

**The
comprehensive
Qantel**

1400 Series

The Qantel Story

A very simple business philosophy has been responsible for the growth of Qantel. It's called commitment. Since our inception in 1969, Qantel has committed its entire corporate energies to the research, design, development, manufacture, marketing and service of small business computers. That's our only business, and we bring to it a whole new dimension of mini-based computer technology. For openers, Qantel pioneered the modularity concept in the mini-computer industry. As a result of this effort, a company can grow from one Qantel computer to the next succeeding system without obsoleting their hardware investment, programming investment, and the investment made in training personnel or in changing business procedures.

But, hardware is only a part of the package; software is what makes the computer perform your job. And software requires commitment, too. Computers speak a different language from the businessman, so Qantel offers a "common sense" approach toward software development that makes its computers easy to talk to. In short, Qantel puts computers to work for you. We've been responsible for many industry innovations, and we'll continue to innovate in the future. Qantel remains committed to the modular small business computer, and that commitment has enabled us to produce the first and last computer your company will ever need!

Comprehensive software

Qantel specialists pioneered the field of software for small and medium-sized business computers. Their "common sense" approach to the computer problems of small businesses has resulted in a varied but comprehensive set of software development tools, suitable for use by both the computer expert and the businessman.

- Qantel's BEST operating system provides both the sophistication needed to support complex business and data storage systems, and the simplicity that enables interactive use by even an unskilled operator.
- Qantel's QICBASIC is an English-derivative, high-level programming language, specially designed to permit easy development of complex, interactive business applications.
- Qantel's SOLUTIONS is a series of off-the-shelf, turnkey business applications for order processing, inventory control and accounting, developed by Qantel for the purpose of shortening the systems design and installation cycle for first-time users.
- Qantel's REPORT GENERATOR is a simple, but effective, instrument that permits interactive inquiry and instant report printing using any elements of data in a system's database.
- Qantel's PROGRAM GENERATOR eases the burden on the system designer and programmer by unerringly performing many of the repetitive tasks normally required in application programming, thus greatly reducing the time and cost of writing and testing applications programs.

BEST—sophisticated operating software

Most computers are hard to talk to. That explains why programmers have difficulty telling the computer how to perform a particular function and, why operators have difficulty performing complex data entry procedures.

BEST (Business Executive System for Timesharing) is an operating system designed to overcome such problems, and to make Qantel computers easy to talk to.

BEST is a multi-user operating system. Under BEST, each user has an interactive terminal and a dedicated memory partition. An individual user can execute either a unique process, or program, or the same process as one or more other users. Either way, there is no system conflict. User programs can gain private access to any available peripheral device, but for disc input/output, multiple users can read and write in the same file concurrently without conflicts, even when updating the same record.

Dynamic storage allocation is one example of BEST's outstanding file management capabilities. When a file is created, BEST assigns a small disc area for its data. As records are added to the file, the file expands automatically; and when records are deleted, unused disc area is returned to a pool so that it can be reused. This dynamic storage allocation relieves the programmer of the tedious task of mapping and remapping disc storage areas to accommodate changing requirements of the user. BEST is an "all-purpose" operating system. It gives the operator easy access to applications programs,

yet it still provides all necessary support to the skilled programmer developing complex software. It provides full support for programming in a simplified, high-level, business-oriented programming language, QICBASIC, but it also provides use of a lower-level language, REAL (RElocatable Assembler Language) to satisfy extremely specialized and complex requirements that might exist.

QICBASIC—a business programming language

QICBASIC is Qantel's popular language for developing interactive, business-oriented, programs. It is similar in concept and command structure to Dartmouth BASIC, but has more sophisticated file handling and printing capabilities because it was developed by Qantel specifically for business applications.

The QIC prefix to QICBASIC means Qantel Interactive Code. Most business applications involve a high level of interaction between operators and data files, and on many minicomputer-based systems, such a high level of interaction between operators and data files produces a serious increase in the time it takes the system to respond to an operator's input. But Qantel's unique terminal and operating software architecture has unusually high throughput capabilities. The high throughput is achieved by using a microprocessor in an operator's Video Terminal. The "smart" terminal, in combination with QICBASIC programming techniques and Qantel's sophisticated BEST operating system, enables an application program to accept large numbers of input variables from a terminal

with a single command. This minimizes interruptions of the main processor in a multi-terminal system. And the "smart" terminal itself accomplishes a large part of the data validation job that must be done in most systems with in-line code, thus adding further to throughput capabilities.

QICBASIC makes the job of program development an easier one. Program modules that are required in several programs, such as data file specifications, input/output formats and complex processing routines, need be prepared only once, then reused in all necessary places by a simple one-line reference. QICBASIC allows the use of meaningful eight-character names for all data elements, and permits unlimited source program documentation, both without penalty with regard to the size of the final program.

QICBASIC source programs are translated into efficient machine-usable programs by the QICBASIC compiler. Once compiled, programs run efficiently and require a minimum amount of main memory, thus providing savings of both time and money.

Thus, QICBASIC is not only an efficient language at run-time, it is an extremely efficient language at program-development time. And a comprehensive library of utilities are available to support the generation and maintenance of QICBASIC programs.

**SOLUTIONS—a turn-key
business system**

A series of Qantel developed and fully supported applications program modules is available for installation on an as-is basis, or they can be modified to meet specific user needs. The series of SOLUTION programs include the following application modules:

- Order Entry
- Purchase Orders
- Payroll
- Inventory Management
- Sales Statistics
- Accounts Receivable
- Invoicing
- Accounts Payable
- General Ledger

**REPORT GENERATOR—
a conversational
inquiry language**

To give users of Qantel equipment an opportunity to use their system's data base more fully, Qantel provides an interactive REPORT GENERATOR. It can be used by businessmen who have little or no programming experience. Through a simple question-and-answer dialogue, the user specifies the report requirements:

- The data file to be used
- The information elements within the file to be printed
- The criteria with which to select items for printing
- The order in which to print the items
- The items which contribute to report totals
- The report title

The REPORT GENERATOR automatically translates these requirements into a program that prints the required report whenever it is needed.

**PROGRAM GENERATOR—
more for less**

Qantel's PROGRAM GENERATOR is a major innovation in the development of applications software for the small business computer. It relieves both the systems designer and programmer from hours of repetitive steps that are otherwise a normal part of any computer installation.

First, the systems designer is led through a simple series of steps to create the overview of the system. Then, as each basic element of the system design is defined in more detail, the PROGRAM GENERATOR automatically, and unerringly generates complete QICBASIC programs to perform the task.

With automatic program generation, there is less opportunity for programmer induced errors, thereby reducing the time required for writing and testing programs. For many applications, the programming task can be reduced by a factor of ten.

The total effect of the PROGRAM GENERATOR's use is a shortened software implementation period, improved program quality, a higher degree of program consistency, self-documentation, and a greater ease of future modification.

**COMPATIBILITY—
a total commitment**

Qantel is constantly advancing its software in the same way that it is constantly advancing its hardware —always providing customers with the greatest computing power per dollar. And, all of the software and hardware advances are done with integrity to the users as the foremost objective. The result: programs written for one Qantel computer do not have to be discarded and rewritten when the user upgrades to a more powerful Qantel computer. All program development software, all system software, and all applications software can be used on any Qantel computer system.

Comprehensive hardware

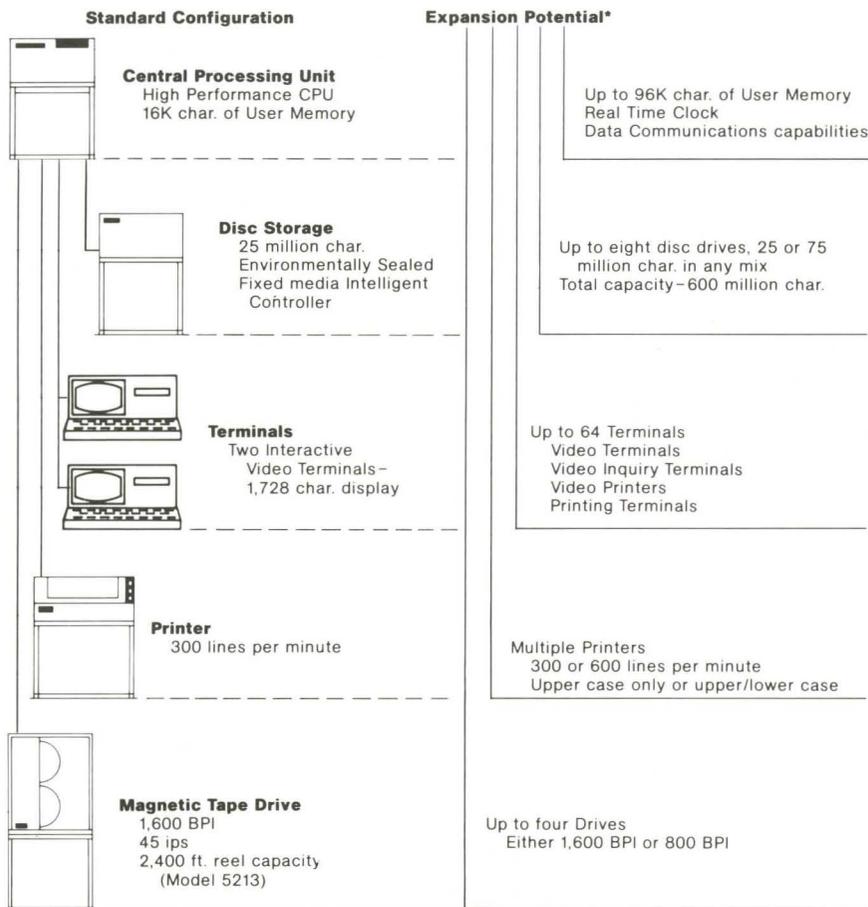
In its basic configuration, the 1400 Series handles all of the computing requirements of small to medium-sized businesses. It can also function as a stand-alone host, or satellite processor in a distributed computing network. The hardware capabilities of the System 1400-2 include:

- a high-speed central processing unit; specially designed to support business data processing functions.
- 16,384 (16K) characters of "user-dedicated" main memory, along with sufficient "system-dedicated" main memory for a sophisticated, resident operating system.
- 2 video terminals for interactive

data entry, inquiry and programming.

- a sealed, fixed media, random access disc drive with a storage capacity of 25 million characters.
- a line printer with a rated speed of 300 full lines per minute.
- a large reel, 45 inches-per-second, magnetic tape unit, providing data security, transaction logging, and the ability to transfer data to other computer systems via tape-reel exchange.
- built-in expansion space to accommodate additional plug-in main memory and input/output devices.

The performance characteristics of these devices are summarized on the last page of this brochure.



*Maximum system configuration of memory capacity and peripheral devices is determined by available input/output channels, power requirements and operating software configuration. In some cases, configuration may differ from maximum expansion specifications for each peripheral device.



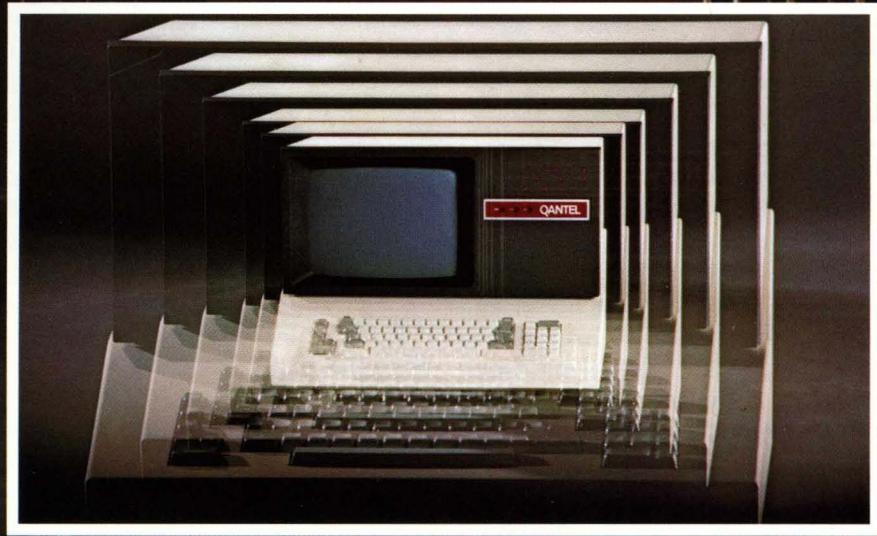
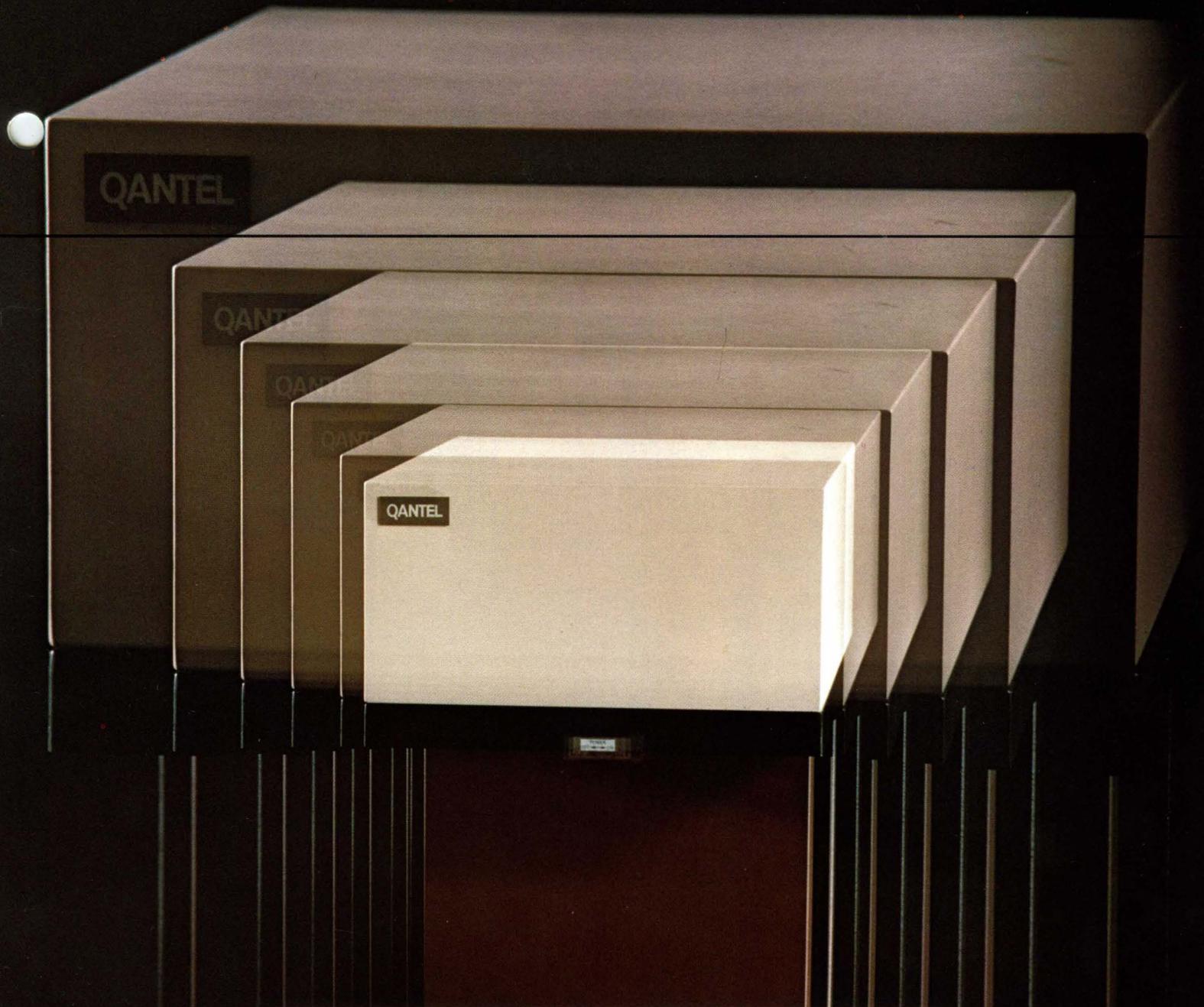
Expandable hardware

The basic configuration is only a beginning. The 1400 Series gives you plenty of room for growth.

- user memory expansion...From the standard 16K characters, System 1400-2 can be expanded to 96K characters in 8K character increments.
- terminal expansion...Up to 16 video terminals can be accommodated by each terminal controller, and by adding terminal controllers, the 1400 Series can support up to 64 video terminals. The practical number of video terminals supportable by any System 1400 depends on the application software in use, the volume of data to be processed, and response-time requirements. Where the "soft" characteristics of a video terminal do not satisfy specific application requirements, the "hard-copy" printing terminal, which outputs at 45 characters per second, provides an attractive alternative.
- disc capacity expansion...The disc controller in the System 1400-2 supports up to four disc drive units, including both the standard 25 million character version and the high-capacity 75 million character version. The drives can be intermixed on a single controller, in any desired combination. If more disc capacity is needed, just add a second controller. Total capacity: 600 million characters!
- print capacity expansion...If 300 lines per minute does not satisfy your printing requirements, then replace the standard printer with a printer that outputs at 600 lines per minute. Or, if versatility is a primary requirement, add a

second printer of either type. And, for yet greater versatility, both printers are available with combination upper/lower case character sets at slightly reduced speeds.

- magnetic tape unit expansion... Each magnetic tape controller supports up to four magnetic tape drive units. Although 1600 bits-per-inch (BPI) recording density is standard on the System 1400-2, 800 BPI recording density is also available where there is a requirement for compatibility with existing recorded data.



Advanced technology disc storage

Fixed media, environmentally sealed

Qantel's technology leadership is exemplified by the use of an advanced type of disc drive being supplied with the System 1400. The advanced drive uses a fixed media, environmentally sealed disc with a capacity of either 25 million or 75 million characters of storage. Using sealed-drive technology, the disc recording surfaces, read/write heads, and head positioning mechanism are manufactured as a complete, airtight unit. This technique eliminates potential alignment problems normally associated with removable discs.

Because the drive mechanism is sealed, it is not exposed to dust, and it cannot be subjected to improper handling by operators—the two factors most commonly responsible for disc reliability problems. The disc drive uses low-inertia read/write heads, and has a rated Mean-Time-Between-Failures of 25,000 hours—more than ten times the ratings of conventional disc drives using removable discs. This means that the System 1400 will work reliably in some environments that are too harsh for other systems. The sealed-drive technique not only ensures reliability, but also provides more disc capacity in a much smaller equipment enclosure. The 75 million character drive is contained in a cabinet no larger than used for preceding models with less capacity. The disc drives are permanently mounted in System 1400 cabinetry to ensure maximum reliability. Low-cost file protection is achieved using magnetic tape. Disc copy time is approximately 15 seconds per million

characters. The higher capacity and greater reliability are achieved at no loss in data access speed. Track-to-track and average seek times are 10 milliseconds and 30 milliseconds, respectively. Average access time, including rotational delay, is 40 milliseconds.

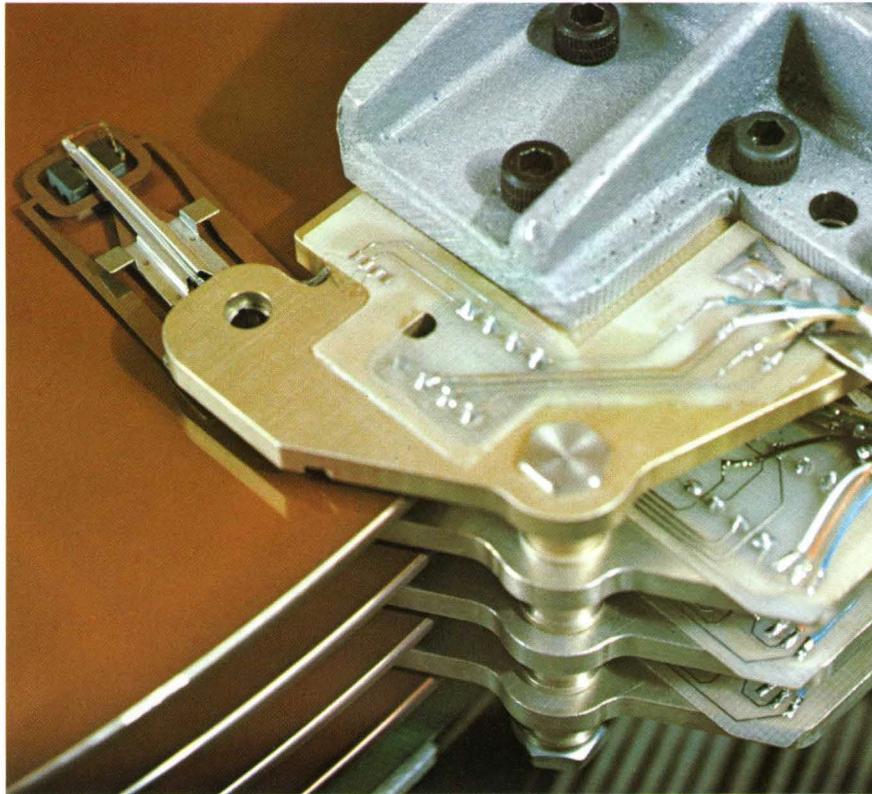
System 1400's standard disc storage drive has a capacity of 25 million characters. The 75 million character capacity is optional, as are additional drives in either capacity.

Intelligent disc controller

Not only does the 1400 Series provide more disc capacity than other systems in its price range, it provides more throughput as well. Even in earlier systems from Qantel, most of the input/output and communications burdens were removed from the main processor by using microprocessors within video terminals and in most peripheral devices as well as communications controllers. Qantel has extended this design philosophy to its new disc storage subsystem by using a microprocessor in the associated disc controller.

This "intelligent" disc controller handles much of the housekeeping work associated with data storage and retrieval—such as the automatic detection and marking of bad disc sectors, and the substitution of good sectors from a reserve pool.

Just as importantly, the intelligent disc controller includes 16,384



(16K) characters of local memory. Within this local memory area, the microprocessor stores and manages a dynamic stack of the fifteen most recently used disc sectors. The nature of database utilization and the characteristics of the BEST file management subsystem are such that much of the data stored on disc is used repetitively. With the intelligent disc controller, the data needed to satisfy a user program request is frequently available in the "sector stack" as a result of prior use, so the data can be supplied to the user without physical disc access. And since the user program disc access requests are frequently satisfied without physical disc access, most disc oriented jobs will show measurable throughput improvement.

Each disc controller accommodates up to four disc drives, and processes data requests independently so that seeking can occur simultaneously on all four drives. This feature can cut as much as 75% from the comparable time required to retrieve data from a four-drive system using a conventional disc controller.

The high performance features of the new sealed, fixed-media disc drive and the intelligent disc controller can be achieved using programs written earlier for other models of Qantel equipment. This upward compatibility derives from Qantel's long-standing policy of providing for expansion without reprogramming penalties—making a Qantel computer the first and last computer you'll ever need.

Peripheral equipment for Qantel's comprehensive equipment series

Terminals

A. Model 4011 Video Terminal

Character Set	96-character ASCII (upper and lower case) plus an internal, blinking cursor symbol
Character Display Capacity	1728 characters, 64 characters per line. 27 lines
Character Structure	7 x 9 dot matrix on a standard 525-line TV raster
Data Transfer Method	Direct Memory Access (cycle steal)
Data Transfer Rate	Up to 960 characters per second
Data Formatting	Positive (green on black) display for variable data; Negative (black on green) display for fixed data

B. Model 4321 Video Printer

Interface	Directly to Video Terminal or Video Inquiry Terminal; not under processor control
Printing Speed	45 characters per second (average)
Character Set	96 character ASCII
Horizontal Spacing	10 or 12 characters per inch (program controlled)
Vertical Spacing	6 or 8 lines per inch (program controlled)
Copies	Original plus up to five copies (or more, depending on form construction)
Print Line	13.2 inches

C. Model 4301 Printing Terminal

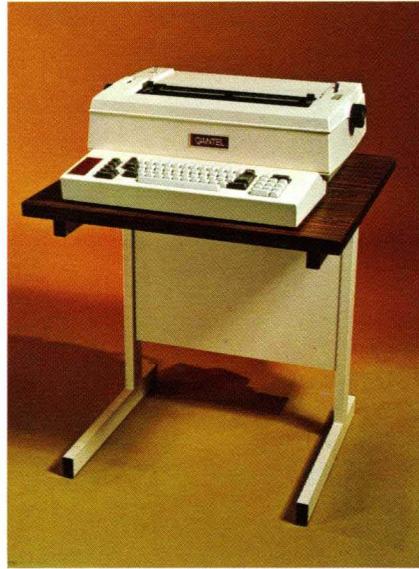
Horizontal Spacing	10 or 12 characters per inch (program controlled)
Vertical Spacing	6 or 8 lines per inch (program controlled)
Copies	Original plus up to five copies (or more, depending on form construction)
Print Line	13.2 inches



A.



B.

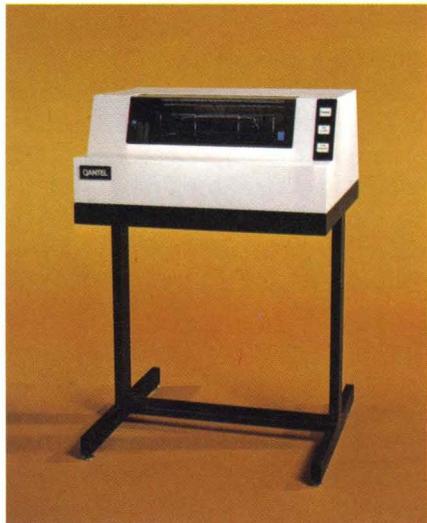


C.

Printers

A. Model 5061 Line Printer	
Model 5062 Line Printer	
Printer Speed	Model 5061; 300 lines per minute Model 5062; 220 lines per minute
Character Set	Model 5061; 64 character ASCII Model 5062; 96 character ASCII (upper and lower case)
Character Spacing	10 characters per inch, 132 characters per line
Line Spacing	6 lines per inch
Paper	14 ⁷ / ₈ inch width (maximum) Pin feed continuous fan fold forms
Copies	Original plus five
B. Model 5051 Line Printer	
Model 5052 Line Printer	
Printer Speed	Model 5051; 600 lines per minute Model 5052; 420 lines per minute
Character Set	Model 5051; 64 character ASCII Model 5052; 96 character ASCII (upper and lower case)
Character Spacing	10 characters per inch, 136 characters per line
Line Spacing	6 or 8 lines per inch (operator selectable)
Paper	16 ³ / ₄ inch width (maximum) Pin feed continuous fan fold forms
Copies	Original plus five

A.



B.

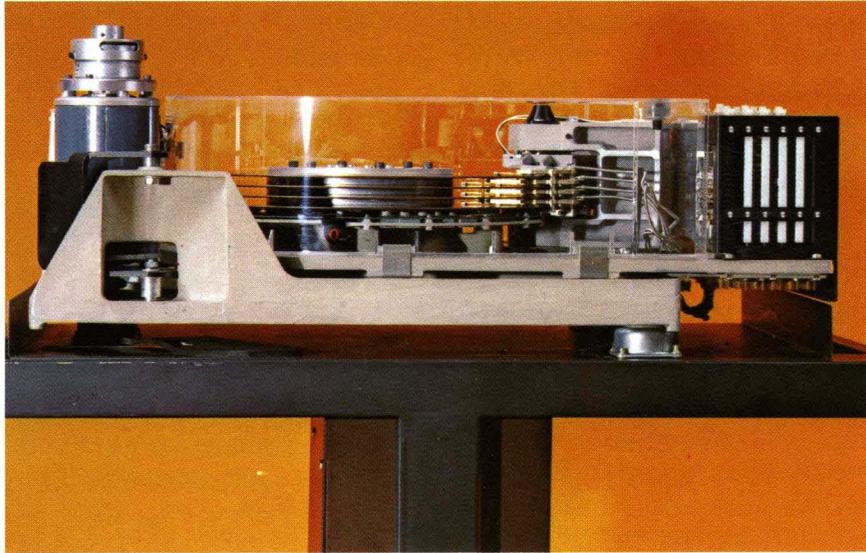


Disc storage

Model 3401 Disc Storage Drive

Model 3421 Disc Storage Drive

	<u>Model 3401</u>	<u>Model 3421</u>
Capacity (million characters)	25	75
Recording surfaces	2	6
Recording heads per surface	2	2
Tracks per surface	700	700
Tracks per inch	300	300
Recording density (average bits per inch)	5640	5640
Rotational speed (RPM)	2964	2964
Average latency (milliseconds)	10	10
Maximum latency (milliseconds)	20	20
Average seek (milliseconds)	30	30
Maximum seek (milliseconds)	60	60
Data transfer rate (characters per second)	885,000	885,000



Magnetic tape units

A. Model 5213 Magnetic Tape Unit

Data Density	1600 BPI, nine-track
Recording Mode	Phase encoded
Tape Velocity	45 inches per second
Data Transfer Rate	72,000 characters per second
Reel Size, Capacity	10.5 inches maximum diameter, 2400 feet maximum capacity
Data Validation	Automatic read-after-write
Compatibility	Industry standard

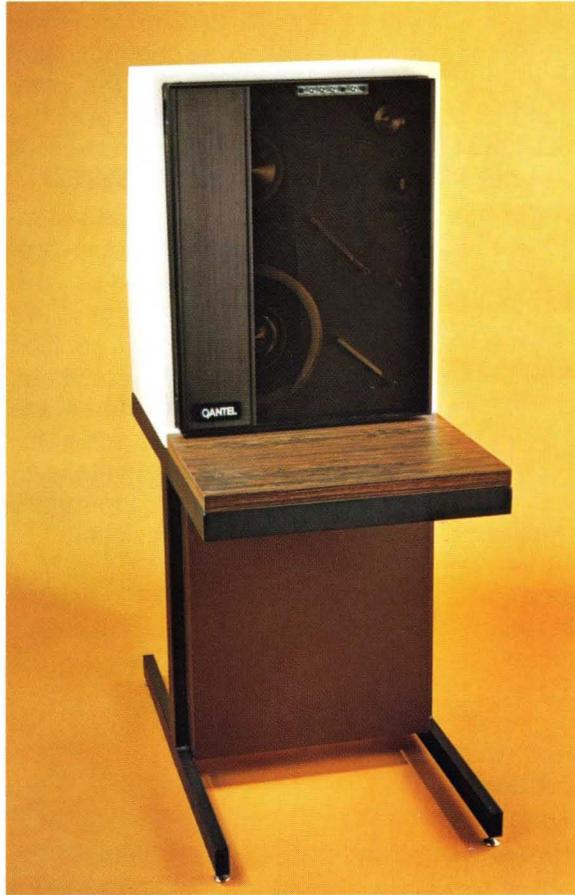
B. Model 5203 Magnetic Tape Unit

Data Density	800 BPI, nine-track
Recording Mode	NRZI
Tape Velocity	45 inches per second
Data Transfer Rate	36,000 characters per second
Reel Size, Capacity	10.5 inches maximum diameter, 2400 feet maximum capacity
Data Validation	Automatic read-after-write
Compatibility	Industry standard

Card reader

C. Model 5301 Card Reader

Card Type	80-column, Hollerith
Reading Speed	Up to 500 cards per minute
Read Mode	Serial by column, parallel by bit
Hopper/Stacker Capacity	450 cards each



A. B.
C.



Data communications

Sophisticated data communications controllers with transmission speeds up to 50 kilobaud, or in excess of five thousand characters per second, can be accommodated by the 1400 Series. Each communications controller contains a specially designed microprocessor, 2048 (2K) characters of local, dedicated, memory to store the complex line-handling micro-program routines, and 256 characters of memory usable by the line-handling program for working data storage.

The line-handling program, which is loaded into the communications controller from the main processor, determines the functional characteristics of the communications process. These characteristics include the communications discipline (synchronous or asynchronous), the transmission mode (half duplex or full duplex), the transmission speed, control code formats, and provision for automatic answering or dialing capabilities.

Thus, the program storage available in the communications controller is ample for performing many of the functions normally performed by software drivers in the main processor. For this reason, a major portion of the communication task can be removed from the main processor, and performed

instead by the communications controller. To further increase communication throughput, data is transferred between the communications controller and the main processor via the processor's direct memory access facility.

Qantel provides various communication programs for the main processor, along with related line-handling programs for the communications controllers. In addition to programs for Qantel-to-Qantel communications, programs are available that provide for communications between Qantel systems and most other computers or communications devices.

QANTEL

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