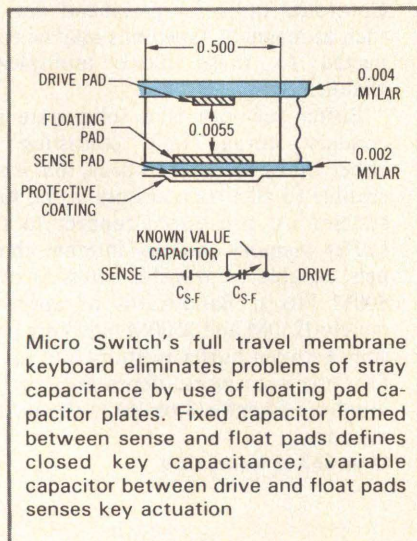


Full travel membrane keyboards seal switching elements within sandwich



Using variations of membrane technology, sealed, full travel capacitance and contact keyboards and a flat touch panel keyboard protect the signal generating elements with unusual sealing and venting procedures. Micro Switch, a Honeywell Div, 11 W Spring St, Freeport, IL 61032, designed the keyboards for use in low cost terminals being introduced for industrial, commercial, and home applications. The combination of sealing, capacitor design, and shielding makes for an electronic unity that permits close tolerances, reduces impact of stray capacitance, simplifies circuit design, and improves overall reliability.

The sealed capacitance keyboard virtually eliminates unpredictable signal generation due to dust and moisture. Its patentable capacitive network provides the keyboard with superior overall performance characteristics.

Membrane keyboards are constructed from thin sheets of polyester film. Polymer ink networks of pads and connecting lines have been screened onto two of the Mylar sheets. These two plastic sheets are separated by a spacer sheet with cutouts corresponding to contact pad locations. Depressing a keytop brings the two screened ink networks together to generate appropriate signals.

Venting the keyboards relieves internal pressure built up during storage at temperature extremes or through multiple key actuation. Full travel keyboards use a 6-layer sealing sandwich for

internal venting. This permits full sealing against fluids, moisture, and dirt. Arranged top to bottom, drive layer, spacer sheet, sense layer, pocket spacer sheet, flexible diaphragm, and second spacer sheet are bonded with adhesives to form the sealed unit. Total thickness of the sandwich is about 32 mils (0.8 mm). Air pressure changes in the switch cavities cause air to interchange through small holes in the sense layer to larger pockets in the first pocket spacer sheet. The diaphragm between pocket spacer sheets then flexes to normalize the pressure in the switch cavities.

The problem of stray capacitance has been minimized by using floating pad capacitor plates that fit between the normal screened on drive and sense pads. Drive pads (one per key) are inked onto the bottom of the top sheet of Mylar. Float and sense pads (one per key) are inked onto the upper and lower surfaces of the third layer of Mylar, with the float pads on top so that one float pad comes between every drive and sense pad. The three pads form two separate capacitors: a fixed capacitor between the sense and float pads, which accurately defines the closed key capacitance, and a variable capacitor between drive and float pads, which senses key actuation. During key actuation, the drive pad is pushed down through a hole in the spacer sheet toward the float pad, increasing the variable capacitance. The change in capacitance is detected by the sense circuit before the drive pad reaches the float pad. This permits electrical and physical overtravel with no bounce or teasing. Drive and sense lines are connected to the printed circuit board electronics. This combination of variable and fixed capacitors produces a predictable and reliable capacitive coupling.

To eliminate stray capacitance and electrical noise in the closely spaced membrane, the conventional method of driving is inverted. All unused drive lines are therefore grounded and act as a shield. All unused sense lines are also grounded. Grounding is accomplished by a scanning chip in conjunction with a microprocessor, effectively prohibiting any interaction between key stations and significantly reducing the impact of electrical noise.

The hard contact keyboard is offered as a wired-only unit and as an encoded keyboard with 2-key rollover option. Both capacitance and contact keyboards offer standard or low profile key modules that meet European standards

and provide operators with firm tactile response. Since sensing elements are found within the membrane layers, the key actuator module has been simplified. It consists of housing, actuating plunger, return (compression spring), and snap spring, which provides the definite hysteresis between operate and release points that prevents teasing and ensures positive contact.

The flat touch panel keyboard is made up of only three membrane layers; venting takes place through channels formed in the spacer and lower circuit layers. A snap disc in each position offers tactile feedback and protection of the switching area against actuation by sharp objects.

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Micro-Winchester based desktop computer offers system development tools

Model XP/3 features a 5M-byte micro-Winchester hard disc for storage of system programs and data, plus a 900k-byte double-sided GCR (group code recording) minifloppy drive for I/O and backup. This enables the system, from Commercial Computer Inc, 7884 12th Ave S, Minneapolis, MN 55420, to provide high capacity, fast access, low cost storage with easy backup.

Compared with the industry standard minifloppy, the micro-Winchester stores 30 times as much data, accesses data twice as fast (170 ms average), and transfers data 20 times faster (5M bits/s). Standard system features include Z80 microprocessor, 64k of RAM (standard), a 1920-char CRT with antiglare amber screen, serial communications channel, and a Centronics-compatible parallel printer interface. Options include up to two additional 5M-byte micro-Winchester disc drives in their own cabinet and a selection of dot matrix and daisywheel printers.

The unit is supported by the CP/M operating system, with Microsoft BASIC (interpreter and compiler), FORTRAN, and COBOL available, as well as the Wordstar word processing system. Also offered are a group of software development tools that allow the OEM to interactively define and generate end-user business software. Metasoftware™ produces business packages in highly structured BASIC source code that can easily be modified to add specialized tasks.

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