

THE DISTEC SYSTEM: A SIGN OF OUR TIMES

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The DISTEC system is an indoor-outdoor display system that is new on the market and is the result of a number of years of development and testing. This new sign system was developed to overcome faults in the old signs; among those faults are high cost, high maintenance, high power consumption, poor visibility under certain conditions, poor resolution, limited display capabilities in terms of types and sizes of characters displayed and their location, and limited control capabilities. The new system is controllable by low-cost, solid-state means without a multitude of expensive current-carrying wires.

The DISTEC is a complete system and includes a display portion, a solid-state control unit, and various readers or input devices and arrangements. The system is supplied on order and as OEM components to sign companies.

The display portion of the system is passive; that is, it does not emit light but instead controls the passage and reflection of light. Thus, it does not "fight" the sun but uses ambient and artificial light to produce displays that are clearly visible under all lighting conditions from the brightest direct sunlight to complete darkness. Displayed characters appear to be made of continuous lines but are really a mosaic of small, very thin vanes that are positioned so as to be unseen or to block the passage of reflection of light (Fig. 1).

Displays are formed by electrostatically moving the vanes into 1 of 2 positions: erased (hidden from view) or written (in view). There are no magnets, levers, air jets, or other mechanisms. In fact, there is nothing one can see in the sign to indicate how it does work; visible are only a small number of printed-circuit lines to conduct the control signals and set up the unseen fields.

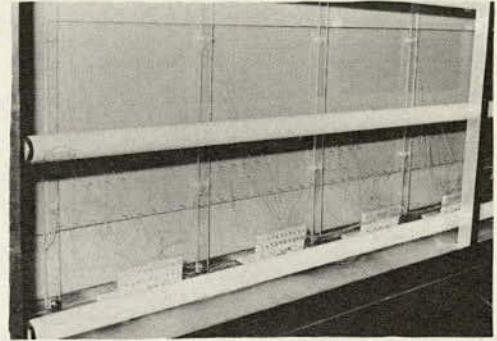
A sign face is made up of modules. Each module has 100 vanes. They fit closely together, horizontally and vertically. This means that signs may be almost any size, single- or double-sided, and characters are not limited to certain locations. A character may cross module boundaries and be any size or shape. Pictures may be shown.

Control wiring is extremely simple. In addition to using printed-circuit technique, the sign is connected in a new way, which we call digital cross-grid. Digital cross-grid is a new method whereby only a few wires are needed to control even a very large sign, the wires are very small in size as well as in number, and they do not have to carry much power. Figure 2 shows the inside, rear of a sign, illustrating the simple wiring.

Figure 1. Displayed characters of DISTEC system.



Figure 2. Inside wiring from rear of sign.



We do something else differently; we use proportional writing. Proportional writing is like proportional typing; the characters do not all occupy the same amount of space. For instance, in proportional writing, an "i" is not as wide as a "w." This allows the use of more characters and makes a better looking display.

Displays may be black on white or white on black (or, in some instances, in color). The device may be illuminated by either ambient or artificial light or both. Light may be from the front or from the back. This has been necessary in the advertising field, for almost all of the commercial outdoor signs in use in the United States today are interior illuminated. From gas station signs to shopping center and theater signs, back-lighting is universal. The advertising industry has found that the drawing power of a backlighted sign is many times greater than a frontlighted sign and insists on this arrangement. The DISTEC sign may be lighted either front or back, according to the particular requirements and specific use, or not lighted at all.

The modules are made of molded translucent acrylic plastic with iridized aluminum vanes. A 13-in. square module with 100 vanes weighs only $1\frac{3}{4}$ lb. Signs must have a protective cover, which is very effective to reduce vandalism.

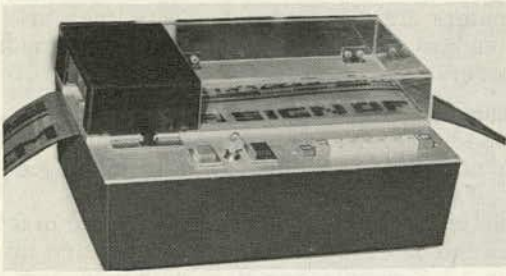
The signs have a very long life and require little or no maintenance. Millions of cycles of operation, temperatures from -40 to $+165$ F, and zero to saturation humidity seem to have little effect.

The power used in this device is very small, for theoretically there is no power consumption at all, and the voltage is about a fifth of that for a neon sign. It is completely safe; the maximum current available is less than a tenth of that normally specified as safe.

Each sign requires a solid-state control. This may be a simple power supply for a single-message sign or a more complex device for reception of teletype signals. With the exception of a single-message sign, the controls serve to convert low voltage (5- or 12-V) signals from an input reader into a form and voltage usable by the sign. The control uses plug-in, solid-state, printed circuit boards. The number of boards used depends on the size of the sign and whether each side of a double-sided sign is to display separate messages. An interface computer unit is plugged into the control if it is to work from a teletype machine, tape reader, computer, or keyboard. Controls are about 12 by 15 by 17 in. and weigh less than 25 lb. They function from 120 V ac and require less than 30 W even for a large sign of thousands of display elements. A battery-inverter unit is available as a part of the control.

With the exception of single-message signs that function directly from the supply mains, an input must be used to operate the control, that is, to tell the control what to write on the sign. We call these input devices readers. Almost any type of reader may

Figure 3. Tape-card reader with tape.



be used. Combinations of different readers may be used with the same sign. The types of readers are as follows:

1. Marked tape-card readers are produced by Display Technology Corporation. They are optical devices and read marks on 4-in. wide translucent or transparent tapes or cards. Figure 3 shows a tape-card reader with tape. The tapes instruct the control what is to be displayed and where it is to be located on the sign. This is done by means of standard BCD coding for location and direct character representation. For example, one edge of a tape

will have the actual "scene" to be displayed marked on it. I say "scene" because one is not limited here to a predetermined number and shape of characters. Any size and shape of symbol—even graphics—may be displayed. (Displays are not limited in location; they may be anywhere on the sign without regard to modules and may be written in a random fashion.) Tapes may be short or many feet long. They may be continuous loops and can be programmed to automatically change messages at predetermined times. Display Technology Corporation supplies premarked tapes on order or will supply coded, unmarked tapes for field use. Premarked cards are also available. These cards are provided in fonts. A font contains several hundred cards including duplicates, each marked with a character, number, or punctuation symbol. An operator simply chooses the cards that spell the message he desires and puts them in the slot in the reader; the display appears on the sign. Four standard-sized characters are currently available: 10.4, 13.0, 15.6, and 20.8 in. high. The width of the lines of characters varies according to the size of the characters. Word cards are also available. They contain commonly used words such as THE, SALE, TODAY, or WELCOME. Other word cards are available on order.

The following readers all use standard ASCII-8 level coding with choice provided for different-sized characters. Special features, such as proportional writing, automatic centering of messages, and continuous choice of character size, are included. Readers may be connected to the control directly by twisted pair line or by telephone line or radio link.

2. A digital magnetic cassette tape reader will work the DISTEC system. We feel that anyone with a car stereo can operate one of these!

3. Standard punched-tape readers may be used. They are available from Display Technology Corporation or may be purchased elsewhere.

4. The keyboard message reader is available on special order. It contains keys marked with complete messages instead of individual characters. Thus, CAUTION, SLOW TO 30 MPH, TAKE NEXT OFF-RAMP, ACCIDENT AHEAD, or WEIGH STATION CLOSED can be displayed without spelling out each word. This reader requires a special interface unit. The messages may also be controlled directly from a computer without having to spell out each word.

5. Teletype machines may be used with the DISTEC system. Two or more sizes of characters are provided as for the punched-tape and magnetic-tape readers. The control will detect operator or technical errors in instructions from the teletype, inform the operator in very polite language what the error is, and tell him how to correct it. Note that it will do this for instructions, not for spelling! Teletype machines in use for other purposes may be utilized, or they may be obtained from Display Technology or directly from Teletype Corporation.

6. The DISTEC reader consists of an electric keyboard with a small TV type of monitor. Messages typed on the keyboard appear on the TV screen and may be edited before they are sent to the control. That is, words or characters may be erased, corrected, moved about, or otherwise altered to the satisfaction of the operator before

they are sent to the control and put up on a sign. Connection may be direct by twisted pair line or by telephone circuit or radio link.

7. The controls may be connected to computers directly by twisted pair lines or by telephone lines or radio link. Coding is standard ASCII-8 level. Writing is proportional unless specified otherwise by special order.

The DISTEC system is a new concept in changeable-message displays; it has complete obliteration and is unique in its low cost, low power consumption, extraordinary contrast, and ability to be backlighted. It has unlimited variability. Its maintenance requirements are close to zero.

The display is passive and is clearly visible under all lighting conditions from direct sunlight to complete darkness. Symbols appear to be continuous lines. There are no magnets, levers, air jets, or other mechanisms. Signs are any size, with no separation between adjacent modules.

Characters may cross module boundaries and be any size or shape; graphics may be shown. Writing may be proportional; displays may be black on white or white on black. There is no radio interference.

Sign wiring is simple, even for thousands of display elements. Remote control is TTL compatible, ASCII coded, low voltage, and direct or by telephone line or radiolink.

Operation may be by marked tape, cards, message keyboard, magnetic tape, punched tape, teletype, keyboard-TV monitor, computer, or a combination of these.

All sign circuits may actually be shorted without danger of fire or other hazard. Signs are tested from -40 to +165 F and zero to saturation humidity.

The system may be supplied with modules mounted in a subassembly and prewired and tested to fit within a decorative enclosure made to order or supplied by the purchaser.

The Mark II modules themselves are 13 in. square and have 100 display elements each. Other sign modules with different-sized elements are expected to be in production next year.