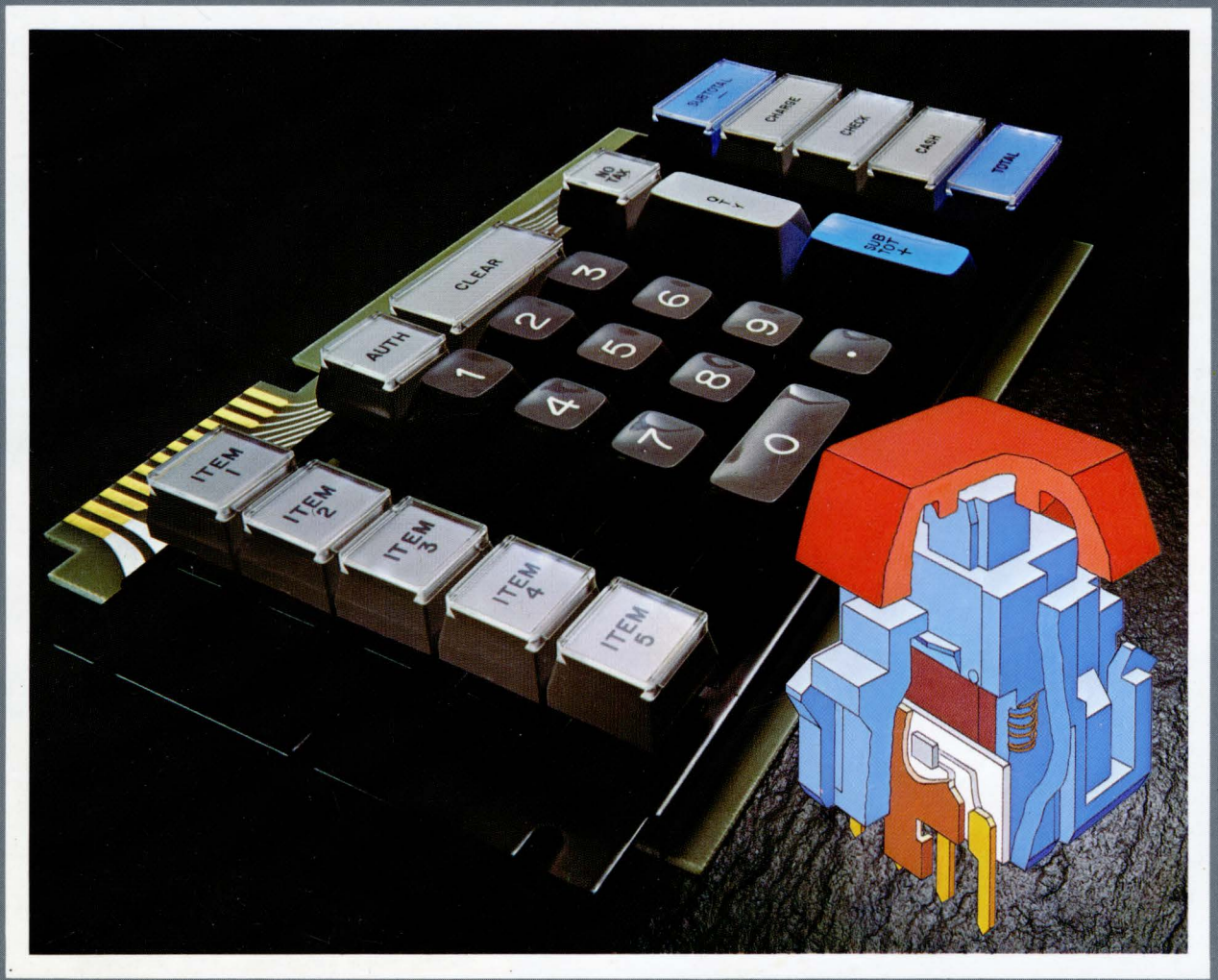
MICRO SWITCH

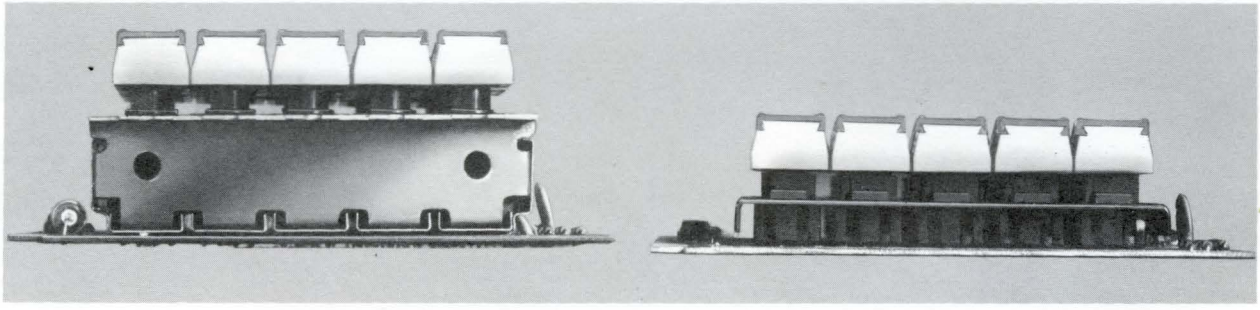
PRODUCT BROCHURE **SD**

new Low-Profile Solid State Keyboards

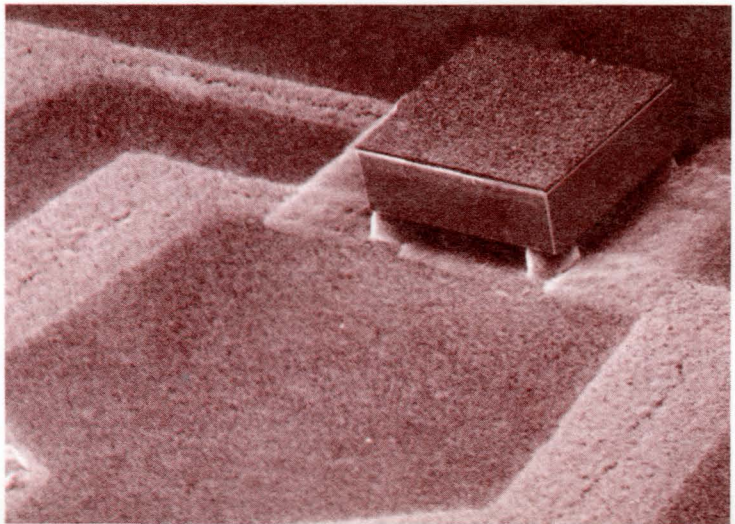


The MICRO SWITCH "NEW GENERATION" SD Solid State Keyboard boasts a compact profile. It is about half as high as the popular SW line, yet built into it are the time-proven technology and reliability that have made MICRO SWITCH the number one solid state keyboard manufacturer. This low-profile design reflects the new demands for terminal equipment used in cash register and desktop operation as well as in portable equipment. This new line of keyboards will be available in prototype models in 1974 and in volume during 1975. We are introducing the SD line now to allow you sufficient planning and engineering design time for new applications.

The SD line represents MICRO SWITCH's total dedication to automation in the production of solid state keyboards. You now get solid state reliability for what you might pay for mechanical contact keyboards. So price is no barrier to using the best keyboard available.



The **new**

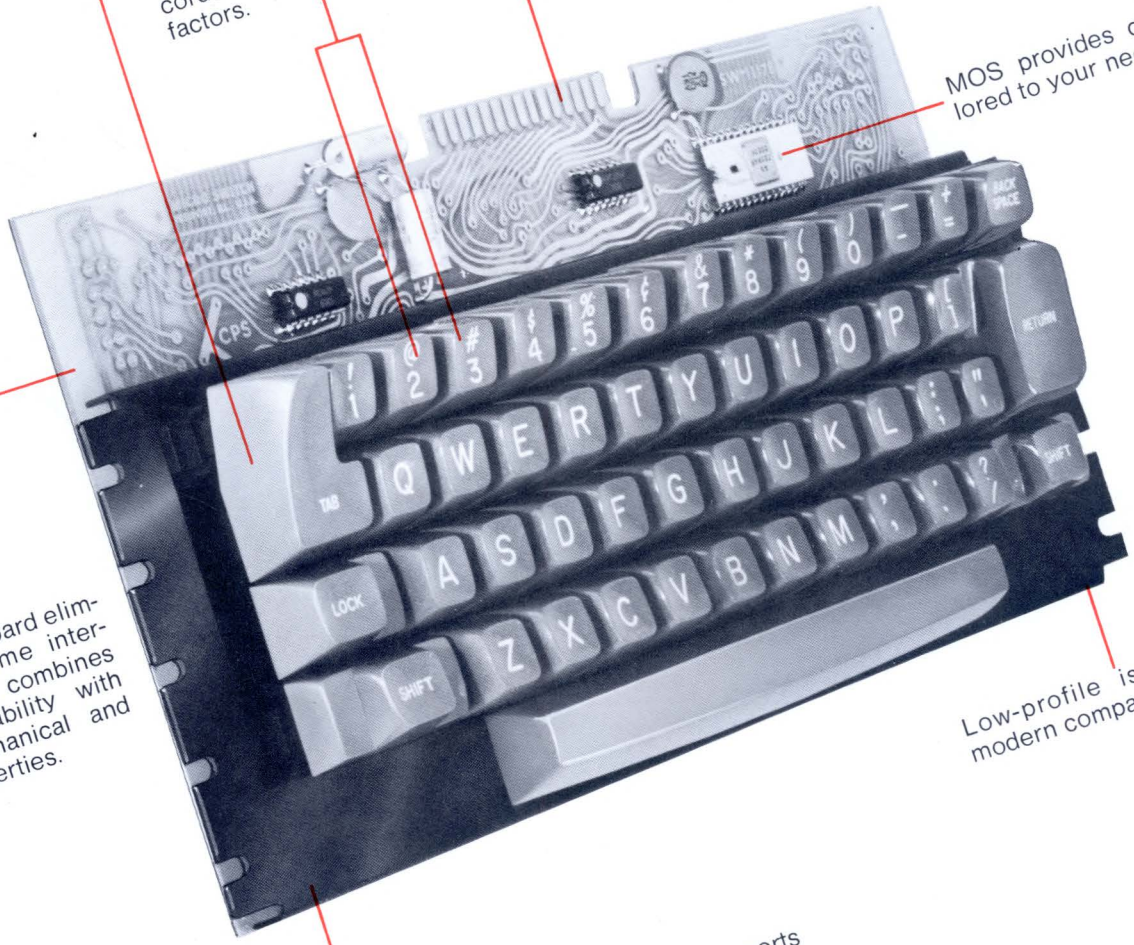


Perhaps the most significant advancement in reducing the price and increasing the reliability of the SD line is the development of an advanced mounting technique that places the chip face down on the ceramic and gives the new technology its name—"flip chip." With this process, the proven reflow solder method replaces the laborious hand operation of ultrasonically bonding the microscopic wires from the chip to the lead frame.

generation of MICRO SWITCH solid state keyboards... **series SD**

MICRO SWITCH
Series SD solid state keyboard

(typical typewriter array)



Solid state switch modules

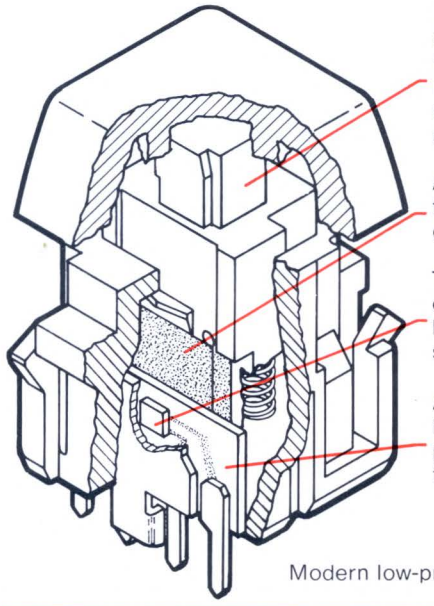
The time-proven Hall effect solid state switch pioneered and developed by MICRO SWITCH is the heart of every key on the keyboard. It is directly compatible with all common logic families with no special buffering or electronic circuitry needed. The components and materials have been selected to achieve our objectives for the most reliable switching element ever designed. You can expect these switches to last a long, long time.

These switches modules are available initially with:

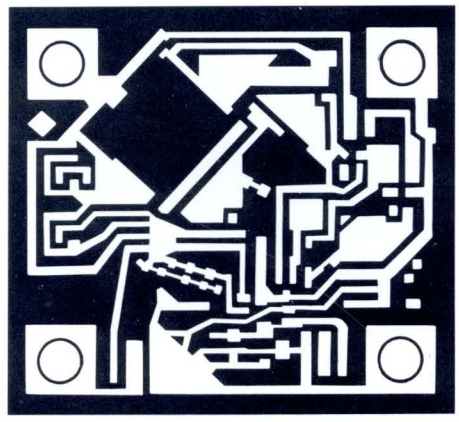
- Level or pulsed outputs
- Sourcing or sinking outputs
- Momentary or alternate action

The above modules will be produced in a variety of electrical and mechanical configurations including:

- LED lighting
- Sloped or stepped
- Tactile feel
- Secretary shift



Modern low-profile design.



Tiny solder "bumps" in each corner of the chip, identify MICRO SWITCH's advanced "flip-chip" technology.

Switch module operating characteristics

	MOMENTARY	ALTERNATE ACTION
Total Travel (in.)	0.160 Nom.	0.160 Nom.
Force at operating point	2.8 oz. Nom.	4.5 oz. Nom.
Pretravel (in.)	0.090 Nom.	0.090 Nom. (Latch at 0.110 Nom.)
Release point (in.)	0.040 Min.	0.040 Min.

The operating characteristics of our keyboard modules were selected for high operator throughput and are similar to those found on the highest quality office typewriters. We can also supply modules with either higher or lower operating forces.

Note: When buttons larger than one-unit are used we provide support modules in addition to the switch modules. Springs are used to balance the operating forces, making these modules compatible with single-unit buttons.

Switch mounting and termination

A rigid metal plate supports the switch modules and is designed to insure good button alignment between stations and rows. The mounting plate design offers almost complete flexibility since it allows the switch modules to be inserted automatically according to programmed instructions.

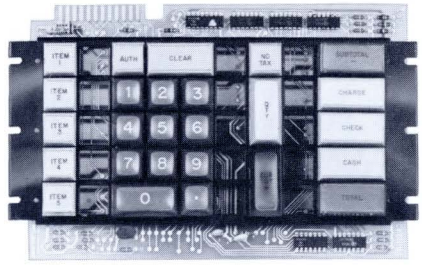
The switch modules and associated electronic components are terminated to a high quality printed circuit board with excellent mechanical and electrical properties. A card edge connector provides a simple means of interfacing the board to all common logic families without special electronic circuits.

Stock listings

The typical listings shown below are for point-of-sale and word processing applications. Other prototype and evaluation models for data entry, communication, etc. applications can also be supplied. However, it is our intention to work with you in specifying keyboards that are exactly suited to your needs and provide them at the most economical price possible.

For additional information, request Product Sheets 26SD1-1 or 51SD12-1.

POINT-OF-SALE KEYBOARD



26SD1-1

features

- Solid State Keys
- Six Bit Address Code
- Mono Mode
- "N" Key Lockout
- Relegendable Buttons
- One Character Storage

The 26SD1-1 low-profile keyboard is ideally suited for modern compact terminal applications. Simplicity in electronics adds to its inherent reliability—so important to the business transaction market.

Every aspect of the keyboard is designed for operator convenience and acceptance, and for maximum throughput. These include proven operating force displacement characteristics, key spacing, button shapes, and legending. In addition, an electronic "n" key lockout option is included. It prevents the entry of undesireable or erroneous codes when two or more keys are operated at the same time. The first key depressed is recognized. All other key depressions are ignored until all keys are released. The one-character-storage feature allows the system ample time to read the keyboard output.

To increase the versatility of the 26SD1-1 many of the keys have a relegendable keytop. This enables customizing at the job sites, which is especially important for new installations.

TYPEWRITER KEYBOARD

51SD12-1

features

- Solid State Keys And MOS Encoding
- Six Bit Binary Code
- Familiar "Selectric" Array For Typewriters
- "N" Key Rollover
- Secretarial Shift Lock
- PROM Capability

The 51SD12-1 is a dual-mode, low-profile keyboard especially suited to word processing and photo-typesetting applications, particularly where high speed alpha-numeric data entry is required. The key array of the 51SD12-1 conforms to most familiar high quality office typewriters.

This keyboard features our "n" key rollover. Data bits, set by a pulse from the down stroke as each key is depressed, are stored in the MOS memory. When a second key is operated, new data is set into the memory even if the first key is still depressed. Thus, there is no possibility of missing a character or of transposing characters as a result of the order of key release. Any number of keys may be held depressed, then released in any sequence without affecting the proper data entry sequence. This feature has been proven to reduce operator error by as much as 30%. The pulsed output is part of the solid state chip within each key, rather than a pulse network of discrete components, and significantly improves keyboard reliability.

The MICRO SWITCH SD Keyboards are the culmination of many years of design experience and incorporate the following time proven features of our long–popular SW line.

Technology We selected the Hall effect solid state switch because of its simplicity, reliability and overall economy. Our encoding techniques let us match the exact code you need at a modest cost. Even if your requirements call for a keyboard that generates totally unrelated codes, we can supply it. We've built keyboards where each key generates six levels of code! Our extensive human factors research has led to a keyboard design that is comfortable and natural to the operator because that's the secret to maximum throughput.

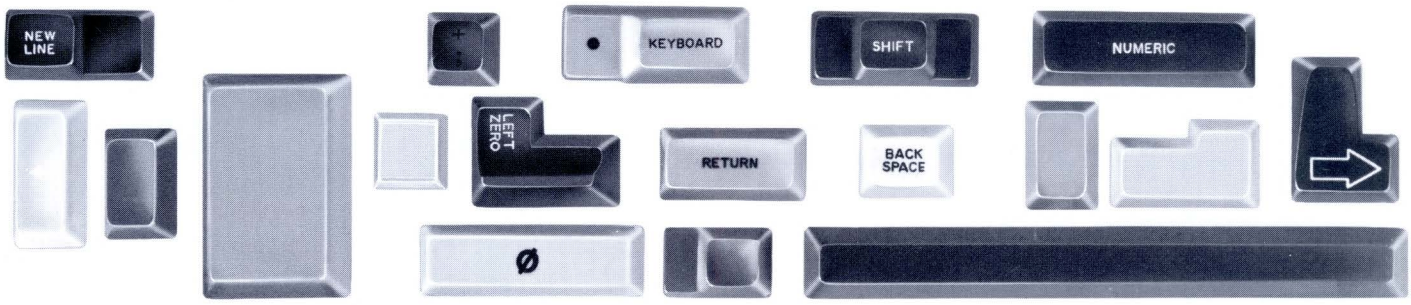
Flexibility Whether your keyboard calls for 12 or over 212 stations, we can build it in the configuration that you tell us. Our factory-based application engineers will visit you to work out the details. Once the requirements are transmitted back to our factory, a design team will lay it all out to meet your exact requirements. Thus you pay only for what you need. We have pre-designed electronic options to meet almost any requirement. These include arrays, level or pulsed strobe, "n" key or two key rollover, three types of shiftlock, "n" key lockout, repeat, system control, one character memory and serial output. Plus many more too numerous to mention. The point is, we can provide the features needed for your application without expensive engineering charges.

Reliability The most important element of an electronic keyboard is the switch module. We selected solid state because it eliminates the most troublesome part of the switch...the contacts. And our encoding uses the fewest possible discrete components. Thus, every aspect of the keyboard has been selected for its high reliability. The inherent reliability of our keyboards has been confirmed by extensive laboratory testing. Documented evidence assembled at MICRO SWITCH over the past six years proves the Hall effect chips have an indicated MTBF of over one million hours and MCBF of 20 billion operations. But, more important, tens of thousands of our keyboards are performing reliably in everyday use. MICRO SWITCH keyboard reliability saves you money and earns your customer's goodwill. You'll make fewer service calls; your customers will have less downtime.

Quality A complete quality procedure has been established for every step of production. Equipment has been designed to make checks all along the way. Final inspections are performed by our exclusive automated checker. We call it CAKE (Computer Assisted Keyboard Evaluator). With CAKE conducting final inspection, the chance for human error is eliminated. This thorough inspection procedure provides a 1% AQL which means you can simply sample inspect each keyboard shipment, and save money on incoming inspections.

Capability Our manufacturing facility is geared to make high quality keyboards by the thousands. And high volume means lower per-unit pricing, whether you want one or ten thousand keyboards.

Buttons



There is no need to compromise your button requirements when you specify a MICRO SWITCH keyboard. We have the largest selection of buttons in the keyboard industry. Having already tooled over 6,000 different legends, we have the in-house capability to tool any special legends you may require. Over a dozen foreign languages are available, in addition to mathematical and scientific symbols. We produce these buttons in 40 different outside colors, 28 separate inside colors and 30 various configurations.

Buttons are either double-shot or tri-shot molded to insure attractive durable legends. With this technique, the legend can never wear away and there are no depressions in the legend area to fill with dirt. Re-legendable buttons are also available. A legend film strip is supplied with the button to be slipped between the button cap and lens. These strips can be supplied in 7/64, 9/64 and 13/64 inch sizes.

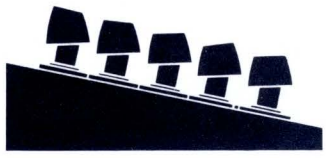
Buttons may be specified with either a glossy or matte finish. We also offer sculptured buttons to provide a contoured typing surface. The top surface of each row of buttons is molded at a slightly different angle to form a dished effect similar to that found on some high quality office typewriters. (In fact, we can supply a duplicate array of the IBM Selectric.) This feature adds to operator comfort and enhances the appearance of the keyboard on your equipment.

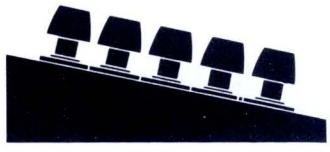
Button orientation

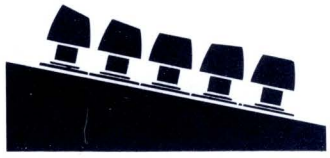
We offer stepped, stepped with sculptured buttons, sloped, or sloped with sculptured button arrangements. These terms refer to the angle of the button in relationship to horizontal. The sloped key arrangement is 11.5 degrees to horizontal, while in stepped configurations, the keytops are orientated horizontal as shown below.

All evidence to date indicates that both stepped and sloped key arrangements provide equal typing speed and operator comfort. The stepped arrangement has its origin in the typewriter industry because of the mechanical design. Sloped key rows have been used most often in key punch equipment.


STEPPED


STEPPED WITH SCULPTURED BUTTONS


SLOPED


SLOPED WITH SCULPTURED BUTTONS

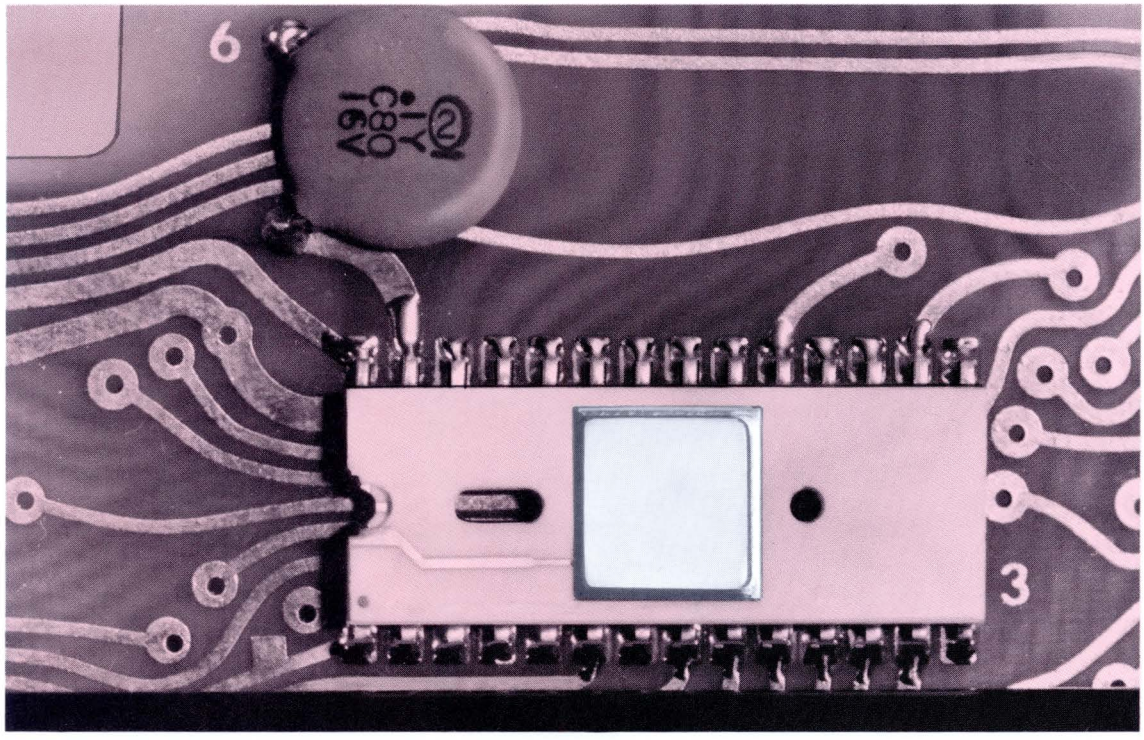
Encoding

We offer a great deal of flexibility in providing codes that meet your exact needs. Our unique two-of-n code is developed from the two isolated outputs available from each key switch. This code is used to address the keyboard encoder, thus eliminating the need for complex and costly scanning techniques.

With MOS, a wide variety of electronic options are available which can simplify your system as well as increase its versatility. Where encoding and system requirements are less complex, TTL or DTL encoding is used.

Our encoding techniques can generate any code that you specify and in the number of modes necessary for your system. Totally unrelated codes may be generated by the same keys. For instance, a keyboard may be specified that generates two modes of USASCII and two modes of EBCDIC. Since we do not have to logically pair our encoding for multi-mode operation, you may pair characters in any way you choose.

For quick turnaround on prototypes and low volume orders, we can supply keyboards tailored to your needs through our PROM (programable-read-only-memory) capability. In many cases, as soon as two weeks from receipt of your order. So you can have the exact code required without long delays for new encoded designs. In other words, with our encoding techniques there are almost no limitations. Tell us what you need and we will supply it.



MOS Encoding increases your system's versatility

Reliability

Our sound, simple keyboard design insures reliability; we use a minimum of discrete electronic components. On MOS keyboards, all encoding and electronic functions are usually performed on one chip. And most of our keyboards use only one printed circuit board for switch termination and keyboard electronics. This eliminates troublesome circuit board interconnections.

The inherent reliability of our keyboards has been confirmed by extensive laboratory testing. We have on file at our Freeport, Illinois headquarters objective evidence of testing. For instance, a test conducted on a 52-key keyboard had an indicated mean time before failure of 11,000 hours. More important, our keyboards have been proven by tens of thousands of units in everyday use, many since 1968. To show our confidence in our keyboards we have doubled our warranty period from 12 to 24 months.

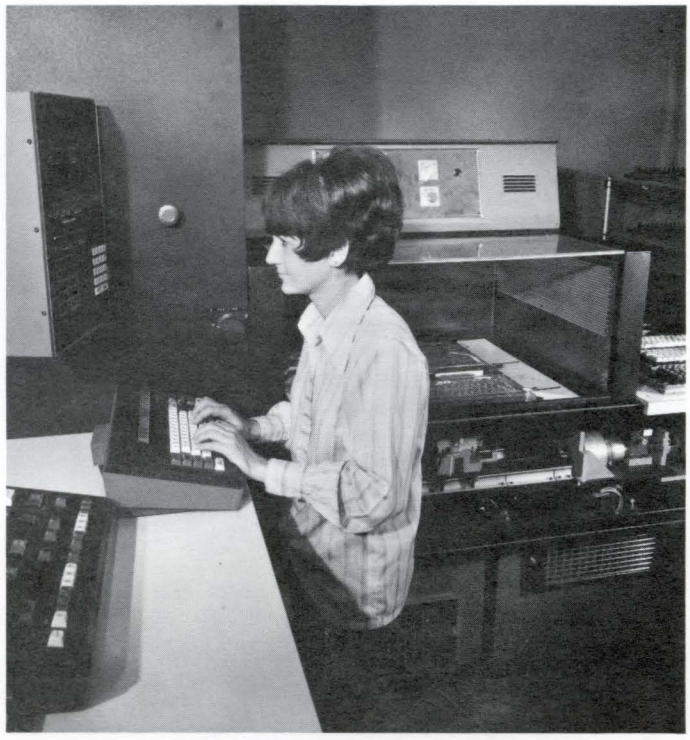
Our test lab has specially designed evaluation equipment that operates the key modules around the clock, hammering out millions of operations to simulate years of normal keyboard use.

Quality

We have established a quality program that covers every aspect of the keyboard. This starts with the design concept and extends through a complete computerized final inspection. Our keyboards are 100% electrically tested at room temperature and at 125°F. Every keyboard is visually inspected for solder joints, component values, button placement and all workmanship details.

The final inspection is conducted by our computer assisted keyboard evaluator, shown on the right. This equipment was designed and built by MICRO SWITCH personnel, and has been featured in leading business publications. It not only performs final inspections at least six times faster than previous techniques, but also is much more accurate. Among parameters checked for each key are proper code, rise and fall times, operating characteristics, plus current and voltage levels.

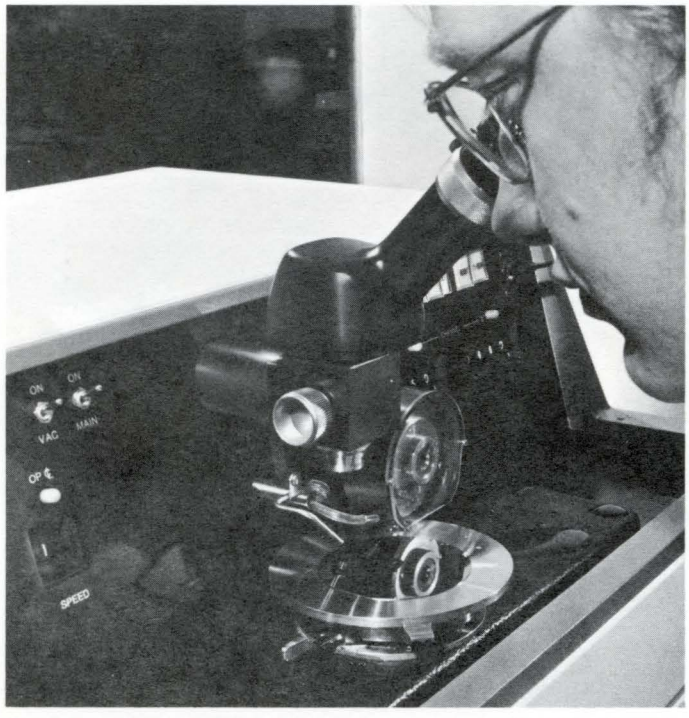
Because of our comprehensive quality procedure we are able to offer a 1% AQL (acceptable quality level). This is an important consideration when selecting a keyboard vendor. Our quality program assures you of keyboards that are ready to install... without problems.



Final inspection is conducted by CAKE. Here both static and dynamic parameters are measured.

Capability

MICRO SWITCH's SD line represents our total dedication to automation in the production of solid state keyboards. Our manufacturing is set up to make high quality keyboards by the thousands, and large capital investment has been made to do this. Much of our equipment was designed and built by our own personnel because there simply was nothing on the market to do the job. This includes automatic module packaging and assembly, fully automated flip chip bonding process, solid state chip handling and computerized quality control equipment. To evaluate the keyboard design we have a complete engineering test laboratory that includes monitoring as well as environmental testing equipment. Billions of cycles have been recorded and everything from high speed photography to simulated typists are used to prove the design. In addition to our domestic plants, we have manufacturing facilities located in both Europe and the Far East.



Silicon wafer separation by ultrahigh-speed saw insures the straight sides needed for the continued automated handling of the microscopic chips.

Ordering Information

Contact our branch offices for complete ordering and application assistance. Our factory-trained field engineers are ready to work with you in determining your specific needs and transferring them to a MICRO SWITCH Keyboard Specification Sheet. They are in an ideal position to give you sound advice and suggest cost-saving possibilities in the selection of options and features.

Branch Offices

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617/275-2440

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Cleveland, Ohio 44103
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Dallas, Texas 75240
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214/661-5459

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