

GE-400 Time-sharing Information Systems

Bring a powerful computer to the
fingertips of all your people



Information
Systems

GE-400 Systems



Time-sharing magnifies the power of your people's thinking





The Switch Is on to GE-400 Time-sharing

Computer users today are crying for more value from an information system . . . in terms of greater cash value and performance . . . in terms of more people getting greater use of it.

Now, General Electric fills this need by offering two new GE-400 time-sharing systems designed to give you and all your people more useful computing power for your investment:

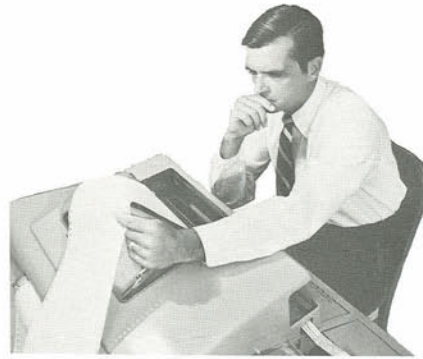
The GE-430 — an expanded time-sharing system capable of servicing up to 30 users simultaneously. The GE-430 is an excellent way to start building.

The GE-440 — A logical growth step offering twice the memory capacity. It's capable of servicing up to 50 users at the same time. 200 terminals can be set up to serve over 500 people. The GE-440 is the greatest price/performance bargain in medium-scale time-sharing today.

Once the tool of financial and technical men, the information system is now reaching out as a thinking aid to men of all professions. And computer time-sharing is the big reason.

Read on to learn all the benefits of General Electric 400 time-sharing . . . how simply you can bring full medium-scale computer power right to the fingertips of hundreds of your people.

Remember, more conversational time-sharing is done on General Electric systems than any other make.



A more apt name for "time-sharing" is "computer-sharing". It's a method whereby many people can use an information system simultaneously from different locations simply by connecting typewriter-like terminals into the system.

It literally takes the glass walls down from the computer room. A terminal can be put anywhere a telephone line can reach . . . right to the fingertips of anyone who would ever have need for computing power. No more key punching. No more explaining to a programmer. No lengthy preparation.

The Computer Feels Like Yours Alone

A GE-400 system computes at incredible speeds. Though many others may be using it at the same time, you never know it . . . it feels like yours alone.

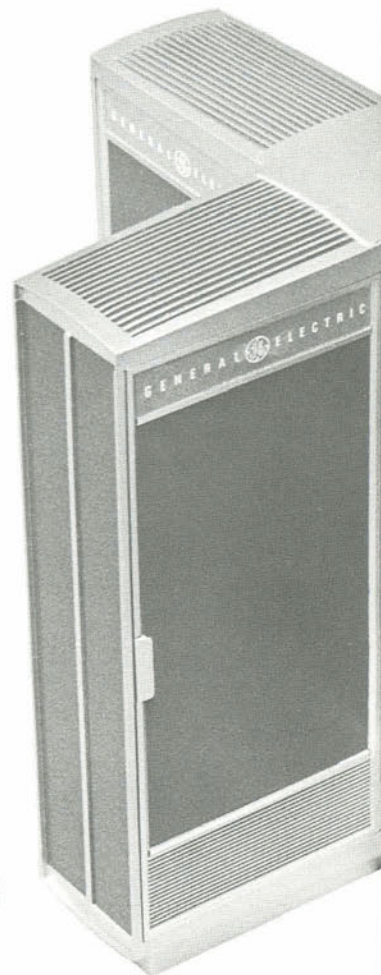
You can operate the system from anywhere. Just set the terminals where the work is and let your people do the rest.

The computer will be right at their fingertips. An easy-to-use conversational language makes the machine perform. Your scientists, engineers, accountants, and managers find that in just a few hours of instruction, they can develop

and run their own programs. No longer must they wait in line for precious computer time or for programmers to do the work. GE-400 time-sharing, is an extension of their thinking power.



Time-sharing Is Really Computer-sharing



Ten Important Benefits of GE-400 Time-sharing



1. Your people have instant access to the full power of a computer. Through simple Teletype keyboards placed anywhere, hundreds of your people can virtually put a computer in their laps. Up to 50 people can use the computer at the same time.

2. Increased productivity. With a powerful computer right at their fingertips, your people will actually extend their thinking power. And that means all your people — engineers, scientists, accountants, marketers, production managers. They need no prior computer experience — just the drive to get more work done faster.

3. Uses the easiest computer language yet devised. Even people who have never before dealt with a computer can learn to use GE-400 time-sharing in less than a day. The extended BASIC* language it uses is powerful enough for complex mathematical problems.

*Developed by Dartmouth College

4. FORTRAN for your most complex computations. Experienced computer mathematicians can use a specially-adapted conversational FORTRAN for complicated mathematical computations. They have access to the fastest FORTRAN compiler available in a medium-scale system.

5. Grow the system in easy steps. You can start out with a lower cost system — the GE-430, capable of servicing up to 30 simultaneous users. When more computing power is needed, it's simple to grow to a GE-440, to serve 50 users simultaneously. It gives you maximum performance per dollar.

6. Switch off time-sharing; switch on batch processing. GE-400 time-sharing is that flexible. When you want your people to have desk-side access, switch to the time-sharing mode. When you need to compute large runs, change to the

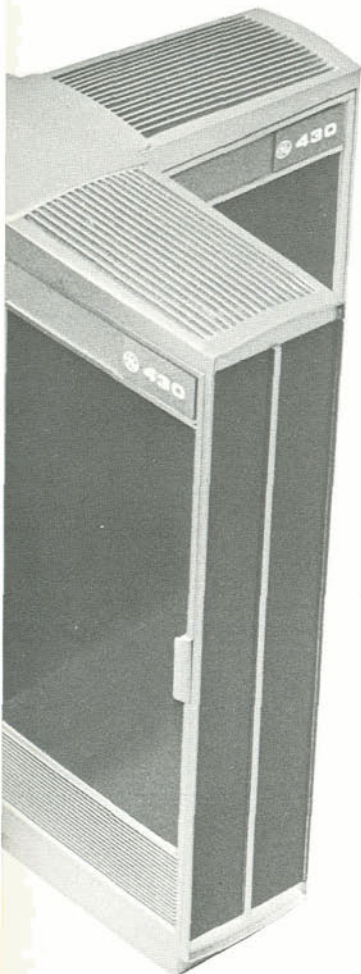
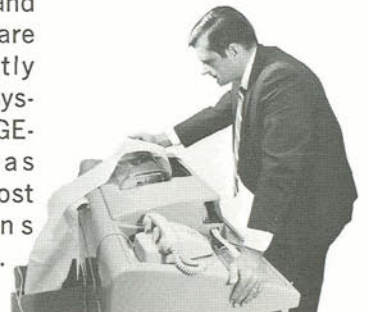
batch mode. You can run remotely through the terminals or run right at the computer. Some are running normal batch at night and using the system for time-sharing during the day.

7. Develop new programs and applications easily. With time-sharing you can experiment. Just as a newspaper reporter edits copy on his typewriter, your users can edit programs on their keyboards. They can also create, test, update, and store programs at the same time.

8. Everyone has exclusive use of the computer. Though many people may be using the computer simultaneously, each thinks of it as his own. The computer speeds back and forth between inputs incredibly fast and emits answers instantly. Programs are fully protected so that only authorized users have access to the information.

9. Proved hardware for reliability. Both time-sharing systems use standard, user proved hardware. Exceptionally fast GE-400 floating point hardware is a part of the time-sharing package allowing you to handle complex engineering/scientific problems as well as everyday business assignments.

10. Proved General Electric time-sharing software. More conversational time-sharing is done on General Electric computers than any other kind. This experience has resulted in the design of the GE-430 and 440. The software extends directly from early GE systems and the GE-420, which has provided low-cost computations since mid-1967.



The real benefit of time-sharing is that *all* your people can use one powerful centralized computer from wherever they are. And they all find it a tremendous boon to productivity — beginners and experienced computer programmers alike.

Beginners Can Learn BASIC in Hours

BASIC, **B**eginner's **A**ll-purpose **S**ymbolic **I**nstruction **C**ode, is a language the computer can understand. Yet it resembles ordinary mathematical notation. It has a simple English vocabulary and few grammatical rules, but it permits complete and precise specification of your problems.

BASIC has recently been extended, but is still simple to learn and easy to use. With just 18 fundamental BASIC statements, you can solve the majority of your computational problems. Even neophytes can compose and run programs using BASIC in just a few hours.

Many have taught themselves simply by studying the BASIC reference manual.

You can change programs easily at any time. You can correct errors or revise logic whenever you need to. Many automatic checks are also made by the system. When it detects errors, it points them out to you in concise self-explanatory language.

Experienced Programmers Have Their Choice of BASIC or FORTRAN

BASIC's simplicity doesn't limit its capabilities. It is a powerful language which provides for logic comparisons, subscripting, lists, and arrays. It has extensive capabilities for matrix manipulations and common

GE-400 Time-sharing Is for Everyone

trigonometric functions are available. You can make provisions to use a particular part of a program many times in solving a problem.

Many experienced programmers who have used more complex programming languages now use BASIC for a large percentage of their problems.

The system responds so rapidly to your instructions that debugging at the keyboard is not only practical, but recommended. Because of its simplicity, your BASIC program can be converted to computer instructions in one pass, taking just seconds.

For complex engineering or scientific operations, your experienced programmers know the benefits of FORTRAN. Now it is available in conversational form for use in communicating directly with General Electric time-sharing systems. Your scientists and engineers can now write programs, run, correct, rerun them, etc., right at their desk without waiting in line for the computer.

Being conversational, FORTRAN is now a practical tool for everyday business as well. For example, an accountant who might previously have avoided using FORTRAN because of time delays, can now get instant answers to everyday problems. Previously, he might have had to resubmit it several times before he had his program running smoothly.

With a keyboard at his desk, he can work out his problems on a trial and error basis and have it running smoothly in a matter of minutes.

Convert to Batch Processing in Minutes

You can use the system for both time-sharing and

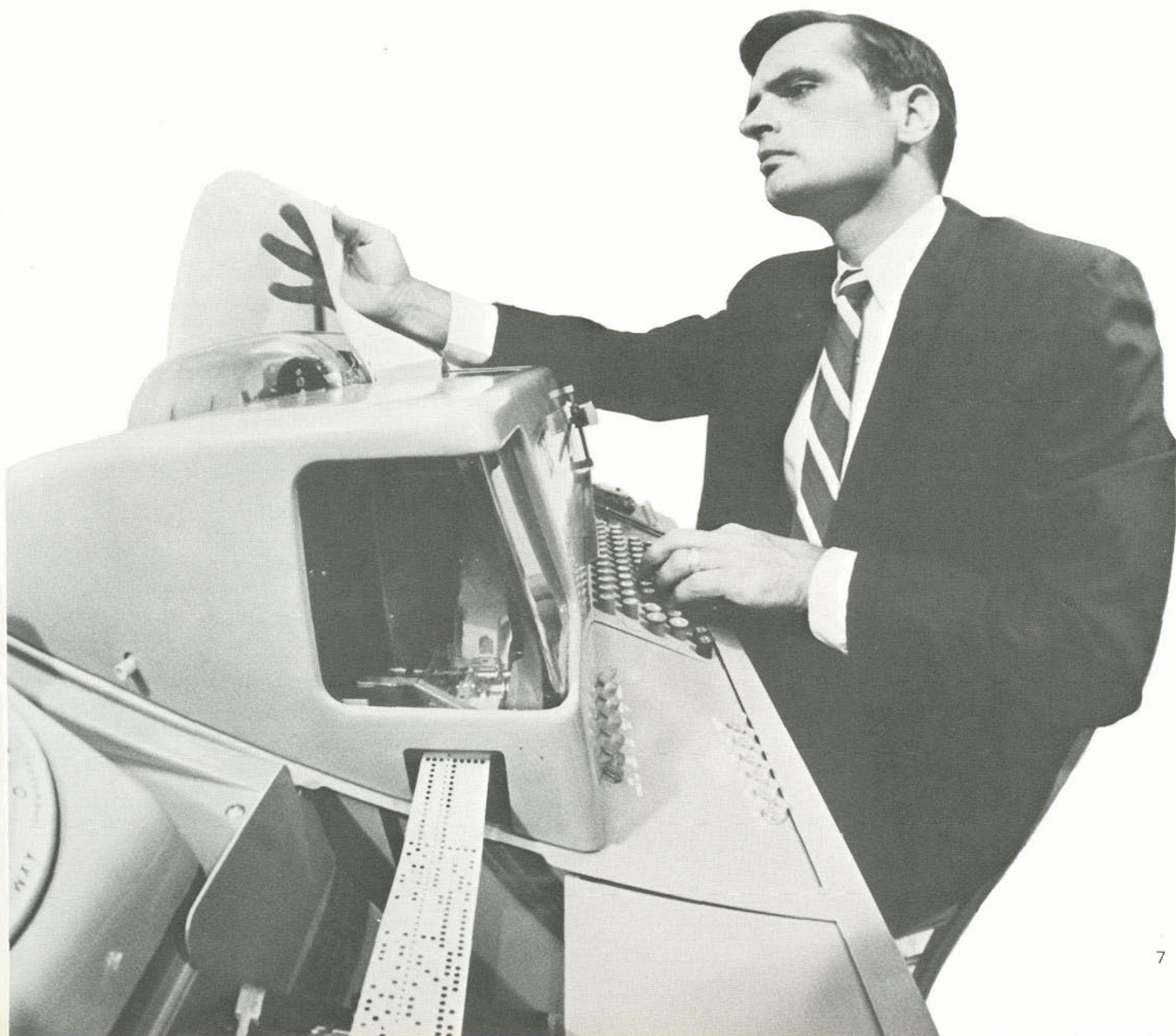
conventional data processing. It takes about five minutes to make the switch. Run payrolls, production, compilations, etc., as you would with a batch processing system. Depending on peripherals, all GE-400 software applies. This includes a complete line of programming and operating systems, language processors, data management techniques like GE's exclusive Integrated Data Store, and many application packages.

Run Batch From Remote Locations, Too

All the hardware options necessary to support General Electric's Direct Access Programming System come with GE-400 time-sharing systems. When time-sharing

is off-duty, you can submit programs and data, maintain files, etc. from remote terminal stations. In this mode, the system has full multiprogramming capability so many jobs can be submitted at the same time — either locally or remotely.

The result of all these features is a highly flexible information system that can give your people access to a powerful information processing system whether or not they have ever used a computer before. It's a system that can do local batch processing, remote batch processing, or time-sharing, and can fill your needs in developing a total management information system.



All General Electric 400 information systems are general purpose machines that can handle engineering and scientific problems as easily as business problems.

And the flexibility of General Electric time-sharing complements this many times over.

GE-400 Time-sharing Has Many Applications

For example, with GE-400 time-sharing, your technical people will benefit by having access to the industry's best FORTRAN IV compiler for a medium-scale machine with optimum compilation and execution speeds. GE-400 time-sharing systems have exceptionally fast floating point hardware — at the best price/performance in the industry. They use a 48-bit floating point number that gives you 11-plus digits of precision.

Below are a few key time-sharing applications:

Engineering design — mechanical and electrical components, chemical and fluid processes, thermodynamics, industrial and electrical systems, electronic circuits.

Theoretical calculations — reliability calculations, experimental calculations.

Applied mathematics — regression analysis, statistical analysis, curve fitting, numerical analysis.

Financial analysis — product cost, depreciation and amortization, general analysis, investment, budgeting, credits and collections, accounting transactions and reports.

Business forecasting and planning — forecasting, evaluating risk alternatives, project planning simulation and modeling, trend analysis, pricing.

Quality control and manufacturing planning — quality control, machine loading, production analysis, work and facility scheduling.

Here is how a GE-400 time-sharing system can be put to work:



In Industry . . .

Any company with a large staff of engineering or scientific people can increase productivity considerably with an in-house GE-400 time-sharing system. Engineers, with a large volume of daily calculations, will no longer have to wait hours or days to get answers back from a batch processing computer. The BASIC language will allow engineers, the majority of whom are *not* programmers, to communicate directly with the computer. They can simply sit at their desks, type in the input, and get the correct answers back *in seconds*.

Engineers report that time-sharing has increased their productivity by 50 to 500 percent. By saving their time, you're saving the company a lot of dollars . . . dollars that can more than pay for the cost of the computer.

In Banking . . .

Banks and other financial institutions, in addition to normal data processing activities, are utilizing time-sharing systems to advantage in trust, loan, economic research, operations research, and bond departments. When off time-sharing, a number of standard banking packages are available. Banks can run their batch processing work at night and keep the system on time-sharing during the day. Users anywhere can merely set up a teletype terminal, and communicate

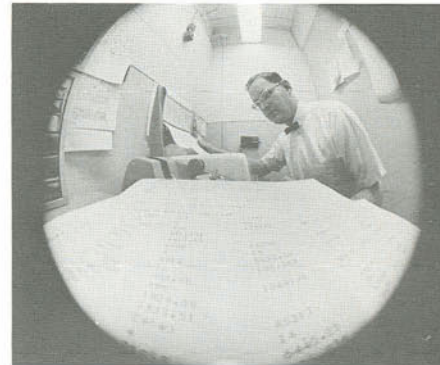


over standard telephone lines directly with the bank system. The bank profits by offering an important new service, and

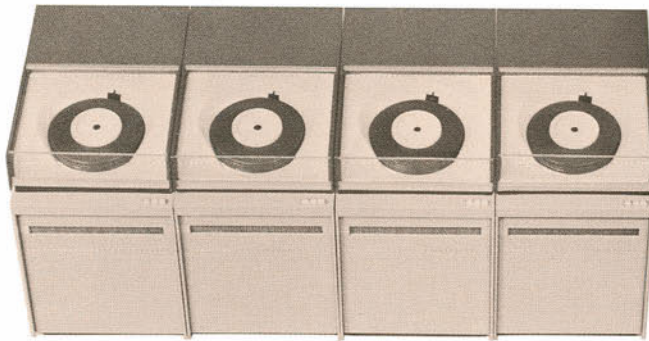
users benefit by getting use of a powerful computer at a fraction of the cost.

In Research and Development . . .

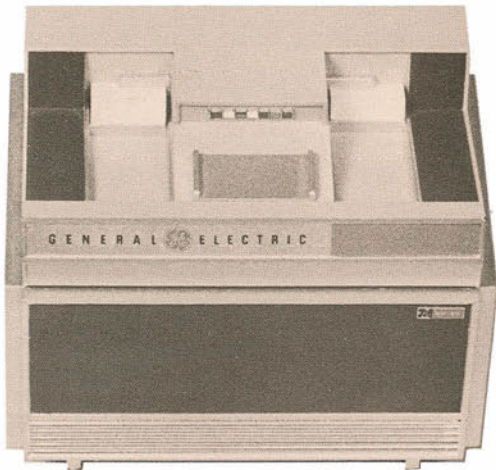
R&D firms were among the first to benefit from computer time-sharing. They usually start out by subscribing to a time-sharing service and gradually increase the number of terminals to the point where it is more economic to have their own time-sharing system. Here again, being able to talk directly to a computer, has been a low cost boon to productivity.



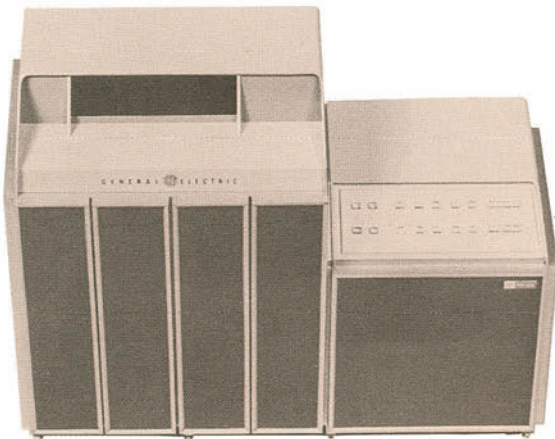
GE-400 Time-sharing System Configuration



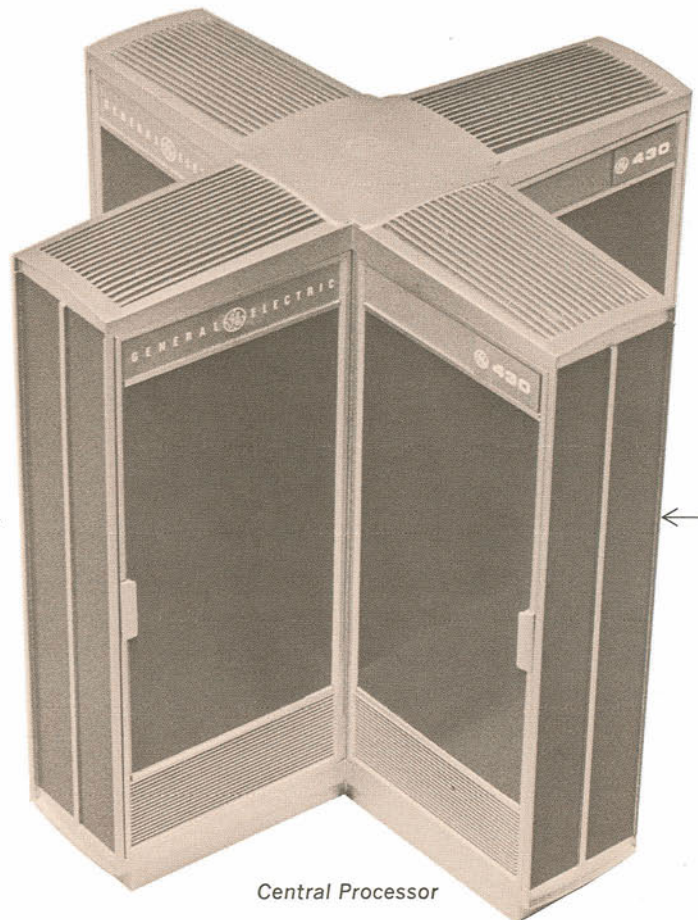
Removable Disc Storage Subsystem



Card Reader



Printer



Central Processor

Start With the GE-430 and Grow

The GE-430 is economical and powerful. It will support up to 30 simultaneous users. This means that approximately 120 terminals can be set up to logically serve 300-400 typical users. Add terminals as your demand increases. At the optimum time, you can switch to the GE-440.

The GE-440 can handle up to 50 users simultaneously. On a cost-per-channel basis, the GE-440 outperforms any other time-sharing system in its class.

As with all the GE-400's, growth is simple. All peripheral equipment is common; user programs are fully upward compatible. You save the cost of reprogramming.

Here's what a typical GE-400 time-sharing system consists of:

Central processor

- Words of memory:
 - 32,000 for GE-430
 - 64,000 for GE-440
- Direct access package
- Time of day clock
- Floating point hardware
- Console

DATANET-30* communications processor

- 16,000 word memory
- Three bit buffer units (GE-430)
- Five bit buffer units (GE-440)
- Up to 10 channels per unit

Removable disc storage subsystem

- Four units and controller
- Stores over 30 million characters
- Transfers data at 208,000 characters per second
- Average random access time is 97.5 milliseconds

*DATANET, Reg. Trade-mark of General Electric Co.

Printer

- 600 lines-per-minute, or
- 1200 lines-per-minute

Card reader

- 600 cards-per-minute, or
- 900 cards-per-minute

Remote Terminals

- Uses models 33 and 35 Teletypewriter units
- Keyboard send/receive
- Automatic send/receive

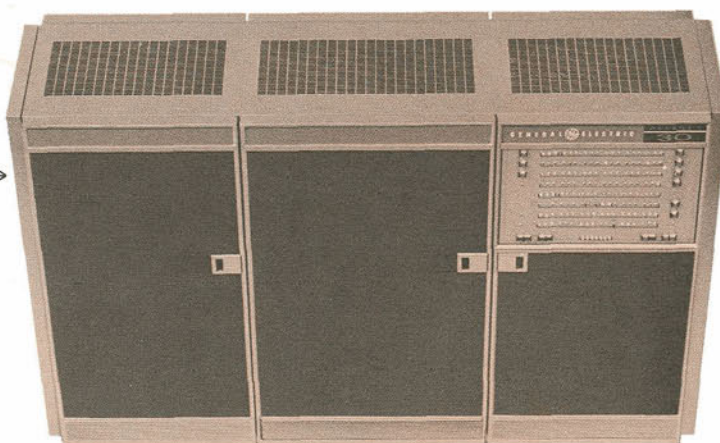
Optional Equipment

The optional peripheral equipment below may be used when your system is not in the dedicated time-sharing mode of operation:

- Magnetic tapes — choose from over 12 subsystems depending on the speeds you need (tape units can be used in the time-sharing mode)
- Card punches — 100 and 300 cards-per-minute
- Fixed disc storage subsystem
- Removable cartridge mass storage subsystem
 - Magnetic drum subsystem
 - Perforated tape subsystem
- Reader/sorter subsystems —
 - MICR reader/sorter
 - COC-5 document reader
- Multiple tape lister
- Peripheral switches



Model 33 or 35 Teletypewriter units



DATANET-30 Communications Controller



Offices

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BUFFALO, NEW YORK
CHARLOTTE, NORTH CAROLINA
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HOUSTON, TEXAS
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INFORMATION SYSTEMS

GENERAL  ELECTRIC

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performance and operational flexibility.*