

TTL Trends

from Texas Instruments



MSI is here! And Friden is putting it to work in a new breed of "computerized" electronic calculators — one of the first commercial applications for this advanced generation of TTL circuits. By combining three MSI arrays with more familiar TTL flip-flops, DTL gates and numerous discrete devices from Texas Instruments, Friden engineers significantly reduced costs while upgrading performance. Result... user savings up to 50% over other calculators of similar capability.

Turn page for story.

MSI from TI helps Friden cut costs of "computerized" calculators



For the Friden 1151 Programmable Calculator shown here, TI supplied three MSI arrays plus 153 DTL and TTL ICs, as well as numerous discrete components (silicon diodes, small signal transistors and power transistors). These broad product-line capabilities significantly reduced Friden's procurement problems.

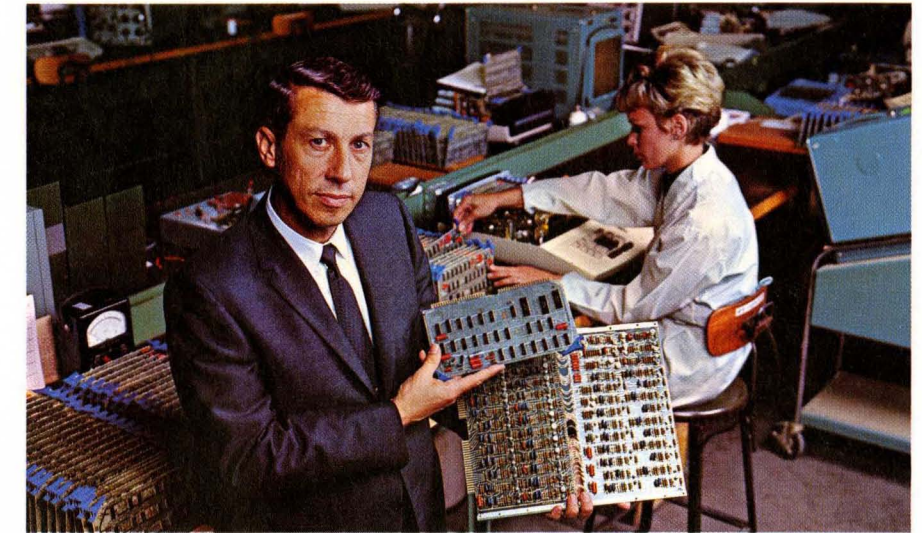
TI combined the equivalent of 93 gates in just three 24-lead MSI arrays to help Friden engineers reduce package count, circuit boards and overall costs of their new 1150 and 1151 electronic printing calculators.

Three custom TTL ring counters form the heart of Friden's sophisticated "computerized" calculators. These MSI units recirculate all arithmetic and memory information handled by the machines. Since June of 1966, they have been making possible substantial reductions in both costs and complexity.

Friden engineers took advantage of TI's broad IC capability to develop a low-cost, single-chassis design combining both electronics and printer in a single unit. They packed up to 662 gates on only six compact circuit boards by selecting optimum combinations of multiple-gate DTL and complex-function TTL integrated circuits. This single-chassis design not only means lower manufacturing costs, but also greater reliability and convenience for the user.

The high noise-immunity of TI circuits also provided an unexpected bonus. With both printer and electronics combined in a single chassis, Friden engineers were concerned with possible noise problems...but none developed. Expensive noise-suppressing design techniques were therefore unnecessary, and further cost reductions were realized.

As a result of these cost (and space) economies, Friden engineers were able to upgrade performance without corresponding



Smaller circuit boards, made possible by MSI and multiple-gate ICs, enabled Friden engineers to develop high-performance low-cost calculators, with both electronics and printer in a single chassis. Here, R. A. Ragen, Friden's Director of Engineering compares a new MSI/IC circuit board with one of the larger functional equivalents required in an earlier all-discrete-component model. In the pre-assembly checkout area (background), an 1151 Calculator performs final screening of hundreds of circuit boards each day.

price premiums. Here are two cases in point: The "stacking" feature, which allows retention of intermediate answers; and the floating decimal point, which permits the user to preselect desired accuracy. In addition, the 1151 is a programmable machine capable of "learning" up to 30 mathematical steps.

All this performance...at user savings up to 50 percent over machines of similar capability!

In these and other ways, Friden's new breed of calculators help close the gap between computers and office machines. They reduce the time required for complex calculations and minimize operator errors...yet they are priced far below today's least expensive computers.

Reliability is another bonus. The marriage of an all-IC logic design with a mechanical printer of unique simplicity dramatically reduces maintenance.

Finally, broad total semiconductor availability—in volume—were key considerations in Friden's design and procurement decisions. For example, gates are Series 15 830 DTL and flip-flops are Series 74 because this combination promised optimum performance/cost ratios. And inspection of TI manufacturing facilities indicated capacity sufficient to meet Friden's high-volume production requirements.

Cost...performance...size...availability...reliability...product saleability. These are some of the ways Friden benefited by using TI integrated circuits in their new computerized calculator line.

You can benefit, too. Join the growing list of OEMs that are improving their profits and building for the future. Include TI integrated circuits in your new equipment designs...today.



TEXAS INSTRUMENTS
INCORPORATED

Nine new TTL decoders expand complex-function line

These new monolithic decoders give design engineers new opportunities to reduce costs and improve performance of logic and display systems. They couple the high speed and high noise immunity of TTL with the overall economies of complex functions for a host of new applications.

Four basic logic forms are offered: BCD-to-decimal, excess 3-to-decimal, excess 3 gray-to-decimal, and BCD-to-seven segment. Active-high and active-low logic configurations are available.

All decoders have buffered inputs to reduce fan-in requirements to a standard TTL load.

A choice of output configurations are offered. Three of the decimal decoders (SN7442-44) employ familiar totem-pole outputs for high capacitive drive capability while two others (SN7445 and SN74145) have high-performance open-collector outputs to drive display lamps or relays. Two of the seven-segment decoders (SN7446-47) can drive display lamps directly while two others (SN7448-49) are designed to drive large displays through external power transistors.

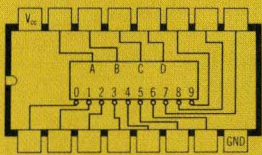
Two temperature ranges are offered...full military (Series 54) and industrial (Series 74).

All decoders except the SN7449 are available in either of TI's 16-pin dual in-line packages...the low-cost plastic or the ceramic hermetic. For space-critical applications, the SN7449 is offered in the hermetic 14-lead flat package.

For data sheets on any or all these new decoders, write on your letterhead to Texas Instruments Incorporated, P.O. Box 5012, M.S. 980, Dallas, Texas 75222.

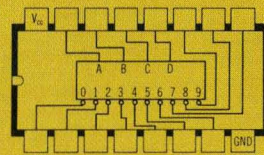


SN5442/SN7442
BCD-to-decimal decoder.



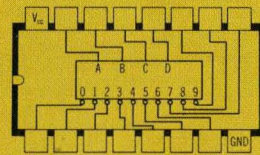
Active-low outputs. Fully compatible with all popular DTL and TTL logic.

SN5443/SN7443
Excess 3-to-decimal decoder.



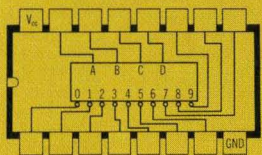
Active-low outputs. Fully compatible with all popular DTL and TTL logic.

SN5444/SN7444
Excess 3 gray-to-decimal decoder.



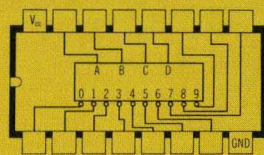
Active-low outputs. Fully compatible with all popular DTL and TTL logic.

SN5445/SN7445
BCD-to-decimal decoder-driver.



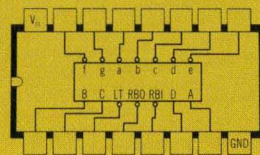
Active-low high-performance outputs. 30V breakdown, 80 mA sink-current capability for lamps, relays or memories.

SN54145/SN74145
BCD-to-decimal decoder-driver.



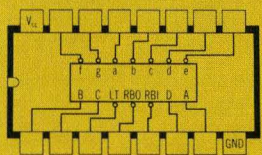
Active-low high-performance outputs. 15V breakdown, 80 mA sink-current capability for lamps, relays or memories.

SN5446/SN7446
BCD-to-seven segment decoder-driver.



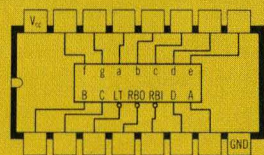
Active-low, open-collector outputs. 30V breakdown, 20 mA sink-current capability to drive indicator segments.

SN5447/SN7447
BCD-to-seven segment decoder-driver.



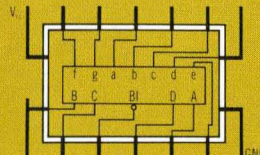
Active-low, open-collector outputs. 15V breakdown, 20 mA sink-current capability to drive indicator segments.

SN5448/SN7448
BCD-to-seven segment decoder-driver.



Active-high, passive pull-up outputs. For current-sourcing applications to drive logic circuits or power transistors.

SN5449/SN7449
BCD-to-seven segment decoder-driver.



Active-high, open-collector outputs. For current sourcing applications to drive logic circuits or power transistors.

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