

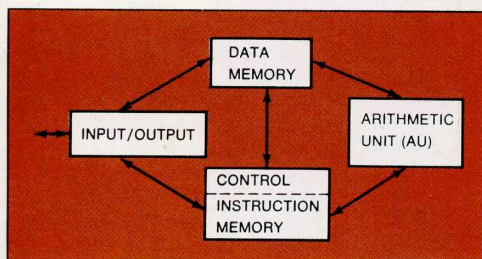
The Goodyear Staran computer:

A new way of thinking for complex data-handling operations

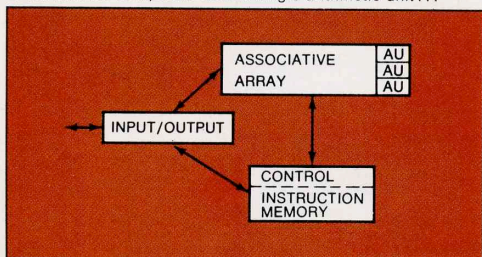


Think of it this way:

STARAN is like thousands of simple computers operating simultaneously.



Conventional computers have a single arithmetic unit...



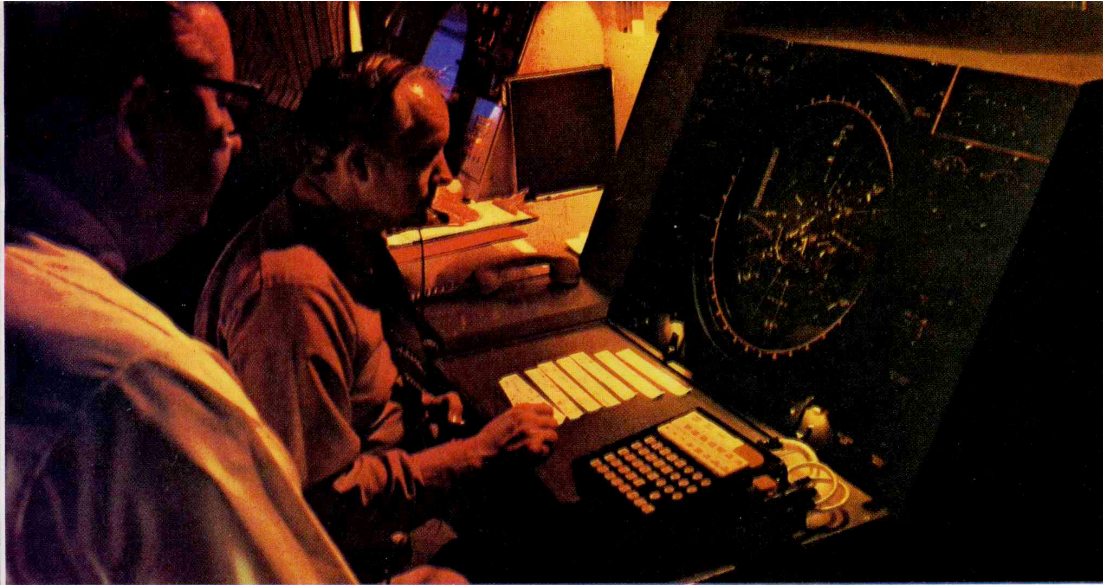
but STARAN has many arithmetic units and can perform many add operations at once.

Goodyear STARAN is an entirely different kind of computer. It's the world's first commercially available associative array processor. It can achieve execution rates of hundreds of millions instructions per second, and input/output rates of up to 20 billion bits per second.

That's far beyond the capabilities of any present-day conventional computer. Yet because STARAN reaches this efficiency through "a new way of thinking"—associative processing—rather than through exotic hardware, it may cost only one-fifth as much as other processors for large-scale systems.

Here's the big difference. Instead of the single arithmetic unit in the conventional digital computer, STARAN has a potentially unlimited number of logic and arithmetic cells, one located at each word in memory. This is illustrated in the diagrams at left.

The conventional serial computer performs one add operation on one pair of numbers at a time; STARAN will operate on hundreds or thou-



The first STARAN prototype was installed in 1971 at the FAA's air traffic control facility at McGhee-Tyson Airport, Knoxville, Tennessee. Its performance has demonstrated the potential for ground-based conflict prediction to make flying safer.

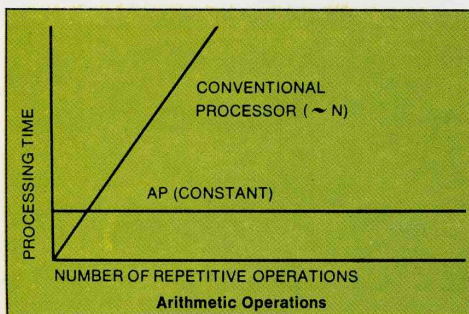
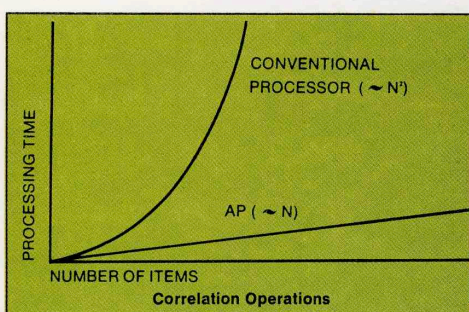
sands of pairs of numbers simultaneously. This is called *array arithmetic* in STARAN.

Secondly, the conventional computer, with its *location-addressed* memory, must search its data file one word at a time until it finds the data it needs. But STARAN, with its *content-addressable* memory, can search a data file and identify all elements meeting the search criteria in a *single memory access*.

Content-addressability and array arithmetic complement each other in such a way as to make STARAN the most powerful processor available today.

This fundamental difference between STARAN and a conventional processor offers a tremendous cost-effective advantage in high data volume operations such as those discussed on the next two pages.

STARAN can increase processing speed in data-handling operations



The graphs at the left show the difference in speed between Goodyear's STARAN and a conventional digital computer. You can see STARAN offers an advantage in processing time that increases with the number of tasks to be performed. This makes it ideally suited to today's critical high data volume applications.

Specifically, STARAN can offer significant advantages in applications that:

- Have a large, highly dynamic data base.
- Require rapid response to unanticipated queries into large data files.
- Require many similar items in a data file to be active simultaneously.

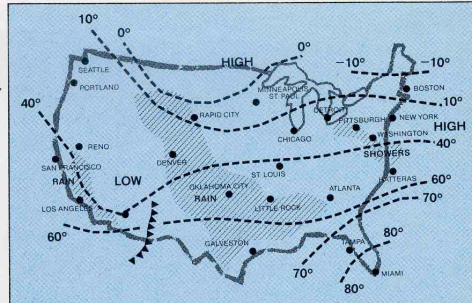
Examples of current problems with these requirements include air traffic control, ballistic missile defense, radar signal processing, weather prediction, and large data management systems. The samples on the facing page show the capabilities of STARAN in two such potential applications.

STARAN is particularly effective in operations in which a high degree of parallelism exists. By combining the processing capabilities of STARAN with the sequential functions of your

Processing speed in complex operations like these.

present computers, you can achieve data-handling capacities inconceivable before the introduction of STARAN.

A WEATHER FORECASTING PROBLEM. The National Weather Service gathers data from thousands of stations all over the world. It must process this data via complex mathematical formulas and disseminate it quickly to various agencies. Although the processing is highly complex, each data stream is processed in the same way. With a conventional computer, the data is processed one item or one operation at a time. With STARAN's array arithmetic thousands of data streams can be processed simultaneously.

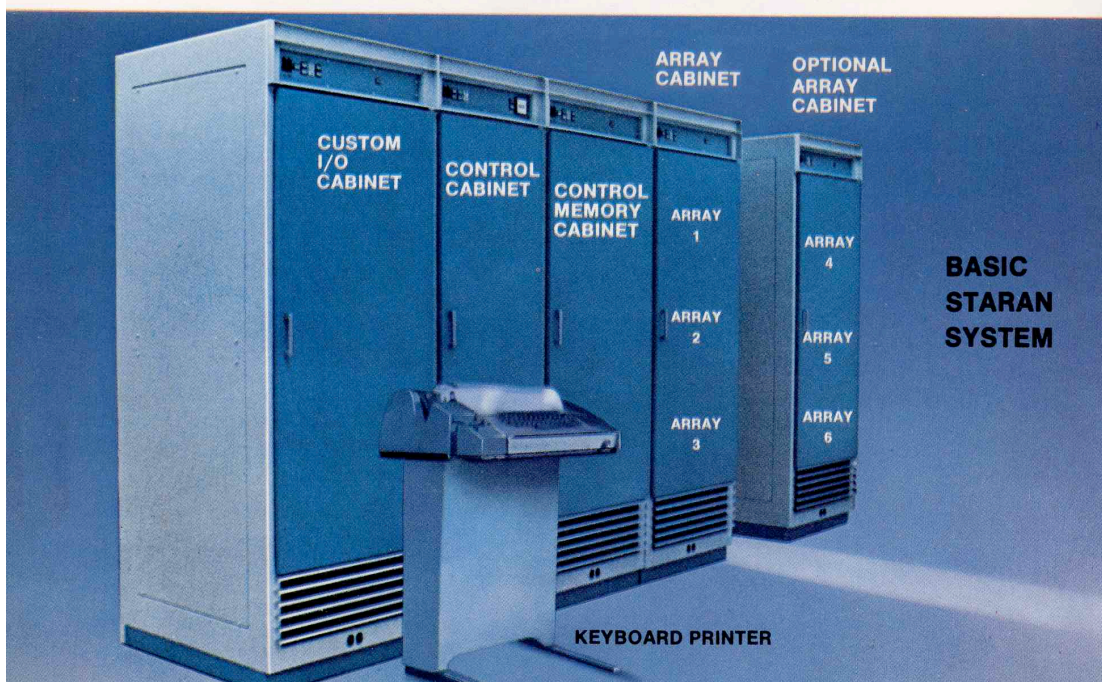


A PATENT SEARCH PROBLEM. U.S. patent examiners must determine whether each new application for a patent infringes on any previous patent. The new patent application description is checked against all previous applications and patents issued, to see if key words of the application appear anywhere in the files. Those responding to the search are reviewed in detail. This matching process is virtually impossible for a conventional computer, but a simple matter for STARAN.

may be used as a timing reference would be made independent of phase and quadrature channels. The lock-on process consists of a series of steps. First, the swept oscillator 12 is locked to a wave stalo 24 just prior to each phase-locking is accomplished by controlling the ramp from the generator 16

Typical patent application text.

STARAN can greatly increase

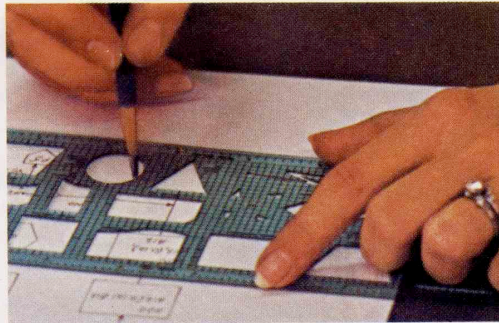


your EDP capability. Think it over.

For all its tremendous capacity, the Goodyear STARAN hardware (shown at left) is relatively inexpensive—and simple.

STARAN can serve as a stand-alone processor, or interface with almost any existing computer. Its modular design lets you put it in service immediately—and expand it in the future—with little or no interruption in current operations. The highlight of the system hardware is reliability. All components, including its integrated circuit memory, are solid state, and a failure of any individual arithmetic unit will affect only the single word of memory to which it is attached—not the entire system.

STARAN software is equally uncomplicated. The STARAN language, called *APPLE*,* assists the programmer by reducing the amount of housekeeping and eliminating redundant file structures in your programs. The powerful instruction set of *APPLE*, which operates simultaneously on all or selected words in memory, drastically reduces the number of program steps necessary to manipulate a data base. These features, and the systems programs furnished, decrease program turn-around time, facilitate



generation of new specialized programs, and in general increase the productivity of your programmers.

Goodyear can provide a complete range of services with STARAN, including application studies, programming services, customer education, and on-site or on-call maintenance—everything you need to get the full benefit of this new way of thinking.

*Associative Processor Programming Language

**STARAN. It's
more than a new
generation. It's a
new way of thinking.**



Our first STARAN associative array processor was placed in service during '71, after more than ten years of research and development. Its performance has been outstanding. The manufacture of additional solid-state units was initiated during '71, and they are now available.

A STARAN associative array processor for your application can result in:

- lower software development cost

- lower hardware cost
- increased processing capability
- high reliability
- modular expansion capability

It is indeed a new way of thinking.

We would appreciate an opportunity to demonstrate a STARAN unit for you at your convenience.

Morris B. Jobe
President

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