RCA SPECTRA▼70

SPECTRA 70 RCA/EDP SYSTEMS

▼ A Spectrum of "family" system elements…communications facilities, input/output peripherals and terminals, mass storage, and computers…for your growth from data processing to total information management in efficient stages. ▼ A Spectrum of multi-computer languages…data, programming, machine, and communications…conforming with industry-wide conventions to ease your systematic evolution. ▼ A Spectrum of advances …bringing you the economical workpower of the first full-scale systems with monolithic integrated circuitry…true third generation technology. ▼ A Spectrum of savings…through a favorable cost/performance index, job-for-job, as you phase into your total management system.

TOTAL INFORMATION MANAGEMENT OF THE NEXT DECADE

SPECTRA 70 ushers in an advanced EDP family for a practical, evolutionary approach to the long-sought integrated management system. It brings together all the elements for total information handling . . . advances anticipated for the next decade . . . which you can selectively employ for a smooth transition to your expanding data processing objectives.

Now you can gainfully begin your systematic solution of needs engendered by the vertical structure of business organization, and magnified by the increasing use of computers. You can tie together all your operating and administrative departments functionally. You can coordinate data flow so as to eliminate vertical departmental information bases with a redundancy of files . . . each reported on different time cycles, though essentially dealing with the same facts. You can evolve in efficient stages to a single information base, from which all corporate departments can operate with current data . . . then to your ultimate goal of a total integrated management system.

Orderly progress to the total management system, paying its way on a job-by-job basis, is one of the inherent strengths of Spectra 70. Instead of accommodating growth by adding more computers, or larger computers, you can replace an existing system with Spectra 70 and gain the benefits of its exceptional cost/performance.

Then you can proceed toward your goal at your own speed. You can select from a spectrum of communications facilities to add linkage with your remote locations for data flow . . . from a spectrum of mass storage to add instantaneous "real-time" accessibility of all your business facts . . . from a spectrum of new terminal and peripheral devices to extend your data capture and display . . . from a spectrum of computers for free-standing, satellite or terminal data handling, or to add scientific computation for management science and problem solving by your technical people. You can gain all the capabilities you need within your Spectra 70 system as you can use them profitably . . . with a single system logic structure.

SPECTRA 70

Multi-lingual adaptability is the key to this growth. Spectra 70 expands your system environment with a wealth of data languages, programming languages, computer languages, communications codes. There is language, data and program compatibility within the Spectra 70 family. There is technology for handling programs of the RCA 3301, 301 and 501, and other systems. Spectra 70 systems also offer data compatibility with the majority of computers currently installed or announced. Finally, the non-privileged instructions, formats and character codes of Spectra 70 are identical with the corresponding features in IBM's new System 360. This means that you can put your Spectra 70 system to work side-by-side with your other systems. You can gain a job-by-job economic justification. You can conserve your heavy programming investment. And you can readily augment your existing system with Spectra 70 specialties.

Third generation technology, featuring the industry's first monolithic integrated circuitry in full-scale systems . . . contributes to Spectra 70 low-cost operations. It is also a safeguard against obsolescence

. . . an assurance of systems longevity.

Multiple circuit functions are compressed into tiny unit components. This makes possible a new order of compactness and reliability . . . of internal operations and throughput geared to billionths-of-a-second speeds.

Cost reduction through technical evolution in Spectra 70 is passed on to the user. Never before have so much compute power, so much throughput, such extensive functional capability been available at so attractive a cost/performance index. And never before has there been such flexibility in use.

You are invited to assess Spectra 70 for your current and long-range needs . . . to evaluate the features described in this brochure . . . reinforced by RCA's reputation for systems support devoted to solving customer's problems . . . and by RCA's achievements in communications systems.
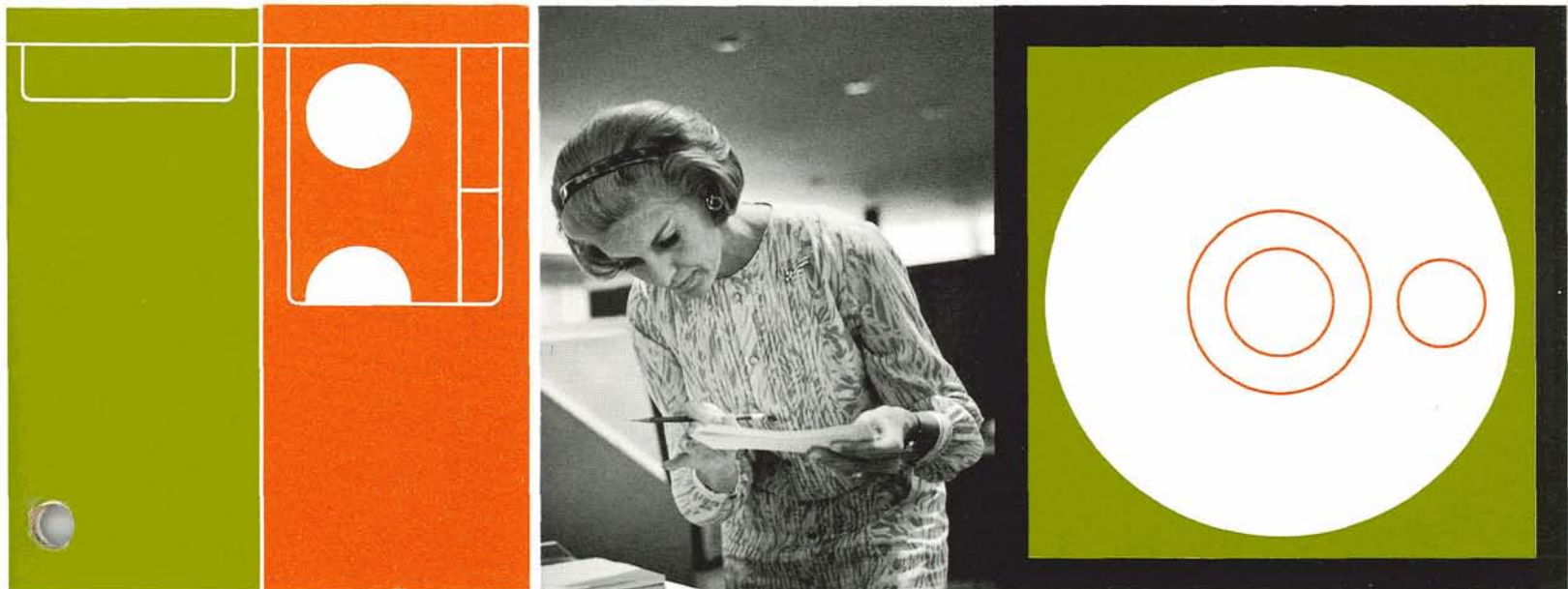
8 ADVANCED CONCEPTS for efficiency and utility

1/EXPANDABILITY—WITH EFFICIENCY

The Spectra 70 family essentially is compatible in data format and program operations, permitting open-ended interplay in function, processing capability and throughput capacity. Family capabilities will be extended through continuing additions to computer, communications, mass storage and terminal and peripheral lines. Communication between computers and the devices they operate is via multi-purpose data channels with a standard RCA I/O interface. This means that you can add functions . . . local or remote . . . whenever needed, or share the same peripheral devices among two or more computers.

2/INDUSTRY-WIDE COMPATIBILITY

Spectra 70 provides effective compatibility with other new computer systems using data organized in language units, called "bytes," of (1) eight-level alphanumeric characters or symbols, or two four-bit numerics, in EBCDIC Extended Binary Coded Decimal Interchange Code, (2) seven-level ASCII American Standard Code, and (3) eight-bit binary formats.

It will also be implemented with hardware/program and data compatibility with the most widely used RCA and non-RCA systems, so that you can employ its capabilities while conserving your substantial past investments in EDP.

3/SCIENTIFIC AND COMMERCIAL CAPABILITIES

Spectra 70 computers are basically binary machines, with extensive variability and complete interchangeability of data formats, and the potency of as many as 144 commands. Binary and floating point arithmetic of progressively increased power, with appropriate instruction sets, makes Spectra 70 equally powerful for both scientific and commercial data operations.

4/WIDEST CHOICE OF THROUGHPUT POWER

You can select your Spectra 70 system configuration with a range of computer memory speeds and capacities and work functions that will perform your operations at the most advantageous balance between the time and cost per job.

Complete memory cycle times range down to one of the fastest in use . . . 840 nanoseconds for 32 bits
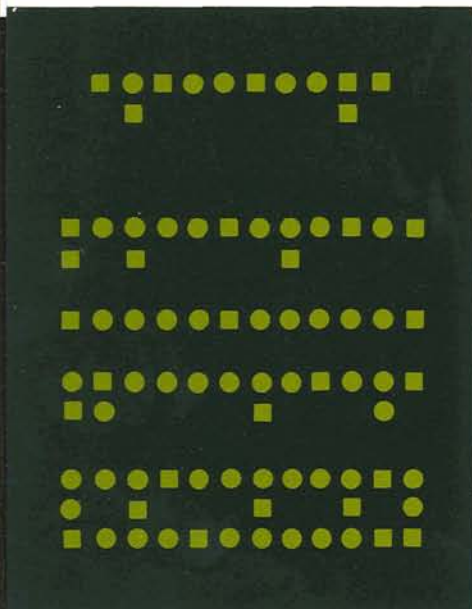
. . . four bytes.

Low-cost, plug-in memory modules let you increment memory economically as needed for program and work areas. Capacities are 4,096 to 524,288 bytes.

5/MULTI-PROCESSING CONTROL

An interrupt system with 32 priority levels, program execution queuing, optional safeguarded memory assignments and direct signalling between multiple computers implement hardware/software control of complex data handling operations. Unique RCA design makes Spectra 70 faster in reaction time than comparable systems. For example, four "processor states," each with its own set of registers, reduce switching time and control coding in a multi-program environment. Other computers generally have to store and restore data in the same set of registers.

6/SUPER-SPEED SCRATCHPAD MEMORY

Scratchpad memory with a complete cycle time of 300 nanoseconds permits an abundance of registers. They are used for processor working registers, and to implement the interrupt and executive systems,

thereby reducing the time taken by the latter. Additionally, they provide facility to buffer data transfers ranging up to millions of bits per second.

7/UP TO 14-WAY SIMULTANEITY

Simultaneous overlapping of input/output terminal and peripheral operations is possible up to the specific Spectra 70 computer's practical memory data rate. Eight multiplexor I/O trunks permit on-line operation of up to 256 slower I/O devices, and optional selector channels of up to as many as six high-speed devices, such as magnetic tape units, simultaneously. Additionally, buffered printers and card devices perform their mechanical operations independent of computer control, once their buffers are loaded.

8/SOFTWARE OPERATING SYSTEMS designed for
Spectra 70 will fully provide for your needs without overburdening you with a large software overhead. Additionally, they contain facilities to support a large variety of your applications with a minimum of operator intervention.

PROCESSOR STATE REGISTERS

REGISTER	PROCESSOR STATES			
	Processing	Interrupt Response	Interrupt Control	Machine Condition
Program Counter	1	1	1	1
General Purpose Registers	16	16	6	5
Floating-Point Registers	8	Floating-point instructions executed in these states use the floating-point registers of the processing state.		
Interrupt-Status Register	1	1	1	1
Interrupt-Mask Register	1	1	1	1

The highest evolution of solid-state technology today is attained by monolithic integrated electronic circuits used in the senior Spectra 70 computers, through size compression of functional elements. They make possible reduced cost and faster, more reliable performance.
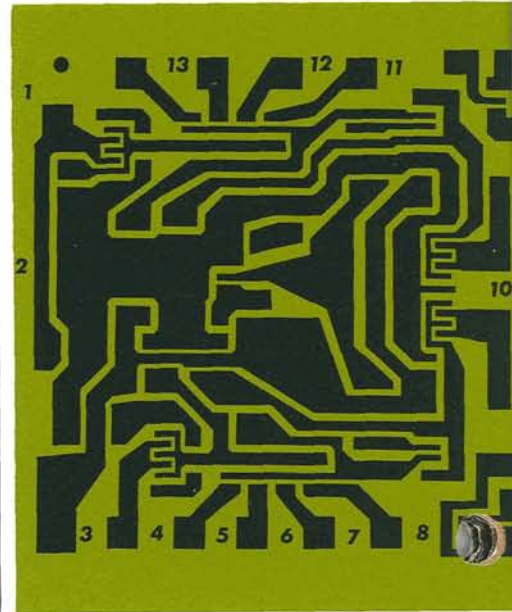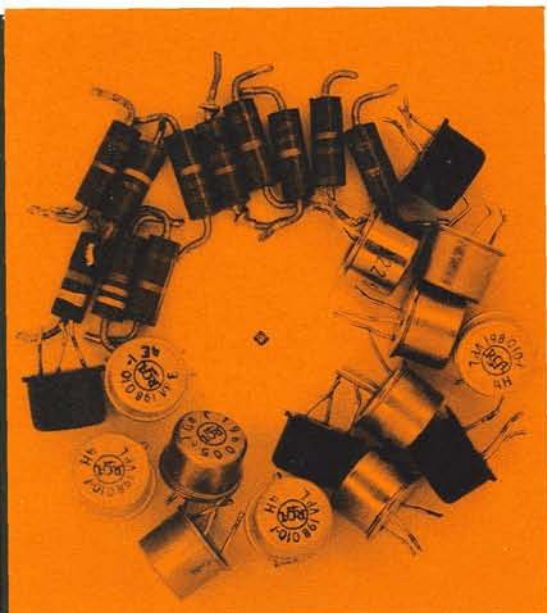
Just as RCA pioneered the first commercial fully transistorized EDP system with the 501, it is again ushering in a new generation of full-scale computers with the extensive monolithic integrated electronics in Spectra 70.

Integrated electronics are literally circuits on a speck. One of the integrated elements used incorporates 15 silicon transistors, 13 resistors and interconnecting "wiring" on about a 1/20 x 1/20 inch chip for two complete logic circuits.

In contrast, hybrid multiple chip circuits incorporate several active and passive components interconnected and mounted in a single housing.

Reliability features—Performance characteristics are controlled in manufacture to exacting specifications. Stability is assured by hermetic sealing of each monolithic integrated circuit. Finally, new backplane techniques are used for assembly, eliminating lengthy wiring and interwoven complex cables, which inherently slow up computer operations.

Multi-system languages—You can use Spectra 70 more readily . . . with more systems . . . because it speaks their languages . . . because it provides you with more language facility at work.

Spectra 70 linguistics include:

▼ Machine codes—Its native tongue is made up of eight-bit bytes, which can automatically become EBCDIC alphanumerics, two numerics, binary, or ASCII, the newly established standard language for communications media.

▼ Data languages . . . industry-compatible 8-level . . . BCD . . . punched card codes . . . and printing in RCA N-2 font for optical recognition.

▼ Problem-oriented languages . . . COBOL, FORTRAN . . . and work-saving symbolic languages—the Spectra 70 Assemblers, among others.

▼ Communications codes . . . 4-out-of-8, ASCII (and second level) . . . Mode 5 (DCA) . . . ACP Formatted Traffic . . . TWX . . . Fieldata . . . Teletypewriter.

Accept same instructions—In two family members, Systems 70/45 and 70/55, all non-privileged instructions, formats and character codes are identical with the corresponding features in IBM's System 360.

Yet, though they appear to be similar to the outside world when it comes to performing a specified job, internally the Spectra 70 systems are quite different, employing a uniquely individual logic, and exploiting a faster responsiveness which their special characteristics make possible.

Cuts conversion costs—Magnetic tape compatibility is another cost-saving Spectra 70 feature. This particularly applies to older non-RCA systems using the IBM 727, 729, and 7330 tape drives . . . so that you can conserve your master files.

The outstanding linguistic feat of Spectra 70 will help preserve the programming investment for your old system. Spectra 70 will be implemented to recognize and interpret their order codes, so that existing RCA 3301, 301 and 501 and the IBM 1401 series systems can be integrated into System 70/45, for example.
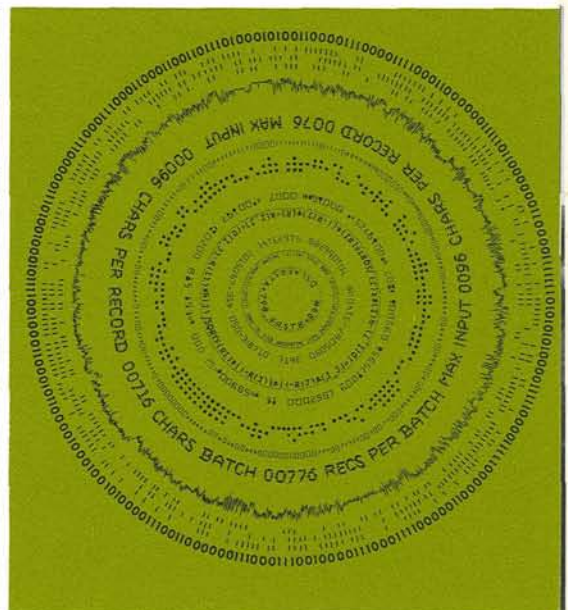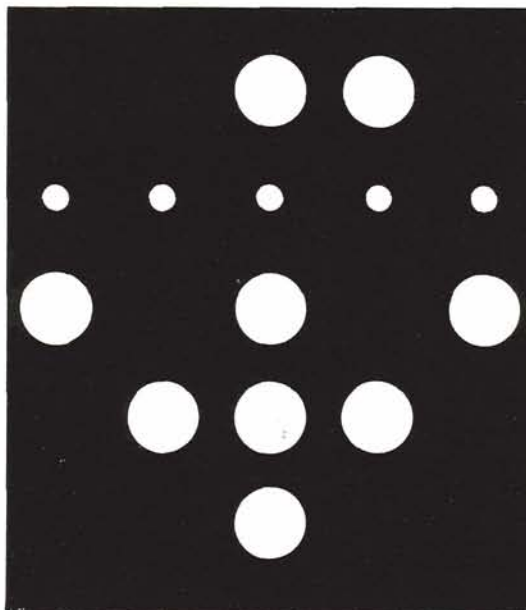
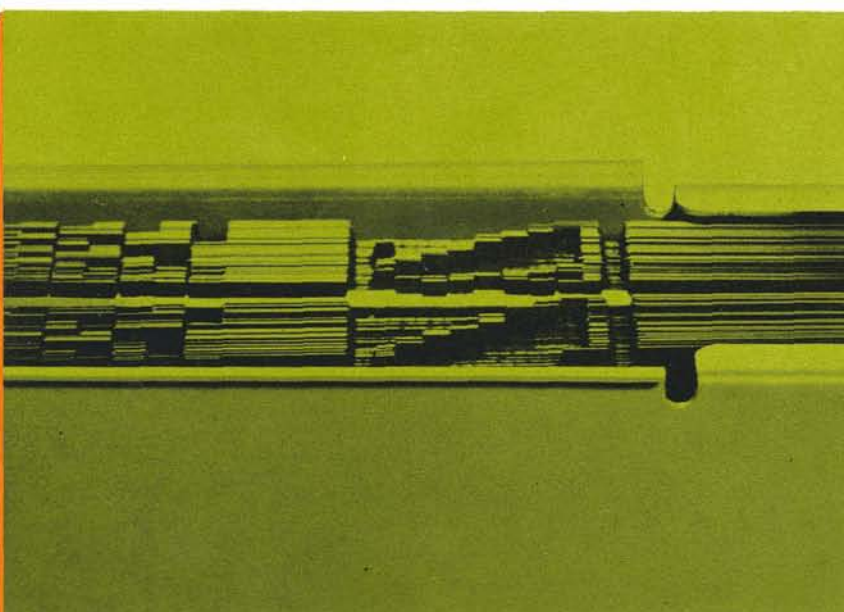## MASS STORAGE FOR YOUR DATA BASE lets you begin total system evolution...profitably

Building your data base is the starting point of your evolution to a total management system. It is facilitated by the variety of mass storage systems available for progressive centralization of all your files. Then your entire organization can operate with the same data within the same time reference . . . as you link your system with all your operating points. You gain better file maintenance. You save on redundancy of files, equipment and personnel.

Extending your Spectra 70 from file maintenance to a corporate-wide total information system is now feasible in easily managed steps. That's because family facility with multi-computer languages is combined with a compatible program logic structure encompassing all the necessary elements for a homogeneous integrated management system. You can grow in any direction . . . concentrate on profits-producing factors instead of on just processing routine operations . . . payroll, accounts receivable, etc.

A spectrum of storage includes three compatible magnetic tape systems and three random access systems.

▼ Magnetic tapes are available with transfer rates of 30,000, 60,000 or 120,000 EBCDIC or ASCII alphanumerics or twice as many digits per second. Optional versions can also handle industry-compatible seven-level codes. Up to 16 of any model can be operated by single and dual channel controllers. The latter make possible simultaneous read/read, read/write, and write/write to accelerate your data base operations.

▼ Fast access, densely packed drum memory units and large-capacity disc storage units speed intransit message storage, as well as call-in of operating system and working program segments. They contribute to more throughput in less time, as well as effecting economies in utilization of the main core memory. For more capacity, you can employ up to eight random access devices with each control elec-

MAGNETIC TAPE DATA TRANSFER RATES

0	30	60	90	120	150	180	210	240

bytes per second (thousands)

numbers per second (thousands)
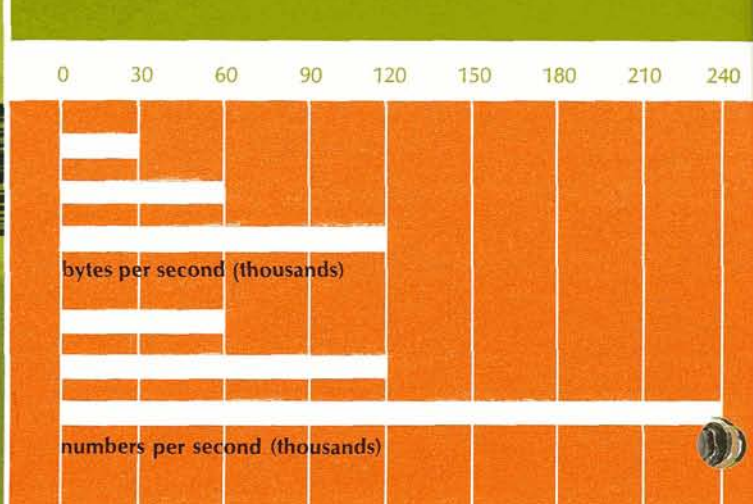
tronics, including the unique RCA 70/568 multi-billion character mass memory units. Drum memories are available in million-byte units . . . with an average access time of 8.3 milliseconds, and a transfer rate of 117,000 bytes/sec. Disc storage units each provide 7.25 million-byte capacity. Average access time is 85 ms., and data rate, 156,000 bytes/sec.

▼ The RCA 70/568 mass memory units provide a mass data base on-line of virtually any conceivable capacity requirement . . . with multi-billion bytes of storage per controller. It powers Spectra 70 for an immediate answer or action on any record on file, or for "one-pass" processing of all pertinent master records with the introduction of a transaction into the data system.
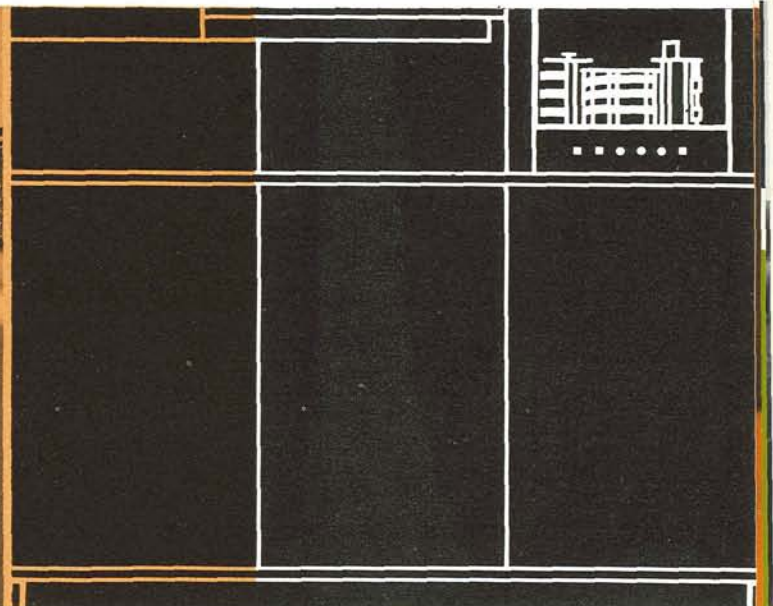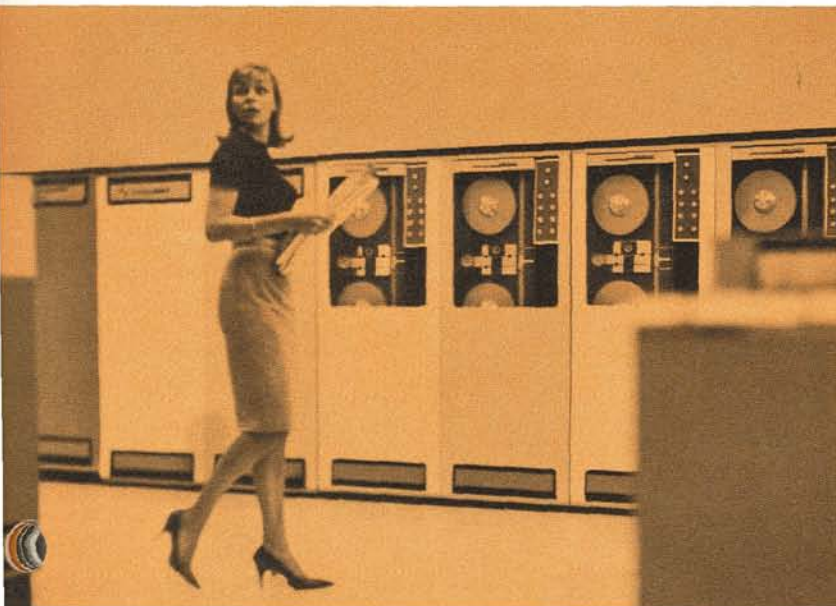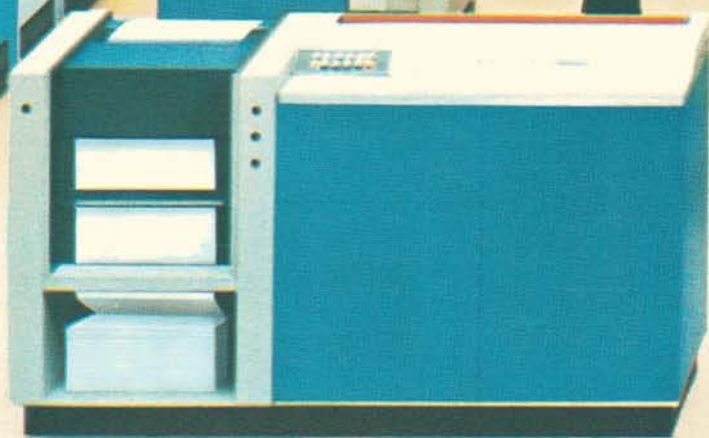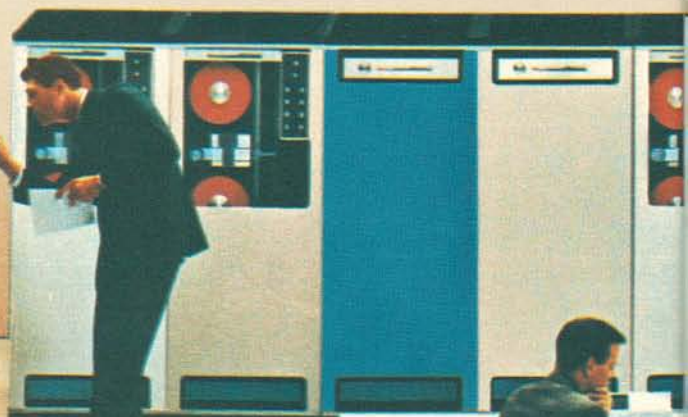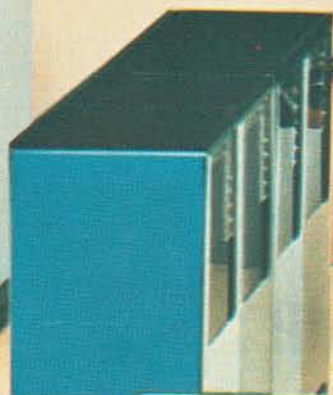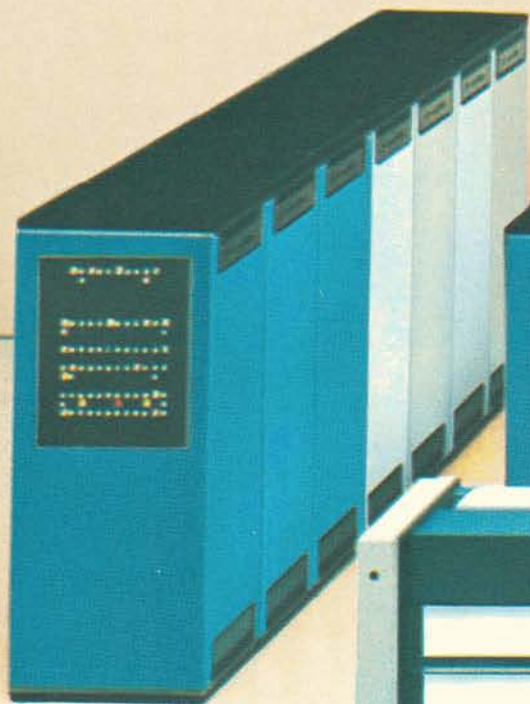
Real-time capability can be extended to existing systems by adding wide-ranging spectra of communications devices to the random access memories, and terminal and peripheral input/output facilities available in this new family. Existing unit record installations can readily be integrated for advanced Spectra 70 processing.

Communications facilities span the complete range of local and remote digital data transmissions . . . for the services most extensively used by business . . . at costs business can justify. They range from low-speed teleprinters to medium-speed video inquiry and display and high-speed memory-to-memory information interchange.

▼ Single-channel communications controls permit memory-to-memory communications between remote Spectra 70 computers and between Spectra 70 and RCA 301/3301 computers at data rates up to 5,100 bytes per second.

▼ Autodin buffers can be employed by users qualified for direct linkage to the global Automatic Digital Information Network.

▼ Multi-line networks can be serviced in groups of 16, 32 or 48 lines by a Communications Buffer Control, operated via the Communications Multiplexor Channel . . . up to 256 lines simultaneously.

▼ Data Exchange Control . . . one free-standing unit operated via the standard RCA I/O interface . . . provides memory-to-memory data communications between adjacent Spectra 70 computers.

▼ RCA EDGE electronic data gathering equipment can be linked for collection of operating information from scattered production points, warehouses, etc.

Message exchange traffic control concurrent with programs for other data handling operations, such as normal data processing, is provided by the unique
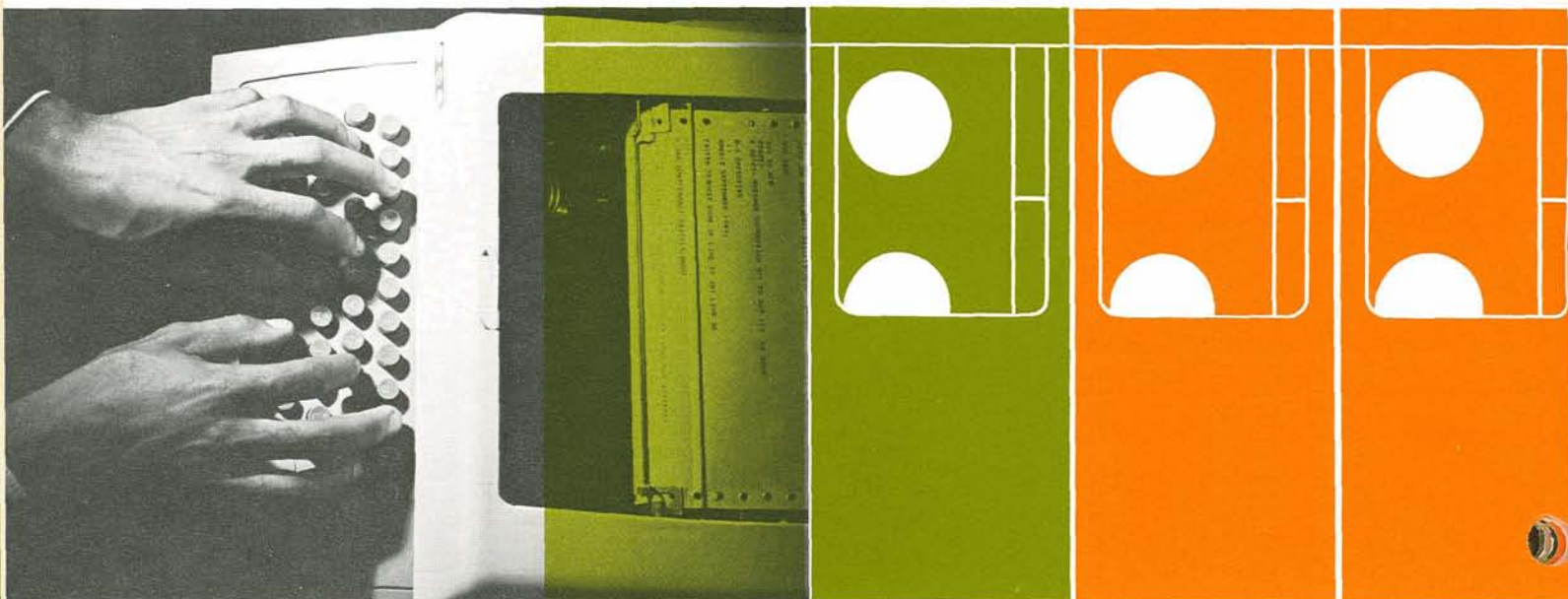
interrupt system embodied in each of the Spectra 70 processors. In general, the interrupt mechanisms make possible the priority handling of communications and "on-the-fly" error detection and recovery.

Your real-time team can be structured from the compatible processors, communications, terminal and peripheral I/O, and random access capabilities that you can select for your ultimate integrated management system. They will let you process information where and as required . . . answer needs where and when they arise . . . abstract and present pertinent facts to all who need to know in time for effective action while the event is still current.
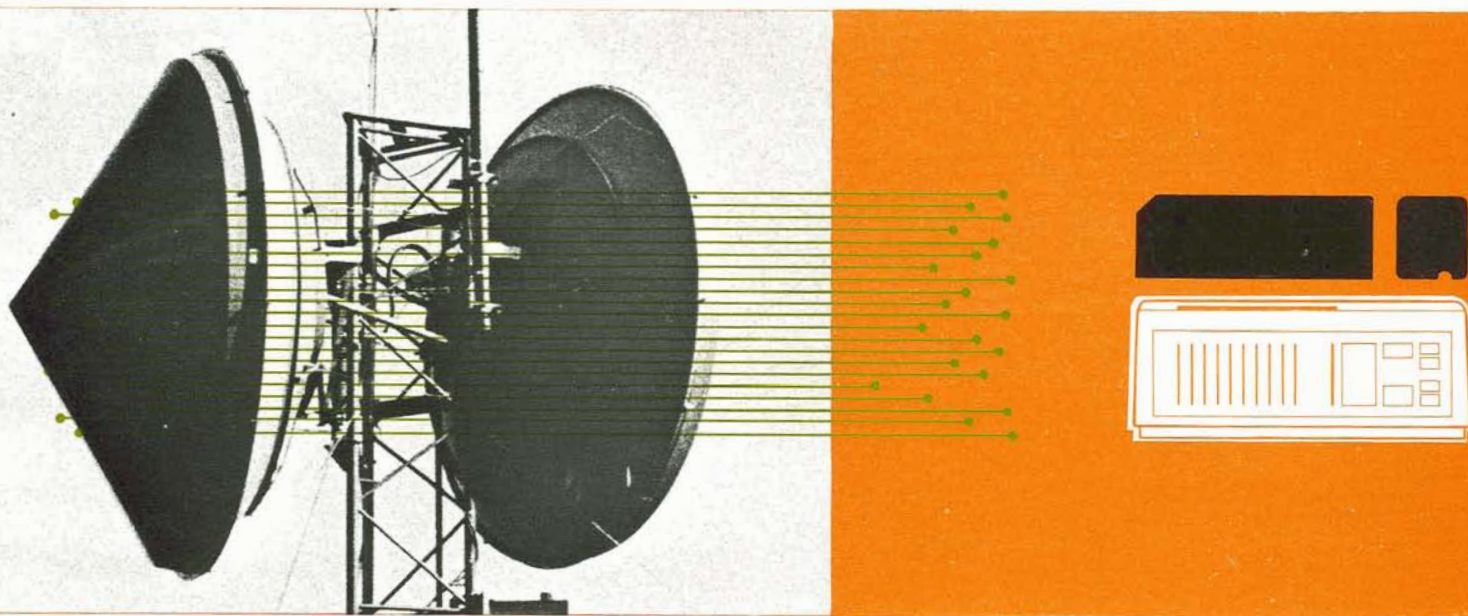
a spectrum of terminals and peripherals to SPAN YOUR WORK REQUIREMENTS

Multi-purpose versatility is one of the distinctive innovations in the many unique terminal and peripheral input/output devices you can select for your Spectra 70 system. In several instances, one input/output device can perform two or three different functions, saving the cost of separate single-function units and their adaptors. The roster includes:

1/ Videoscan optical character reader—it's the industry's first triple-purpose unit, combining OCR with mark sense and card read options. It can read up to 1,800 documents per minute continuously . . . up to 1,300 on demand. It can read printing and marks in the same pass. It can read holes in cards.

2/ Video data interrogators, comprised of keyboard and separable associated display, provide a valuable terminal facility for conventional communications lines. Up to eight interrogator units can be serviced by one interrogator control terminal per outside line, using as many as 16 pre-recorded formats, with up to 480-character display. Transmission rate is up to 180 c.p.s.

3/ A spectrum of punched card devices provides a range of card reading speeds up to 1,435 c.p.m., combines card reading with mark reading, and offers buffered card punching at several speeds up to 300 c.p.m. with optional read/punch.

4/ Paper tape reader/punch—5, 7, 8-level; optional 6-level advanced sprocket hole—reading 200 c.p.s., punching 100 c.p.s., with a direct EBCDIC translation feature.
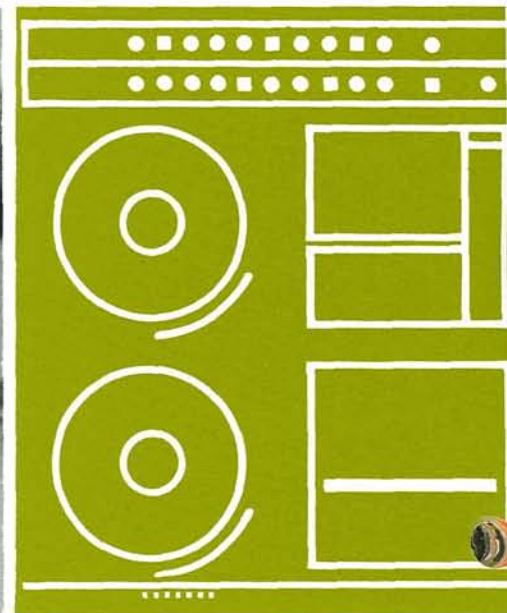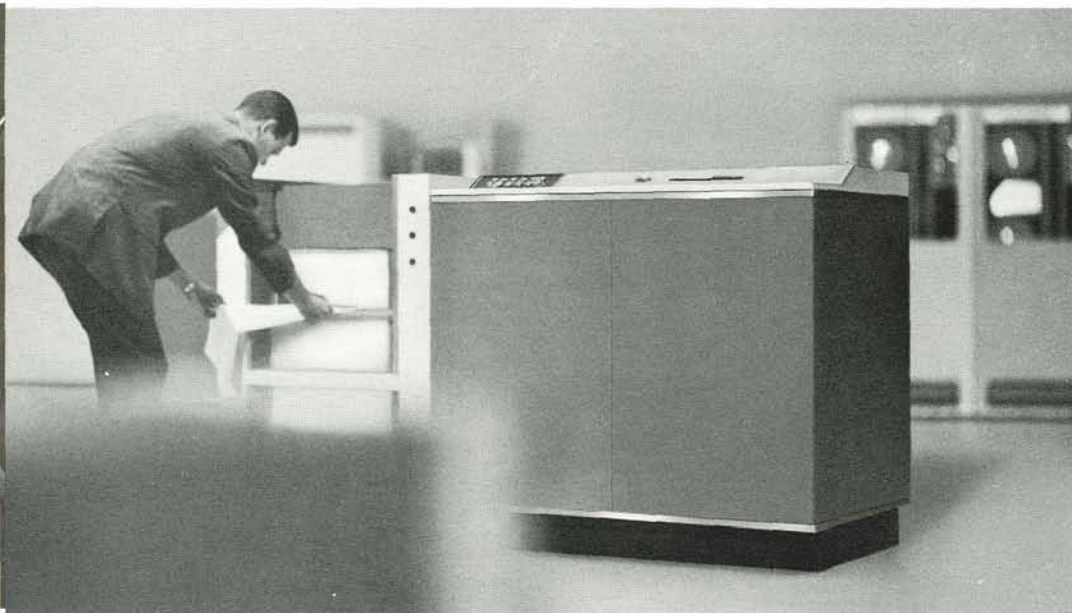
5/ On-line and high-speed printers, 600 and 1,250 l.p.m., respectively, with 132 columns standard, 160 columns optional.

6/ Interrogating typewriter for keyboard inquiry and hard copy response at 10 c.p.s.

7/ Low-cost terminal systems—System 70/15 can link the "master" central processor with the moderate to large-volume data flow originating in remote locations . . . punched card input/output, magnetic tape transfers, and production of printed documents usually found in such applications.

Also available will be MICR devices and associated multiple tape listers, and, in prospect for future implementation, advanced new I/O devices to pro-. vide you with new services.

A SPECTRUM OF COMPUTERS for your evolution to a total information system

WIDE-RANGE SYSTEM ORIENTATIONS are initially provided by four compatible, general-purpose computers for your evolutionary transition to a total management information system.

Each has fast, modularly incremental main memory, circuitry arithmetic, and inherent real-time and communications capabilities. You can select the precise throughput capabilities you need. You can conveniently replace an existing overtaxed system for lower-cost, faster file maintenance. Or, you can grow compatibly . . . either in independent or network operations . . . filling your needs from a wide choice of memory speeds and capacities, computational levels, and communications and data-handling capabilities, as follows:

▼ SYSTEM 70/15—introducing a very low cost, high-speed computer for large volume input/output operations either as a remote communications terminal or as an off-line satellite . . . or to integrate a unit record installation into your total management system, also gaining data processing capabilities. Memory cycle time is 2 microseconds per eight-bit character. Capacity is 4,096 or 8,192 bytes.

▼ SYSTEM 70/25—ideally suited to users requiring a fast and versatile computer, with advanced capabilities at a price tag in the small system class, to replace an overtaxed magnetic tape/punched card data processing system. Memory cycle time is 1.5 microseconds per eight-bit byte. Capacities are 16,384, 32,768, or 65,536 bytes. Four-character moves within memory accelerate throughput. Four types of interrupt facilitate flexibility of operations and error recovery. Up to 123 communication, terminal and peripheral I/O, and storage operations can be on-line.

MAIN MEMORY COMPLETE CYCLE TIMES

|	0 microseconds	1	1.5	2.0
70/15	8 BIT-BYTE			
70/25	8 BIT-BYTE			
70/45	TWO 8 BIT-BYTES			
70/55	FOUR 8 BIT-BYTES			

▼ **SYSTEM 70/45**—designed with monolithic integrated electronics circuitry. It has all the capabilities needed for a medium-scale integrated management system. Memory speed is 1.44 microseconds for two bytes (16-bits); storage capacities, 16,384, 32,768, 65,536, 131,072 or 262,144 eight-bit bytes. Fast data transmission and computation rates, and sophisticated complement of up to 144 instructions, including optional floating point, for highly efficient data processing, communications control, and scientific problem solution. Up to 11-way simultaneity of I/O operations, depending on permissible data rate.

▼ **SYSTEM 70/55**—identical in instruction complement with the System 70/45, but with larger and much faster memory, more powerful four-bytes-at-a-time data handling, and standard double precision floating point arithmetic. Parallel logic is "wired in"

and implemented by solid-state integrated electronics circuitry. Memory cycle time is 840 nanoseconds for four bytes (32 bits). Capacities are 65,536, 131,072, 262,144 or 524,288 bytes. Up to 14-way simultaneity of I/O operations, depending on permissible data rate.

SYSTEM OPERATIONS can be regarded as comprising an interplay of processing and data communications with mass storage, and terminal and peripheral sections — controlled and synchronized by special RCA-designed software. The standard interface through which external devices communicate with the computers makes possible their systems-wide utilization.
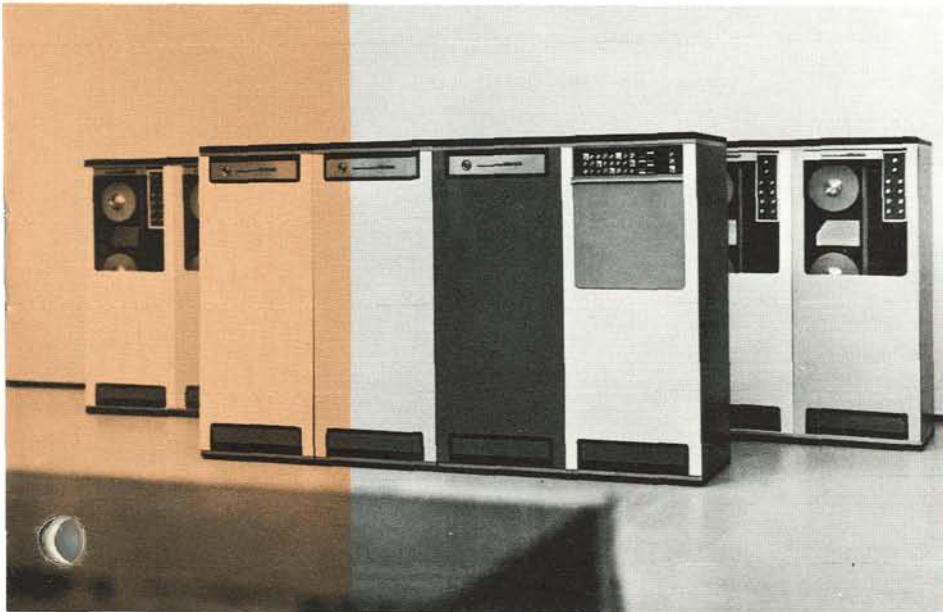
MEMORY CAPACITIES
(8 BIT-BYTES)

70/15	70/25	70/45	70/55
4,096	16,384	16,384	65,536
8,192	32,768	32,768	131,072
	65,536	65,536	262,144
		131,072	524,288
		262,144	

SOFTWARE EASES SYSTEM EVOLUTION with multi-level operating systems complementing hardware

Software-controlled operations let you progress in easily-managed steps and with the least expenditure of programming effort and operator intervention, during your system evolution from file maintenance with a mass data base to total management information.

Multi-level operating systems embody all necessary elements for the performance of a particular task in your application. The software integrates the modular capabilities of Spectra 70, automatically coordinating and executing all input/output instructions, initiating error recovery techniques, monitoring the scheduling and performance of multiple programs within the same or among a number of different processors, and switching, queuing and relocating programs as necessary.

Advanced RCA concepts are incorporated in the operating systems for the various processors. In general, these software systems will be provided at steps of increasing power, reflecting memory capacity, and in magnetic tape and random access versions.

It's easy to step-up from lower to higher level software systems when memory increments are added for more workpower. Continuity is maintained for the user through common sets of commands and standardized operational control.

The multi-level operating systems will provide your technical people with executive control, language processors, system maintenance routines, assembly systems, peripheral control system, file control processor and numerous other standard operating system components—both magnetic tape and
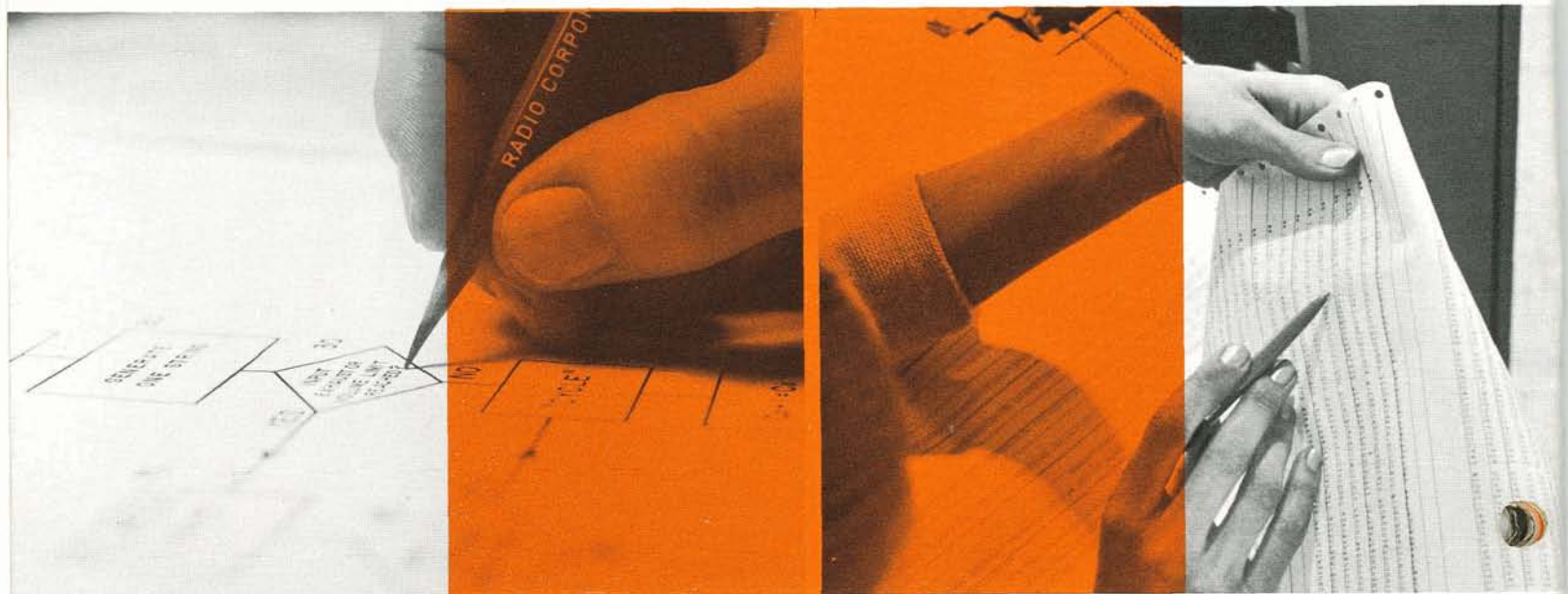
random access oriented. The higher level operating systems also provide multi-programming capability.

Priority multi-programming is oriented toward the concurrent operation of several types of applications. Assignment of priority levels is at the discretion of the user. For example, one priority level can be reserved for a program that must provide rapid responses to real-time devices, such as communications control. Another can be reserved for the peripheral control package to accomplish several media conversions—card to tape, tape to printer, etc. The third priority level could then be used to run either a production or monitor job.

When languages fail your programmers in conveniently expressing your unique problems, they can call on the new RCA Extended Assembly System to coin their own languages, in effect. This system contains directives which enable your programmers to essentially define a new assembly language particularly suited to your needs. A case in point might be when your programmers cannot express the solution to a problem concisely in one of the standard languages, such as COBOL or Fortran. The extended assembler "meta language"—as it is sometimes identified—is a powerful tool that permits the expression of unique applications-oriented languages by your programmers.

PROBLEM SOLVING POWER for growth to management science and technical usage

Combined hardware / software features completely answer your total system requirements when you decide to incorporate scientific problem solving power in any phase of your evolutionary program.

Fast storage and retrieval, communications, an extensive range of terminal and peripheral I/Os help answer your fast computational needs. Spectra 70 software provides the supervisory and control systems and language processors your mathematicians need. It lets your people retain their own programming applications and use the vast body of scientific applications developed in their field.

You can replace existing discrete scientific computers, either by time sharing with your data processing or independently. You can extend your powerful Spectra 70 computational power to remote locations for real-time, multi-access scientific calculations at a fraction of the costs for previous systems.

What is a scientific computer?—Scientific problems are characterized by a minimum of input, a maximum of compute, and a maximum of iteration. Management Science applications partake of these attributes, plus the massive data loads of the normal commercial applications. The requirements for a computer to handle these special applications are—a very large memory, extremely high-speed arithmetics, a large variety of floating point arithmetic commands, a powerful fixed point binary arithmetic set, plus a sophisticated input/output interrupt scheme.

Spectra 70 is scientifically oriented—Its design characteristics offer large core storage of up to one million numerics. It provides 44 floating point and 35 fixed point instructions. It features complete interchangeability of data format. It implements three-dimensional addressing capabilities. It supplies 32 priority interrupts. It includes hardware double-precision, coupled with ease of multiple precision. In combination with its variety of external devices, these features provide the user with the power required to implement the most advanced scientific and management science applications.

RCA is taking advantage of these features to provide the user with a full spectrum of operations research applications. These will include powerful statistical analysis techniques, an efficient matrix manipulation package, a comprehensive linear program code, and numerous other powerful tools for the use of the manager in his decision-making problems.

THE LAST WORD

Spectra 70 makes practically attainable the long-awaited transition from automatic data processing to integrated management systems. It literally expands the horizons of the computer for the capture and interaction of all significant corporate data. It will let you eliminate redundancy of files and reports. It will improve your customer responsiveness. It will minimize your equipment replacement for growth or for new tasks. And it will equip you, the business manager, with a sensitivity of decision attuned to the rapid changes of your economic world.

**For further information,
phone or write a nearby
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525-6547

BOSTON, 886 Washington St., Dedham
DA 6-8350

CHICAGO, Room 101A
110 N. Wacker Dr., ST 2-0700

CINCINNATI, 407 Carew Tower
441 Vine St., 241-1690

CLEVELAND, 1600 Keith Bldg.
1621 Euclid Ave., CH 1-3450

DALLAS, 7901 Carpenter Freeway
ME 1-3050

DENVER, 2401 East Second Ave.
399-1460

DETROIT, Southfield Office Plaza Bldg.
17000 West Eight Mile Rd., Southfield
356-6150

HARRISBURG, 2525 N. 7th St.
236-9367

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ME 6-0436

KANSAS CITY, MO., 1627 Main St.
HA 1-7890

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6363 Sunset Blvd., HO 1-9171

MIAMI, 95 Merrick Way, Coral Gables
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