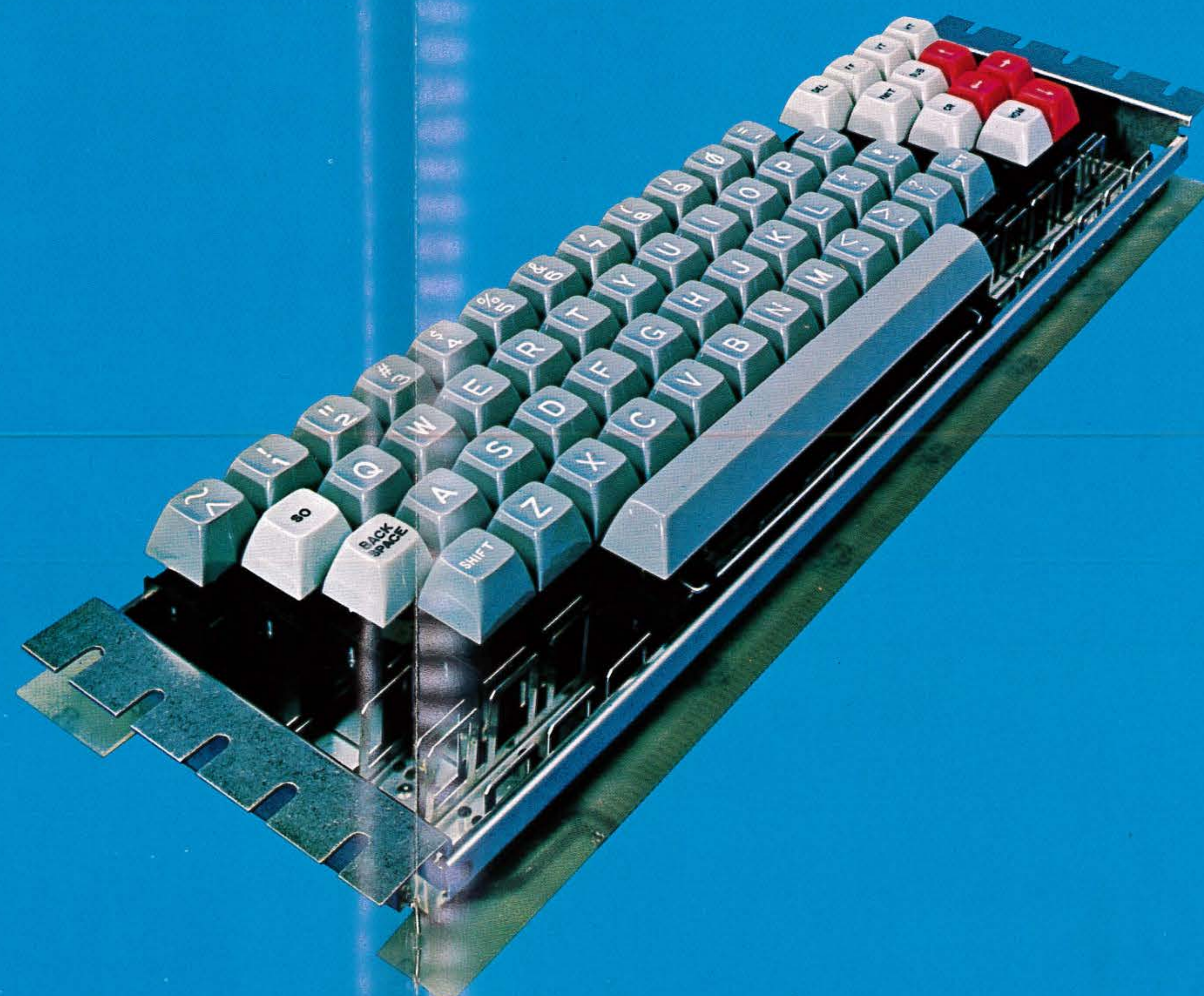
What's inside this little black box?



A breakthrough in keyboard technology from MICRO SWITCH

Inside this key is a new discovery. Using the Hall effect, MICRO SWITCH has developed the world's first practical application of an integrated circuit as a keyboard switching element. An integrated-circuit chip (only .040" square) is actuated with a magnet mounted on a plunger. Thus, MICRO SWITCH has combined integrated circuitry with manual actuation to bring you an all solid state keyboard, unlike any other ever made. It is called SSK. A keyboard unmatched in reliability, flexibility and low cost!



It makes possible this all solid state keyboard... SSK... the first of its kind

SSK is a keyboard that is compatible with your present *and* next generation communications and data preparation equipment. Assembled, wired and encoded—ready to plug into your equipment.

A breakthrough in keyboard reliability

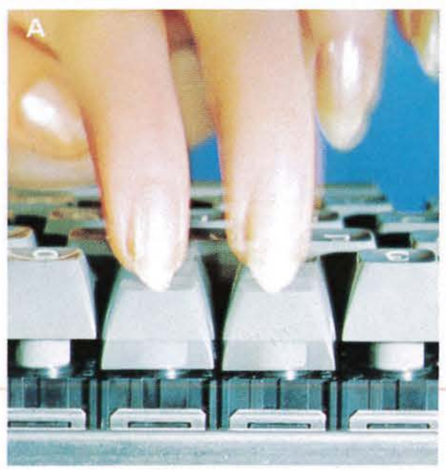
From key to connector, every unit of the new SSK keyboard is all solid state. The only moving mechanical part is the plunger. There are no mechanical linkages and no moving contacts to wear or fail. The result is unequalled reliability.

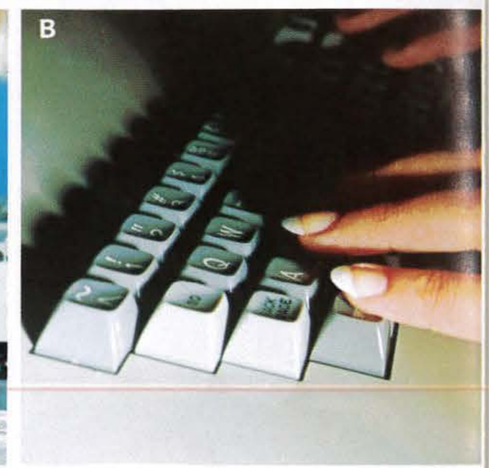
A breakthrough in keyboard economy

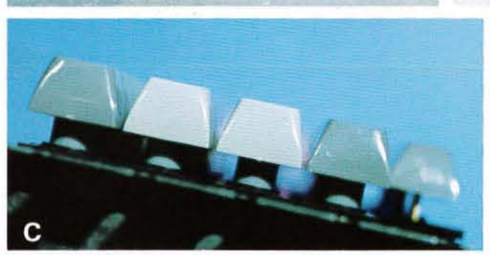
You get triple economy. First, the initial cost is less, tailored to your high production commitments. Second, the bounce-free output of SSK requires no special interface circuitry to adapt it to your equipment; just plug it in. Finally, being solid state, SSK is practically maintenance free; cuts your service costs to the bone.

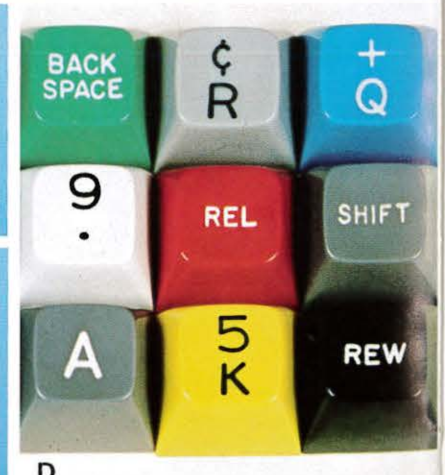
All in a completely flexible package!

For more facts on MICRO SWITCH SSK, turn the page.









The plasma display

by R. H. WILSON

INTRODUCTION

Although display technology has progressed rapidly during the past few years, there is at present no large tactical display which is completely satisfactory nor is there a completely satisfactory digitally controllable display for airborne systems or for ground portable van systems.[1,2] Recently, a new advance in the state-of-the-art was made with the invention at the University of Illinois of the plasma display.[3,4] Although the plasma display does not satisfy all of the conditions that one would like, it does come closer in meeting those conditions for the above systems than any other technique.[5] In the following, we will consider the characteristics of the plasma display. We will discuss the history of the development, cell construction and the experimental set up used to measure the cell's characteristics, a few of the experimental results which shed light on the mechanisms responsible for the cell's behavior, an explanation of the bistable characteristic, techniques for writing and erasing, the current status of the display, and finally problem areas which remain to be solved.

History

In order to minimize the amount of control electronics necessary to control an array of discrete light emitting elements, crossed grid arrays have been made. For instance, for a crossed grid array of n x n elements, instead of requiring n^2 control circuits, only 2n control circuits are required. However, if the light emitting elements of the array are not bistable only a single element can be selected at a time, an external memory device must be used and the display must be cyclically refreshed at a high enough rate to prevent flicker. Since only one element is on at a time, the average cell on time is low and the average cell brightness is much lower than what it would be if the cell were on continually. On the other hand, if the elements have a bistable characteristic, the display does not have to be continually refreshed, no external memory is required and on cells are on all of the time thereby yielding the full brightness of the cell.

Under appropriate conditions a larger voltage is necessary to ignite a gas discharge than is required to sustain the discharge.[6] At intermediate voltages the gas discharge has a bistable characteristic associated with it and the properties of a light source and memory are combined. Thus, arrays of gas cells are ideally suited for arrays of self-luminous elements because gas cells combine the functions of the light emitting element and memory element into the same embodiment.

One of the first arrays of gas cells was made by Skellet in 1954.[7] His design had two orthogonal sets of wires which were separated by a small distance and sealed in a neon atmosphere. There were 100 horizontal and 20 vertical wires. Skellet reported that a discharge could be confined between any crossed pair of electrodes in the array. He did not report on experiments in which more than one cell was fired concurrently. However, Harris,[8] in a memorandum on the Skellet display, pointed out that when a number of cells were ignited additional unwanted cells would also be ignited.

Moore[9] in 1963 made a rectangular array similar to that shown in Figure 1. A honeycombed glass panel was placed between two outer glass panels and parallel transparent thin film electrodes were deposited on the inside surfaces of the outer glass panels. Air was evacuated from the array and the array was filled with neon. Initially, Moore was interested in igniting only a single spot of light and in this he was successful. Later, when he tried to ignite a number of cells, he discovered that cells which had electrodes in common with the fired cells would also ignite.

Thompson,[10] in 1964, added a series resistance to each gas cell to reduce the coupling between the electrodes. He made a matrix of 10 x 10 cells, and demonstrated that any combination of cells could be fired without firing unwanted cells. One set of parallel electrodes were on the inside surface of the outer plate. The other set was isolated from the discharge cells by resistors which were connected to feedthrough electrodes, one for each cell. However, fabrication difficulties limit both the cell density and the cell size with this technique. Also, cathode sputtering and local impurities cause an undesirable variation in the cell's characteristics.

Bitzer, Slattow and Willson,[11] in 1964, placed electrodes on the outside surfaces of the outer plates. Their first experiments were on a single cell that was filled with neon. They observed that the cell had a large bistable characteristic and that the cell's electrical characteristics were time dependent. The time dependence was attributed to impurities in the cell

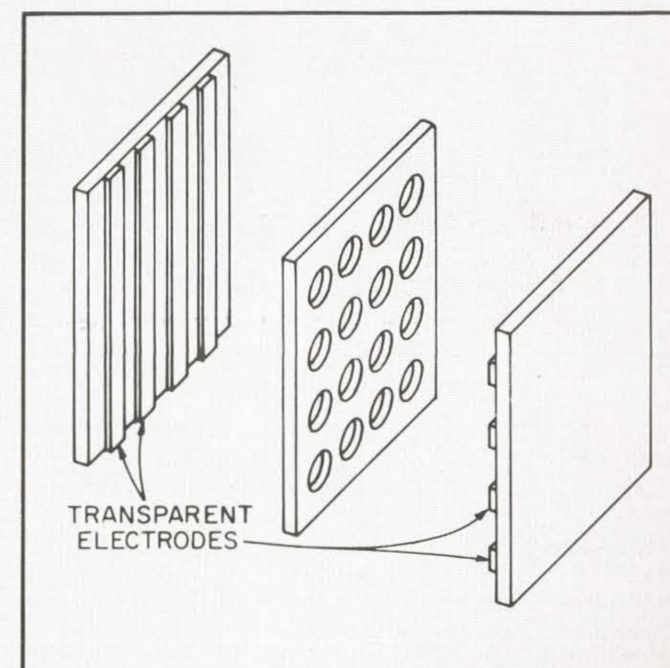


FIGURE 1a: Rectangular array of gas cells with internal electrodes