

# GE TIME-SHARING SERVICE MAKES NEWS

## The Field of Numerical Control



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### G.E. Announces NC Tape Programming Service Via Time-Shared Computer

NC users can now have the advantages of computer-assisted tape programming without owning a computer. The "instant-programming" facilities are available as part of a recently announced expansion of the nationwide time-sharing computer service of the Information Service Department of General Electric Co.

The new service enables shops to develop part programs and immediately obtain EIA-coded machine tapes via an in-plant teletypewriter connected to a G.E. computer center.

Users will have access to the G.E. library of standard programs and sub-routines that greatly reduce the programming effort and eliminate manual calculation. Proprietary programs, accessible only to the owner, can also be stored in the system.

The computer output comes back almost immediately after the programming instructions are complete. Output can be in the form of a program print-out, a plot or a machining tape. Stored programs tailor the tape format to the user's specific machine-control combination.

The G.E. time-sharing service is offered at present for two- and three-axis positioning work and for some point-to-point contouring. The firm plans to add programs for contouring on milling machines and lathes also.

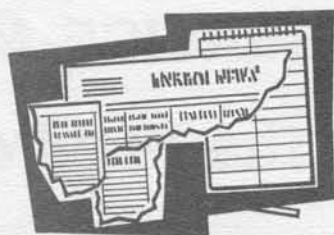
The cost of service is based on a charge of 4 cents per sec for computer time and \$10 per hr of on-line terminal time. A typical tape should cost under \$10. The minimum service charge is \$100 per month. This includes a fixed charge of \$2.50 per month per 1,536-character unit for storing the user's program files.

The time-sharing NC programming service is available from G.E. centers in 61 metropolitan areas in 28 states and the District of Columbia. Headquarters are in Bethesda, Md. ■



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GENERAL  ELECTRIC



## BACKGROUND

### the stories behind the news

#### TIME-SHARED COMPUTERS SPEED NC PROGRAMMING

*With the advent of time-shared computer services, even small plants can take advantage of big computers.*

Through teletypewriters in their plants, users of the nation's fourteen thousand numerically controlled machine tools can now call on the power of million-dollar computers for aid in programming.

This is made possible by time sharing, in which many users in different locations share the time—and cost—of a central computer. User and computer are linked by public telephone lines.

Pioneer in the time sharing concept is General Electric's Information Service Department, which has its headquarters in Bethesda, Md. GE time sharing service is locally available in sixty-one metropolitan areas and the District of Columbia. In many of these areas, users dial local telephone numbers to get remote computers without incurring long distance charges.

Time sharing gives NC parts programmers their own personal large computers. The teletypewriter units can be installed right at their desks. Because of the speed of modern large computers, there's no waiting for service. The programmer simply tells the computer his problem, through the keyboard of the teletypewriter, and the answer comes back in seconds.

Programs that used to take several days or even a working week of manual computations can now be carried from part drawing to machining tape in a couple of hours—and sometimes in just a couple of minutes.

Parts programmers don't have to become data processing experts to use the computer. NC time sharing employs a number of symbols and English-like words similar to those used in manual NC programming.

A series of computer programs has been developed by GE and is stored in the GE time sharing library. At the keyboard of the teletypewriter in his office, the programmer uses the GE

programs to describe and analyze part geometry, calculate X-Y coordinates, "format" data for specific machine tool controllers and direct the punching of EIA coded tape.

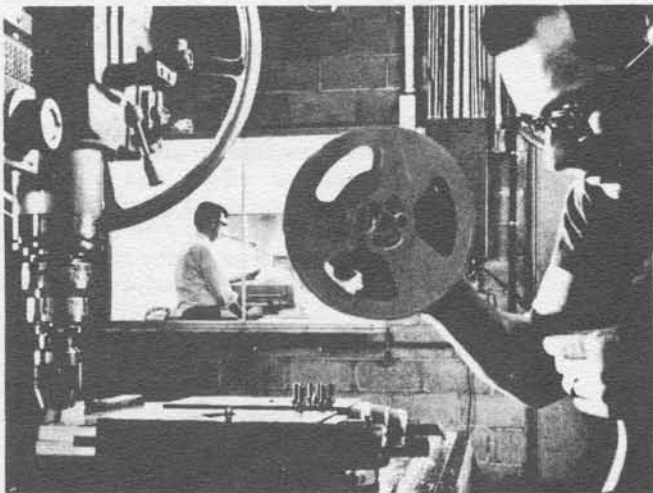
Having immediate access to the remote computer over a telephone line, the parts programmer can quickly correct any errors discovered in the tape after the machine has been set up for production, minimizing idle time and the need to tear down an expensive setup.

At present, GE time sharing services can be used to prepare control tapes for most two-axis and three-axis point-to-point numerically controlled machine tools. The service capability will be expanded with additional library programs for contouring operations such as diesinking.

Even today, the service can be used to prepare tapes for contouring operations on many two-axis point-to-point machines. Most firms are not taking advantage of this capability of their machine tools at present because man-



**TALKING TO A LARGE COMPUTER** located in another city, this parts programmer is able to prepare control tapes for NC machine tools in his plant in a few minutes. The computer is linked to the teletypewriter by telephone lines. The time sharing service is from General Electric.



**POINT-TO-POINT** machine is controlled by a punched tape produced by a computer. Parts programmer, seen through window, can talk with a remote large computer through a teletypewriter, produce a new tape in minutes if production trials show that a change is needed.



ual programming is too complex. With time shared computer programming, contouring on suitable point-to-point machines presents no programming problems.

In addition to using the GE programs, the user can write his own programs and store them in the system. These are not available to other users of the service.

Three GE programs are used for parts programming. The first, NCPTS, is used to describe the geometry of the piece to be machined in terms of points, lines and circles in reference to a common coordinate system. The computer does the geometry calculations in seconds and sets up a list of X-Y coordinate pairs, which is stored in the system as a point coordinate file.

A second program, NCPPP, is used to prepare the actual control tape format for a specific machine tool and numerical control combination. The format is based on data stored in the point coordinate file, instructions which direct the tool through the machining operation, and a description of the machine tool.

The third program, NCEIA, converts the control tape format into EIA code and directs the punching of a master control tape at the teletypewriter terminal.

GE time sharing service is available from 8:00 a.m. to midnight, five days a week at all locations and is available around the clock in some areas.

Present user fees are \$10 per hour of terminal time (time the terminal is in use) and 4 cents per second of computer time. Teletypewriter rental from the local telephone company is from \$80 to \$150 per month, depending on the model, and is billed directly to the user. Telephone line charges where there is no local time sharing service number are based on the distance from the service area.

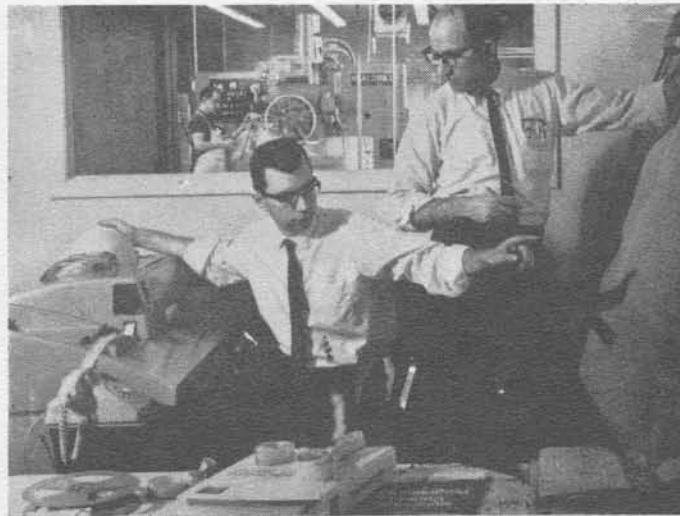
Savings in programming time and the elimination of errors common to manual programming can make the payoff in time sharing a big one.

The time sharing service is not limited to NC programming. Time sharing can also be used to solve engineering and scientific problems, to do mathematical and statistical analysis, to calculate economic order quantities, to help plan make-or-buy decisions, to estimate shop costs and to aid in project planning. ▲▲

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## PRODUCTION EQUIPMENT

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### Commercial time-sharing of computer service

From a teletypewriter in their office, NC programmers at Numerical Cutting, Inc., a custom subcontract parts manufacturer in Elma, N.Y., use over telephone line the computational power and speed of a distant General Electric computer system to prepare EIA coded tapes for the firm's NC machine tools. The use of this service has enabled the firm to obtain, in 1½ hours, a tape for a contouring operation which would require 45 man-hours to prepare using manual methods.

GE time-sharing, reported used by more than 50,000 people for a variety of technical and management computational tasks, is a technique people in scattered locations to obtain immediate solutions to problems almost simultaneously. GE spokesmen say parts programmers do not have to be data processing experts, have prior computer experience or learn new programming language. To sum it up, they say, "Time-sharing adds a new dimension to machine tool utilization."

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# Modern Machine Shop

## Scanning the Metalworking Horizon

### Computer Time Sharing Aids NC Tool Use

General Electric has expanded its commercial time-sharing computer service thus enabling manufacturers to prepare coded tapes for numerically controlled machine tools in a fraction of the time required by manual methods.

Through teletypewriter terminals in their plants, users of the nation's 14,000 numerically controlled machine tools may call over telephone lines on the computational power of a nationwide chain of modern computers to create accurate, economical tapes in minimal time.

Using the new capabilities of GE time-sharing service, parts programmers or other manufacturing specialists can now go directly from engineering drawings to read-to-run tapes in a few hours or less.

The hours saved should permit concentration on the more creative, profit-producing aspects of manufacturing such as improved machining techniques, better machine utilization, and work flow problems.

The service is available now nationwide through computer time-sharing service centers operated by GE in major metropolitan areas.

GE time-sharing, used by more than 50,000 people for a variety of technical and management computational tasks, is a technique permitting people at scattered locations to obtain immediate solutions to problems from a distant computer almost simultaneously. The computer, linked by ordinary telephone lines to an office teletypewriter, operates so fast it appears to be servicing all users in the same split-second.

Parts programmers do not have to become data processing experts, have prior computer experience, or learn new programming languages to use the GE service. N/C time-sharing employs a number of symbols and English-like words, similar to those used in manual numeri-

cal control programming.

A series of work-saving computer programs also has been developed and is stored in the GE time-sharing library. At the typewriter-like keyboard of the terminal in his office, the parts programmer uses the GE library programs to describe and analyze part geometry, calculate X-Y coordinates, format data for specific machine tool controllers, and direct the punching of EIA coded tape at the terminal.

Having immediate access to the remote GE computer over a telephone line, the parts programmer can quickly correct any errors discovered in the tape after the machine tool is set up for production, thus minimizing machine idle time and the need to tear down an expensive setup.

At present it can be readily used to prepare control tapes for most two- and three-axes point-to-point

numerical control machine tools. The service capability will be expanded with additional library programs now being developed for contouring, milling machines, and lathes.

Using the GE service, Numerical Cutting, Inc., a custom, sub-contract parts manufacturer in the Buffalo, N. Y., suburb of Elma, was able to prepare a tape in 1½ hours for a particular contouring operation which would have required more than 1400 individual calculations and 45 man-hours to obtain by manual methods. The firm is also considering the service for production analysis and marketing studies.

Additional details regarding the GE Time-Sharing Service may be obtained from General Electric, Information Service Department, 7735 Old Georgetown Road, Bethesda, Maryland 20014.

For more data circle 181 on Postpaid Card



From a teletypewriter in their office, numerical control programmers, R. Jackson (left) and J. Putnam, at Numerical Cutting, Inc., use over tele-

phone line, the computational power and speed of a distant General Electric computer system to prepare EIA coded tapes for the firm's NC machine tools.



