

## RCA 2, 3, 6, & 7

### MANAGEMENT SUMMARY

The biggest surprise about RCA's new family of four medium-scale computers, announced on September 15, 1970, is the fact that comparatively little of the hardware and software is really new. As its basic technique for obtaining the improved price/performance needed to increase its penetration of the IBM computer market, RCA has chosen to reduce the prices on equipment which, for the most part, is already available and proven in use.

In announcing the new product line, RCA Chairman and President Robert W. Sarnoff predicted that "the progress of the computer business in the 1970's will be determined more by the specific needs of the user than by further radical changes in technology." Upon this premise—which looks somewhat questionable in view of IBM's introduction of the radically improved System/370 Model 145 just one week later—RCA has based its new computer line and supporting business policies.

The new line includes four central processor models, designated simply the RCA 2, 3, 6, and 7. Although some architectural changes have been made, the four new processors have essentially the same functional characteristics as the earlier RCA Spectra 70/45, 70/46, 70/60, and 70/61, respectively. The 70/45 Processor has been the most popular member of the Spectra 70 line since its introduction in 1964, while the 70/46, 70/60, and 70/61 were added between April 1967 and September 1969. Prices of the new RCA processors and main memories range from about 15 to 35 percent lower than their Spectra 70 counterparts. Deliveries of all four models are scheduled to begin in the third quarter of 1971.

Significant price/performance improvements and a unique Guaranteed Conversion Program for System/360 DOS users are the principal attractions of RCA's new line of four medium-scale computers. The hardware and software are largely unchanged from the well-established RCA Spectra 70 line. Virtual memories and standardized core storage modules are being strongly emphasized.

### CHARACTERISTICS

**MANUFACTURER:** RCA Corporation, Information Systems Division, Camden, New Jersey 08101.

**MODELS:** RCA 2, 3, 6, and 7.

### DATA FORMATS

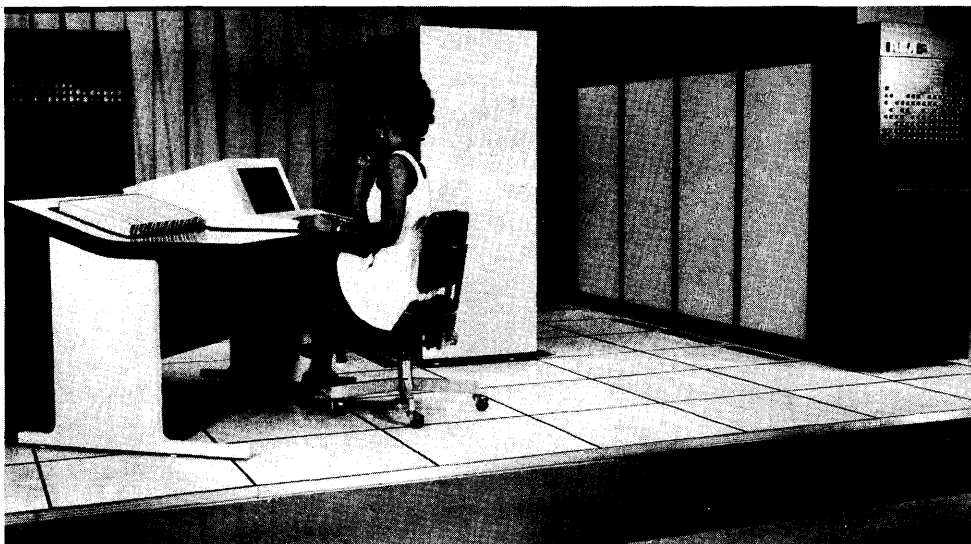
**BASIC UNIT:** 8-bit byte. Each byte can represent 1 alphanumeric character, 2 BCD digits, or 8 binary bits. Two consecutive bytes form a "halfword" of 16 bits, while four consecutive bytes form a 32-bit "word."

**FIXED-POINT OPERANDS:** Can range from 1 to 16 bytes (1 to 31 digits plus sign) in decimal mode; 1 halfword (16 bits) or 1 word (32 bits) in binary mode.

**FLOATING-POINT OPERANDS:** 1 word, consisting of 24-bit fraction and 7-bit hexadecimal exponent, in "short" format; or 2 words, consisting of 56-bit fraction and 7-bit hexadecimal exponent, in "long" format.

**INSTRUCTIONS:** 2, 4, or 6 bytes in length, specifying 0, 1, or 2 memory addresses, respectively.

**INTERNAL CODE:** EBCDIC (Extended Binary-Coded Decimal Interchange Code). The RCA processors can alternatively use 8-bit USASCII, but little software support is provided for this code.



*The Video Operator's Console, shown here with an RCA 6 Processor, consists of a CRT display and keyboard. A console printer and card reader can be added to facilitate console I/O operations.*

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▷ Along with the new central processors, RCA is offering most of the same peripheral equipment—at the same prices—as in the Spectra 70 product line. The peripherals have been renumbered by changing the earlier “70/” prefix to an “8”. For example, the Spectra 70/237 Card Reader is now the 8237 Card Reader. The largely unchanged peripheral equipment prices, coupled with the large reductions in processor and memory prices, will typically lead to overall system rental and purchase prices which range from 8 to 25 percent below those of the equivalent Spectra 70 configurations.

The new RCA equipment will be supported by essentially the same software as the Spectra 70 line. OS/70, designated as the primary operating system for the batch-oriented RCA 2 and 6 processors, was introduced in June 1970 for the Spectra 70 computers. VMOS (Virtual Memory Operating System), the primary operating system for the virtual memory-oriented RCA 3 and 7 processors, is an outgrowth of the Time-Sharing Operating System currently in use on the Spectra 70/46. In addition, users of the new RCA computers can make use of the earlier Spectra 70 Disc, Tape, and Tape/Disc Operating Systems plus a wide selection of language processors and application packages.

All four of RCA's new computers fall into the medium-scale category, with performance beyond that of the IBM 360/40 but below that of the 360/65. Within this comparatively narrow size range, the RCA equipment and software is well suited to handle a wide variety of business and scientific applications. For medium-scale installations that require data communications or time-sharing facilities, RCA displays a particularly strong hand. The new product line (like the Spectra 70 series) includes a versatile array of communications terminals, controllers, and software, while the virtual memories and supporting VMOS software of the RCA 3 and 7 Processors are particularly well suited for time-sharing use.

### GUARANTEED CONVERSION

Clearly, the big news about RCA's new product line is in the pricing and support policies rather than in the equipment and software themselves. In addition to the price reductions discussed above, RCA is offering a unique Guaranteed Conversion Program to certain IBM computer users. Under this plan, RCA will contract to complete the conversion of a given set of user programs at a stipulated price, by a specified time, and (if the customer wishes) within specified performance parameters. If RCA fails to complete the conversion as specified, it will pay liquidated damages to the user for up to 90 days (a maximum of \$45,000).

At present, the Guaranteed Conversion Program is offered only to users of System/360 Model 30, 40, and 50 computers running under DOS. Moreover, the conversion ▷

### ▶ MAIN STORAGE

**STORAGE TYPE:** Magnetic core.

**CAPACITY:** See table. The basic unit of RCA's standardized main memories is a free-standing, independently testable bank of 262,144 bytes. Each bank consists of two 131,072-byte modules. (The 65KB RCA 2 memory consists of one effective half of one 131KB module.) In a multiple-processor installation, each 262K bank can be manually switched from one processor to another processor of the same or a different model.

**CYCLE TIME:** See table.

**CHECKING:** Parity bit with each byte is generated during writing and checked during reading.

**STORAGE PROTECTION:** Protection against both unauthorized reading and writing, in 2048-byte blocks, is standard in all four processor models.

### CENTRAL PROCESSORS

**INDEX REGISTERS:** The programmer has access to sixteen 32-bit general registers, used for indexing, base addressing, and as accumulators, plus four 64-bit floating-point registers. (There are four sets of registers in all—one for each processor state—but only one set is normally accessible to the programmer.)

**INDIRECT ADDRESSING:** None.

**INSTRUCTION REPERTOIRE:** The various processors have from 145 to 163 standard instructions (see table), including all of the 144 instructions which are standard in the RCA Spectra 70 processors. Included are facilities for addition, subtraction, multiplication, and division in four different modes: fixed-point binary, variable-length decimal, and “short” and “long” floating-point. Other instructions handle loading, storing, comparing, shifting, branching, radix conversion, code translation, editing, packing, unpacking, logical operations, etc.

**INSTRUCTION TIMES:** See table. The times shown are for 1-address binary addition of 32-bit fields and for 2-address decimal addition of signed 5-digit (3-byte) fields. The new processors currently have the same instruction times as their Spectra 70 counterparts, though RCA points out that these times may be improved through changes in the control microprograms.

**VIRTUAL MEMORY:** Dynamic address translation facilities enable users of the RCA 3 and 7 Processors to program as if they had 2 million and 8 million bytes, respectively, of main memory at their disposal. The drum-type 8560 Virtual Memory Storage Systems hold 2048-byte or 4096-byte “pages” of data, permitting rapid swapping of program segments into or out of main memory. The RCA 3 uses a translation memory, consisting of an integrated-circuit array of 512 two-byte words with a 90-nanosecond access time, to translate virtual addresses used by the programmer into effective main memory addresses. The RCA 7 uses a new 8-register associative memory to perform the translation function.

**INTERRUPT SYSTEM:** 32 levels of priority interrupts, individually maskable in each processor state. Each of the four processor states has an independent set of operating registers.

**DIRECT CONTROL FEATURE:** This optional feature permits control and synchronizing information to be transferred between multiple processors and/or special external devices. Consists of two special instructions and six external-signal lines.

**1401 EMULATOR:** Permits direct execution of programs written for the IBM 1401, 1440, and 1460 computers; available for the RCA 2, 3, 6, and 7 Processors. ▶

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**CHARACTERISTICS OF THE RCA PROCESSORS**

	RCA 2	RCA 3	RCA 6	RCA 7
<b>MAIN STORAGE</b>				
Cycle time, microseconds	1.44	1.44	0.765	0.765
Bytes fetched per cycle	2	2	4	4
Minimum capacity, bytes	65,536	131,072	131,072	262,144
Maximum capacity, bytes	262,144	262,144	2,097,152	2,097,152
<b>PROCESSOR</b>				
Register cycle time, nanoseconds	300	300	255	255
Read-only memory cycle time, nanoseconds	480	480	255	255
Virtual memory size, bytes	none	2,097,152	none	8,388,608
Number of instructions	145	152	153	163
Add time, microseconds (32-bit binary fields)	8.9	8.9	2.04	2.25
Add time, microseconds (5-digit decimal fields)	16.5	17.0	11.20	11.63
<b>CHANNELS</b>				
Maximum I/O data handling speed, bytes/sec.	1,000,000 (nominal)	1,000,000 (nominal)	5,000,000 (nominal)	5,000,000 (nominal)
No. of selector channels	0, 2, 3, or 4	2, 3, or 4	2, 4, or 6	2, 4, or 6
Trunks per selector channel	2	2	3	3
Max. selector channel data rate, bytes/sec.	694,000	694,000	900,000	900,000
No. of multiplexer channels	1	1	1	1
Trunks per multiplexer channel	9	9	16	16
Max. devices on multiplexer	256	256	248	248
Max. multiplexer channel data rate, bytes/sec.	72,000	72,000	216,000	216,000
<b>EMULATORS</b>				
IBM 1401/1440/1460	optional	optional	optional	optional
IBM 1410/7010	no	no	optional	optional
RCA 301	no	no	optional	optional
RCA 501	no	no	optional	optional

➤ must be into RCA's well-established Disc or Tape/Disc Operating System. This is precisely the type of conversion that RCA has been performing regularly for several years now, and the company is obviously confident that it can now perform such conversions with little or no difficulty. The scope of the program is quite limited at present, and RCA emphasizes that this is only the initial step. Even so, this "first step" already makes the program available to more than half of all the current System/360 users. RCA estimates that the price of its Guaranteed Conversion Program will approximate two months' equipment rent for typical installations.

**HARDWARE FEATURES**

The four new RCA central processors have the same basic data structure and instruction sets as the Spectra 70 processors. Integrated-circuit logic is used, as one would expect, together with conventional magnetic core main memories. Processor operations are controlled by micro-programs in read-only memories.

The principal hardware innovations in RCA's new product line can be summarized as follows:

- Standardized main memory modules replace the integrated main memories of the Spectra 70 processors. These modules can be manually switched from ➤

➤ **1410/7010 EMULATOR:** Permits direct execution of programs written for the IBM 1410 and 7010 computers; available only for the RCA 6 and 7 Processors.

**RCA 301 EMULATOR:** Permits direct execution of programs written for the RCA 301 computer; available only for the RCA 6 and 7 Processors.

**RCA 501 EMULATOR:** Permits direct execution of programs written for the RCA 501 computer; available only for the RCA 6 and 7 Processors.

**8091 VIDEO OPERATOR'S CONSOLE:** Consists of a CRT display with keyboard, plus two optional, free-standing units: the 8093 Console Printer and 8094 Card Reader. The Console connects to the multiplexer channel of an RCA 2, 3, 6, or 7 Processor. A small memory within the console holds two independent pages of data, which can be alternated on the display screen. An optional light pen permits rapid selection of one of several responses displayed on the screen. Data is transferred to the console at 120 characters per second.

**8097 KEYBOARD AND PRINTER CONSOLE:** Provides system control facilities by means of an I/O typewriter and a set of control switches packaged in a free-standing unit. Connects to the multiplexer channel of an RCA 2, 3, 6, or 7 Processor. A run-time recorder is an optional feature.

**MASS STORAGE**

**8560 VIRTUAL MEMORY STORAGE SYSTEMS:** Provide fast, drum-type random-access storage for the RCA 3 and RCA 7 virtual memory systems. Three models are available. Model 8560-005 has 512 tracks and stores up to 2.097 million bytes. Model 8560-008 has 800 tracks and stores up to 3.277 million bytes. Model 8560-016 has ➤

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- ▷ one processor to another processor of the same or different models. (For example, a single 262K-byte module could be switched between an RCA 2 and an RCA 6 Processor.) RCA maintains that this standardization leads to lower manufacturing costs, greater system flexibility, and improved maintainability.
- Virtual Memory Storage Systems, with drum capacities ranging from 2.1 million to 6.5 million bytes, provide fast random-access storage that facilitates page-swapping operations in the RCA 3 and RCA 7 systems.
  - The 8660 Front End Communications Processor (FECP), based upon the RCA 1600 Control Computer, relieves the central processor of most of the functions normally associated with data communications control.
  - The RCA 6 and 7 Processors can have up to 2 million bytes of core memory, whereas the Spectra 70/60 and 70/61 Processors were limited to a maximum of 1 million bytes.
  - The RCA 7 Processor permits a virtual memory space of 8 million bytes to be addressed (compared with 2 million bytes in the Spectra 70/61) and uses a new associative memory to perform the necessary address translations.
  - The new 8457 and 8459 Magnetic Tape Units have data transfer rates of 160,000 and 320,000 bytes per second, respectively, matching the speeds of the IBM 2420 Model 5 and 7 drives while costing substantially less.
  - New horizontal-train printers, with speeds of 600 and 1200 lines per minute, promise improved vertical alignment and sharper print quality.
  - A Video Operator's Console, consisting of a CRT display, keyboard, and optional console printer and card reader, facilitates system operations.
  - Emulators for the IBM 1401, 1440, and 1460 are available for all four processors, and the RCA 6 and 7 can also be equipped to emulate the IBM 1410/7010, RCA 301, or RCA 501.
  - RCA has ordered a large number of IBM's high-performance 3330 Disk Storage Facilities and will supply these units with its new processors. RCA plans to introduce a similar unit of its own early next year.

### COMPATIBILITY

The new RCA hardware maintains full compatibility with the Spectra 70 line, enabling most Spectra 70 programs, ▷

- ▶ 1600 tracks and stores up to 6.554 million bytes. For all three models, average rotational delay is 8.6 milliseconds and data transfer rate is 333,000 bytes per second. Each system includes the required controller and attachments.

**8564 DISC STORAGE UNIT:** Provides interchangeable disc-pack storage. Each disc pack contains six 14-inch discs, weighs 10 pounds, holds up to 7.25 million bytes of data, and is compatible with the IBM 1316 Disk Pack used in IBM 2311 Disk Storage Drives. One read/write head serves each of the 10 recording surfaces. Up to 36,250 bytes (10 tracks) can be read or written at each position of the comb-type access mechanism. Average head movement time is 75 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 156,000 bytes/sec. Record lengths are variable. Up to eight 70/564 units can be connected to an 8551 Random Access Controller. A dual-channel switch is optional.

**8567 DRUM MEMORY UNIT:** Provides fast random-access storage and retrieval for program segments, file directories, tables, etc. Two models store up to 4.13 million or 8.26 million bytes in 800 or 1600 tracks with a maximum data capacity of 5161 bytes each. Record lengths are variable. Average access time is 8.6 milliseconds, and data transfer rate is 333,000 bytes per second. Up to 8.26 million bytes of drum storage can be connected to an 8551 Random Access Controller. A dual-channel switch is optional.

**8568 MASS STORAGE UNIT:** Provides economical large-capacity storage at the expense of slow access times and mechanical complexity. Stores up to 537 million bytes of data on magnetic cards 16 inches long by 4.5 inches wide. The 8568 unit accommodates 8 removable magazines, and each magazine contains 256 cards. Each card has 128 tracks capable of holding up to 2,048 bytes each. Record lengths are variable. Average random access time is 508 milliseconds, and data transfer rate is 70,000 bytes per second. Up to eight 8568 units can be connected to an 8551 Random Access Controller. A dual-channel switch is optional.

**8590 DIRECT ACCESS STORAGE SYSTEM:** Provides large-capacity random-access storage in interchangeable 11-disc packs which are compatible with the IBM 2316 Disk Packs used in the IBM 2314 Direct Access Storage Facility. Consists of a controller and from 2 to 16 independent on-line disc pack drives, each capable of storing up to 29.17 million bytes. Total on-line storage capacity of the 16-drive 8590-016 unit is 466.6 million bytes. Each drive has a comb-type access mechanism that can read or write up to 145,880 bytes (20 tracks) at each of its 200 positions. Average head movement time is 75 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 312,000 bytes/sec. Record lengths are variable. An optional Multi-Channel Switch allows the 8590 system to be shared by two selector channels on the same or different processors.

### INPUT/OUTPUT UNITS

**8432, 8442, & 8445 MAGNETIC TAPE UNITS:** Available in 9-track and 7-track versions, both of which record on standard 1/2-inch tape in IBM-compatible formats. Characteristics of the 9-track versions are as follows:

- 8432: 800 bpi; 30,000 bytes/sec at 37.5 inches/sec.
- 8442: 800 bpi; 60,000 bytes/sec at 75 inches/sec.
- 8445: 800 bpi; 120,000 bytes/sec at 150 inches/sec.

The 7-track versions have the same tape speeds and offer a choice of three recording densities: 200, 556, or 800 bpi. The 8432 and 8442 are dual-drive models (two tape drives per unit), while the 8445 is a single-drive unit. All models can read in both the forward and reverse directions, and no pinch rollers are used. Controllers capable of handling up to 8 or 16 tape drives and either 1 or 2 I/O channels are available. ▶

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▷ data files, and systems software to be run without modification. And, like the Spectra 70 line, RCA's new computers offer a high degree of program compatibility with the IBM System/360. The System/360 compatibility is achieved through similar hardware and compatible source languages. The RCA Assembler, COBOL, FORTRAN, and RPG languages are all essentially the same as their System/360 counterparts. As a result, most System/360 source programs can be assembled or compiled and executed on an RCA system with little or no need for program changes.

As a further step toward System/360 compatibility, a new System/360 mode of operation (supplied as a no-extra-cost feature) will enable an RCA 2, 3, 6, or 7 Processor to directly execute most System/360 DOS object programs. This feature is an emulator that resolves the differences in privileged instructions that have previously precluded direct machine-level interchange of programs between System/360 and RCA computers.

### WHY GO WITH RCA?

Thus, RCA has done just about everything within its power to make it as easy and safe as possible for System/360 users to "leave the fold" and switch to RCA. But it remains to be seen just how many of these IBM users will be willing to switch suppliers and undergo a conversion in order to save a few thousand dollars a month—even under RCA's guaranteed cost and time framework.

The IBM System/370 Model 145, announced just one week after RCA's new computers, offers performance and pricing roughly equivalent to the RCA 6, plus technology that is truly new and exciting. The presence of the Model 145, plus the prospect of smaller System/370 processors yet to come, will unquestionably reduce RCA's chances of convincing great numbers of IBM users to displace their System/360's in favor of RCA equipment rather than IBM's new line.

In summary, then, why *should* a System/360 user consider going with RCA? Here are a number of potential reasons which, for a given installation, may or may not be compelling ones:

- First, the new RCA equipment offers very real price/performance advantages over the currently installed IBM computers in the medium-scale range, and appears to be fully competitive with the new System/370 line as well.
- Second, RCA still offers fully bundled pricing, which means that the equipment prices include all normal systems engineering support, operating software, application programs, and customer education. (As ▷

▶ **8451 & 8453 MAGNETIC TAPE UNITS:** These models record on standard 1/2-inch magnetic tape at 1600 bpi in the IBM-compatible phase-encoded mode. Each unit contains two tape drives. Peak data rates are 60,000 bytes/sec for the 8451 and 120,000 bytes/sec for the 8453. Optional features enable either unit to operate at 800 as well as 1600 bpi. Both models can read in both the forward and reverse directions, and no pinch rollers are used. Controllers capable of handling up to 8 or 16 tape drives and either 1 or 2 I/O channels are available.

**8457 & 8459 MAGNETIC TAPE UNITS:** These new single-drive tape units record on standard 1/2-inch magnetic tape at 1600 bpi in the IBM-compatible phase-encoded mode. Model 8457 has a tape speed of 100 inches/sec and a data transfer rate of 160,000 bytes/sec. Model 8459 has a tape speed of 200 inches/sec and a data transfer rate of 320,000 bytes/sec. Both models offer automatic tape loading, either with or without a tape cartridge, and both can optionally be equipped to operate at 800 bpi (in NRZI mode) as well as 1600 bpi. Controllers capable of handling up to 8 or 16 tape drives and either 1 or 2 I/O channels are available.

**8441 MAGNETIC TAPE UNIT:** This dual-drive unit provides compatibility with the RCA 381 and 382 Hi-Data Magnetic Tape Groups. It uses 1200-foot reels of 1/2-inch tape. Tape speed is 50 inches per second. In the 381 mode, density is 333 bpi and data rate is 16,600 characters per second. In the 382 mode, density is 500 bpi and data rate is 25,000 characters per second. Controllers capable of handling up to 8 or 16 tape drives and either 1 or 2 I/O channels are available.

**8232 CARD READER:** Reads 80-column cards serially at 300 cpm, or at 600 cpm when an optional feature is installed. EBCDIC is the standard code, and column binary is optional. Other optional features permit optical reading of either vertical or slanted pencil marks.

**8237 CARD READER:** Reads 80-column cards serially, on demand, at up to 1435 cpm. EBCDIC is the standard code, and column binary is optional. A 2000-card input hopper and two stackers can be loaded and unloaded while the reader is operating. Optional features permit reading of 51-column stub cards and either vertical or slanted pencil marks.

**8234 CARD PUNCH:** Punches and read-checks 80-column cards at 100 cpm. Contains a full-card buffer. EBCDIC is the standard code, and column binary is optional.

**8236 CARD PUNCH:** Punches and read-checks 80-column cards at up to 300 cpm. Contains a full-card buffer. EBCDIC is the standard code, and column binary is optional. A 1000-card input hopper and two 850-card stackers can be loaded and unloaded while the punch is operating.

**8221 PAPER TAPE READER/PUNCH:** Reads 5-, 6-, 7-, or 8-level punched tape at 200 characters per second and punches it at 100 characters per second. Handles strips or 1000-foot reels. Can read and punch simultaneously by time-sharing one multiplexer trunk. Available options include EBCDIC mode and 6-level advanced sprocket holes.

**8224 HIGH-SPEED PAPER TAPE READER:** Reads 5-, 7-, or 8-level punched tape at up to 1000 characters per second. Handles 1000-foot reels. Offers same options as the 8221, above.

**8242 MEDIUM-SPEED PRINTER:** Prints up to 625 lpm using the standard 64-character print drum. Available with either 132 or 160 print positions. Standard skipping speed is 27 inches per second; an optional Dual-Speed Form Advance feature provides a skipping speed of 75 ▶

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- ▷ an option, RCA offers its equipment without systems engineering support at a 3 percent discount from the standard rental or purchase prices.)
- Third, RCA's Guaranteed Conversion Plan offers a striking contrast to IBM's separately priced technical services and IBM's unwillingness, in general, to agree to penalties for slipped conversion deadlines or poor performance.
  - Fourth, RCA's novel Accrued Equity Contract offers noteworthy additional savings over the basic equipment rental prices. RCA users can realize savings of up to 15 percent from the normal monthly rental charges by agreeing to keep their systems for a 6-year period, after which they will own the equipment. Anytime after one year, the user can cancel the contract by simply paying RCA the difference between the normal rental price and the reduced rate he has been paying.
  - Fifth, the virtual memories which are featured in the RCA 3 and 7 Processors can greatly increase the efficiency of hardware utilization in time-sharing and other multi-access environments. RCA maintains that the virtual memory concept can also yield significant economic benefits in conventional batch processing by increasing the main storage utilization. At present, IBM offers a virtual memory only in the very expensive System/360 Model 67 system.
  - Sixth, RCA's Front End Communications Processor can increase system throughput by relieving the central processor of a large portion of the data communications processing load. At this writing, IBM still does not offer an independently programmed communications processor for the System/360 or 370 (though numerous independent suppliers do).

Despite the absence of dramatically new hardware and software in its highly publicized new product line, RCA clearly has a lot to offer to medium-scale computer users, particularly if their interests are in the data communications or time-sharing areas. □

- ▶ inches per second on long skips. Contains a full-line buffer.

**8243 HIGH-SPEED PRINTER:** Prints up to 1250 lpm using the standard 64-character print drum, or up to 833 lpm when equipped with an extended character set of 96 graphics (including lower-case letters). Available with either 132 or 160 print positions. Skipping speed is 75 inches per second. Contains a full-line buffer.

**8244 TRAIN PRINTER:** Uses a horizontal-train print mechanism, similar to that of the IBM 1403 Model 3, to achieve accurate vertical alignment and sharp print quality. Available in two models, with peak printing speeds of 600 (Model 8244-100) or 1200 (Model 8244-200) lines per minute using the standard character set of 48 graphics. Both models have 132 print positions and

vertical spacings of 6 or 8 lines per inch. A "quietized" design reduces the noise level.

**8248 BILL FEED PRINTER:** An RCA adaptation of the IBM 1404 Printer. Prints on continuous forms (at up to 600 lpm) or on individual 50- to 80-column cards fed one or two at a time. Peak speed is 800 cards per minute when printing 1 line per card on cards fed in "two-up" fashion. Has a 48-character set and 132 print positions. Can print up to 25 lines of data on a card. Requires an 8249 Bill Feed Printer Control.

**8272 MICR SORTER-READER CONTROLLER:** Permits any of the following magnetic ink character readers to be connected to a Spectra 70 system: Burroughs B103 or B116, IBM 1419, or NCR 407.

**8310 STANDARD INTERFACE SWITCH:** A manual or program-controlled device used to switch RCA standard interface trunks. Can be used either to switch one I/O subsystem between two processors or to switch one processor channel position between two I/O subsystems. The 8350 Switch Controller can operate up to eight 8310 Switches under program control, and can be shared by up to four processors.

## COMMUNICATION DEVICES

**8627 DATA EXCHANGE CONTROL:** Connects two RCA central processors, up to 200 feet apart, permitting direct memory-to-memory data interchange via a selector or multiplexer trunk on each of the two processors. Either processor can originate transmission or request data.

**8653 COMMUNICATION CONTROL:** Permits single-channel remote communication with another suitably equipped RCA computer. Transmission can be via the public telephone network at 250 char/sec, a leased voice-band line at 300 char/sec, or a broad-band channel at 5100 char/sec. Connects to a selector or multiplexer channel.

**8656 COMMUNICATION CONTROLLER-SINGLE CHANNEL:** Permits remote communication, in ASCII synchronous transmission mode, with any of the following equipment: another suitably equipped RCA computer, an IBM System/360 with a 2701 or 2703 controller, RCA standard synchronous devices, or the AT&T Collect Message Distribute System. Operates via either dialed public networks or private lines, at half-duplex transmission rates of 250, 300, 2400, 5100, 6250, or 28,800 char/sec. Connects to a selector or multiplexer channel. The central processor program must handle all line and error control functions.

**8660 FRONT END COMMUNICATIONS PROCESSOR (FCEP):** An independently programmed computer designed to relieve the central processor of most communication control functions by performing the necessary line control, error control, and polling/selection operations. Communicates with an RCA 2, 3, 6, or 7 Processor via a Data Exchange Control. Has either 32,768 or 65,536 bytes of core storage with a cycle time of 1.6 microseconds per two-byte access, and a repertoire of 29 instructions. The standard FCEP configuration includes Processor, Data Exchange Control, Time Control, and Console Typewriter and Control. Also required are appropriate data set controls and adapters, depending upon the number and types of lines used.

The FCEP can handle transmission speeds ranging up to 28,800 bytes per second, using ASCII or EBCDIC transmission codes. It can communicate with remote devices that use the IBM Binary Synchronous Communications mode. Among the devices that can interface with the FCEP are the IBM 2701 and 2703 Transmission Controls, the IBM 360/20 and 1130 Computers (through their respective communications adapters), the IBM 2780 ▶

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► **Data Transmission Terminal, and the Burroughs TC 500 Terminal Computer.** Standard operating software for the FECP is the Multi-Function Communications System (MFCS), which consists of a control program, communication line modules, tables, and data buffer areas.

**8668 COMMUNICATION CONTROLLER-MULTI-CHANNEL:** Permits connection of multiple low-speed and medium-speed remote terminals to the multiplexer channel of an RCA 2, 3, 6, or 7 Processor. Can be equipped, via appropriate buffers, to handle a broad range of communication services, speeds, and codes. Transmission speeds can range from 6 to 300 char/sec. Three models are available, with capacities for 16, 32, or 48 buffers. Each buffer handles one half-duplex line; a full-duplex line requires a pair of buffers. One 8668 CCM can service a mixture of up to 16 different types of buffers with a maximum total data rate of 6000 bytes/sec.

**8740 DATA TERMINAL:** Provides remote batch printing capability, with optional card input via the 8741 Card Reader (below). Various models provide a choice of peak printing speeds (either 300 or 600 lines per minute) and number of print positions (either 80 or 132). Users can select either the RCA or ASCII set of 64 printable characters. Transmission is in ASCII synchronous mode, over leased or dialed lines, at up to 9600 bits per second. Facilities for unattended operation are standard.

**8741 CARD READER:** Provides remote 80-column card input at up to 300 cpm when used with an 8741 Data Terminal (above). Off-line data transcription from cards to printer is also possible.

**MODULAR VIDEO DATA SYSTEM:** Consists of an 8759 Video Data Controller, up to six 8756 Video Data Generators, and from two to eight 8751 Video Data Terminals connected to each 8756 VDG by up to 500 feet of cable. The 8759 VDC can be connected either directly to a multiplexer channel or via a remote communications link that terminates in an 8668 CCM at the computer site. The 8751 VDT displays alphanumeric data on the face of a 12-inch rectangular CRT. Display capacity is 270 to 1080 characters, depending upon the number of VDT units connected to the 8756 VDG. Ninety-six different characters, including both upper and lower case letters, can be displayed. Input data can be entered from either a keypunch-style or typewriter-style keyboard.

**8752-100 VIDEO DATA TERMINAL:** Displays alphanumeric data on the face of a 12-inch rectangular CRT. Can display up to 1080 characters at a time, in 20 lines of 54 characters each. Character set consists of 64 ASCII letters, numerals, and symbols. The 8752-100 VDT is a self-contained, desk-top unit that is normally connected, via a remote communications link, to an 8668 CCM at the computer site. Transmission speed is 120 char/sec over either the public telephone network or private voice-grade lines. Messages can be entered via the unit's keyboard and verified on the display screen before transmission.

**8752-200 VIDEO DATA TERMINAL:** This improved stand-alone CRT display unit incorporates all the features of the earlier 8752-100 VDT (above) plus such new capabilities as: transmission speeds from 300 to 2400 bits per second in either asynchronous or synchronous mode; a separate buffer for printing, which frees the display screen and keyboard and accommodates fast serial printers; an optional upper-and-lower case keyboard (96 characters); optional expanded display capacities of 1620 or 1782 characters; and simplified maintenance features.

### SOFTWARE

The RCA 2, 3, 6, and 7 will be able to use virtually all of the extensive software facilities already available for the

RCA Spectra 70 computers, as described in Report 70C-712-01.

In addition, RCA has announced two improved software systems, OS/70 and VMOS, which will serve as the "primary operating systems" for its new computers. OS/70 and VMOS are described in the following paragraphs.

**OPERATING SYSTEM/70:** OS/70, introduced in June 1970 for the Spectra 70 computers, will serve as the primary operating system for the RCA 2 and RCA 6 computers. OS/70 is a modular, disc-oriented system that provides considerably stronger facilities for multiprogramming and data communications than RCA's earlier DOS, TOS, and TDOS systems. It can be used with any RCA 2 or 6 Processor, from 65K bytes upward. The OS/70 Executive requires a minimum of 8K to 10K bytes of main memory for resident routines, and its memory requirements naturally increase as its functions are expanded.

OS/70 consists of a Control System, a Communications System, a Data Management System, a Language System, a Conversion and Compatibility System, and a Utility System.

The OS/70 Control System ties all the other systems together and handles job scheduling and job management. Programs, data, and job control statements can be submitted either locally or via remote terminals. The input is written on a "spooling" disc, and the job is placed in a job queue. Jobs are initiated on the basis of resource availability, priority, and time of submission. Each job is assigned to one of 14 multiprogramming slots, each of which can handle up to 14 associated tasks. Any job can call for dynamic extension of its core memory space, dynamic allocation and extension of output files, and dynamic calling and linking of subprograms. Job output data can be written on a "spooling" disc for later transcription to the desired peripheral device. A job accounting routine accumulates operating statistics on all jobs.

The OS/70 Communications System includes three subsystems which provide software support for a variety of applications. Basic Communications Support (BCS) provides basic routines to facilitate the programming of small and special-purpose communications applications. The larger Communications Oriented Software (COS) system can handle as many as six different communications application programs concurrently. The Remote Job Entry package provides users at remote batch terminals with essentially the same input, output, job control, and status reporting facilities that local users have.

The OS/70 Data Management System provides facilities for creating, accessing, and updating files and data bases. Indexes, data dictionaries, and cross-referencing techniques are used to provide independence between data files and the application programs that reference them. Thus, files can be changed without necessitating extensive modifications of the programs.

The OS/70 Language System includes processors for the following programming languages: Assembler, RPG, COBOL, ANSI (formerly USASI) COBOL, and FORTRAN. In all cases, RCA states that the source languages are compatible with the IBM OS/360 versions.

**VIRTUAL MEMORY OPERATING SYSTEM:** VMOS will serve as the primary operating system for the RCA 3 and RCA 7 Virtual Memory Computers. Designed to control concurrent local and remote processing in the batch, interactive, and communications modes, VMOS is an outgrowth of the Time-Sharing Operating System (TSOS) currently in use on RCA Spectra 70/46 computers (see Report 70C-712-01). Improvements—most of which are also provided in the recently released Version 6

## RCA 2, 3, 6, & 7

► of TSOS—include a new data management system, new COBOL and FORTRAN compilers, additional utility routines, “spooled” remote input capabilities, and a text processing routine called Autoform.

VMOS controls the overall processing environment by allocating the system’s resources, controlling the scheduling and execution of all tasks, servicing all interrupts, managing virtual memory by controlling the “swapping” of pages between main and drum memory, and initiating error recovery procedures. Spooling of card input and printer output on disc or tape drives improves hardware utilization; a new facility permits input from remote terminals to be spooled and processed in batch mode. A Command Language is used for communication between VMOS and the system’s users, operator, and administrator.

The VMOS data management system features improved catalog management techniques for faster access, improved channel utilization through queuing of requests for seek operations on random-access devices, use of the same physical block size in all random-access devices, handling of errors on an exception basis, and the ability to pass files from program to program. The VMOS Information Processing System (IPS) permits integration of all user data into a data base and controls accessing of the data base by multiple user programs.

VMOS provides language processors for both batch and conversational use. The batch-mode Assembler and COBOL and FORTRAN compilers are themselves pageable and produce pageable object programs. The RPG and Sort/Merge programs operate in conventional batch (non-paged) mode. Also usable in the background batch processing mode are a number of applications modules, including PERT, Simscript, Network Analysis, Transportation Model, ECAP, and civil engineering, statistical-biomedical, and mathematical routines.

Conversational languages supported under VMOS include Extended BASIC, IFOR (an interpretive, compile-and-go FORTRAN IV processor), PI-FORTRAN (a fast “short-hand” FORTRAN), and Desk Calculator. A COBOL Syntax Checker (COBSYN) permits rapid detection and correction of COBOL programming errors by users at remote terminals. An Interactive Debugging Aid (IDA), usable in either conversational or batch mode, facilitates testing and modification of programs written in Assembly Language, COBOL, or FORTRAN. Finally, for the larger RCA 7 computer only, RCA offers two new compilers: FAST FORTRAN, designed to provide rapid compilation and effective diagnostic facilities in a conversational environment; and Interactive COBOL, designed to enable terminal users to construct, check, test, and modify programs using the full ANSI COBOL language plus IBM extensions.

Extended VMOS communications capabilities, also available only for the larger RCA 7 computer, include: (1) dynamic message buffering; (2) bulk message storage and a store-and-forward capability; (3) an intercept facility that returns undelivered messages to the sender; (4) a tape logging capability that enables a record of all message traffic to be maintained; and (5) extended terminal support facilities.

### PRICING

The following representative system configurations comprise only a small sampling of the broad configuration possibilities within RCA’s new line. All necessary control units and adapters are included in the indicated prices. The quoted rental prices are for standard 1-year leases and include equipment maintenance.

**RCA 2 TAPE/DISC SYSTEM:** Consists of 65K RCA 2 Processor with two Selector Channels, two 8564 Disc Storage Units, three 8442 Magnetic Tape Units (each containing two 60KB tape drives), 8237 Card Reader, 8236 Card Punch, 8243 Printer, and 8097 Console. Monthly rental and purchase prices are approximately \$12,870 and \$594,800, respectively.

**RCA 3 VIRTUAL MEMORY SYSTEM:** Consists of 262K RCA 3 Processor with two Selector Channels, 8560-005 Virtual Memory Storage System, 8590-004 Direct Access Storage System (4 drives), two 8442 Magnetic Tape Units (each containing two 60KB tape drives), 8237 Card Reader, 8236 Card Punch, 8243 Printer, and 8091 Video Operator’s Console. Monthly rental and purchase prices (exclusive of the data communications and remote terminal equipment normally used in a system of this type) are approximately \$21,110 and \$950,000, respectively.

**RCA 6 TAPE/DISC SYSTEM:** Consists of 262K RCA 6 Processor with four Selector Channels, 8590-004 Direct Access Storage System (4 drives), eight 8445 Magnetic Tape Units (each containing one 120KB drive) and dual-channel tape control, 8237 Card Reader, 8236 Card Punch, 8244 Train Printer, and 8091 Video Operator’s Console. Monthly rental and purchase prices are approximately \$28,500 and \$1,289,000, respectively.

**RCA 7 VIRTUAL MEMORY SYSTEM:** Consists of 524K RCA 7 Processor with four Selector Channels, 8560-016 Virtual Memory Storage System, 8590-008 Direct Access Storage System (8 drives), two 8442 Magnetic Tape Units (each containing two 60KB tape drives), 8237 Card Reader, 8236 Card Punch, 8243 Printer, and 8091 Video Operator’s Console with 8093 Console Printer and 8094 Console Card Reader. Monthly rental and purchase prices (exclusive of the data communications and remote terminal equipment normally used in a system of this type) are approximately \$39,640 and \$1,824,000, respectively.

**SOFTWARE AND SUPPORT:** RCA offers “optional unbundling.” Users of RCA 2, 3, 6, or 7 computers can elect to lease or purchase their equipment either with RCA systems engineering support, at the prices listed in this report, or without systems engineering support, at a 3% discount from these prices. In either case, RCA will provide, at no additional cost, the basic operating software, standard application programs, and normal customer education services.

RCA’s Guaranteed Conversion Program enables certain IBM computer users to move to the new RCA computer systems within a guaranteed time and cost. The plan is available only to current users of IBM System/360 Model 30, 40, or 50 computers running under DOS, and conversion must be into the RCA Disc and/or Tape/Disc Operating Systems.

**CONTRACT TERMS:** The standard RCA equipment rental agreement allows unlimited use of the equipment (exclusive of the time required for remedial and preventive maintenance). There are no extra-use charges. The standard agreement covers maintenance of the equipment for nine consecutive hours a day, Monday through Friday. Extended periods of maintenance are available at extra cost.

RCA offers an Accrued Equity Contract that enables commercial users to realize up to a 15% reduction in monthly rental charges by agreeing to keep their systems for a 6-year period. At the end of the 6-year period, the user can elect to own the system. The user can upgrade any element of the system during the contract period, or he can cancel the contract at any time after one year. In the latter case, he need only pay RCA the difference between the normal rental price and the reduced rate he has been paying. ■



## RCA 2, 3, 6, & 7 EQUIPMENT PRICES

	Purchase Price	Monthly Maint.	Rental (1-year lease)*	
<b>RCA 2 PROCESSORS AND MAIN STORAGE</b>				
8002-001	Processor (for 65K Memory)	175,000	250.00	3,100
8002-002	Processor (for 131K or 262K Memory)	212,500	300.00	4,250
5003-002	Direct Control Feature	9,700	12.00	194
5043-002	Selector Channels 1 & 2	12,500	50.00	250
5044-002	Selector Channels 1, 2, & 3	18,750	75.00	375
5045-002	Selector Channels 1, 2, 3, & 4	25,000	100.00	500
5006-002	1401 Emulator	6,300	10.00	90
8000-011	Memory; 65,536 bytes	37,500	50.00	750
8000-013	Memory; 131,072 bytes	75,000	100.00	1,500
8000-015	Memory; 262,144 bytes	150,000	200.00	3,000
<b>RCA 3 PROCESSORS AND MAIN STORAGE</b>				
8003-001	Processor (for 131K Memory)	282,500	400.00	5,150
8003-002	Processor (for 262K Memory)	282,500	400.00	5,650
5003-003	Direct Control Feature	9,700	12.00	194
5040-003	Selector Channels 1 & 2	12,500	50.00	250
5041-003	Selector Channels 1, 2, & 3	18,750	75.00	375
5042-003	Selector Channels 1, 2, 3, & 4	25,000	100.00	500
5006-003	1401 Emulator	6,300	10.00	90
8000-013	Memory; 131,072 bytes	75,000	100.00	1,500
8000-015	Memory; 262,144 bytes	150,000	200.00	3,000
<b>RCA 6 PROCESSORS AND MAIN STORAGE</b>				
8006-001	Processor (for 131K Memory)	435,000	500.00	8,100
8006-002	Processor (for 262K Memory)	435,000	500.00	8,700
Expansion Features for 8006-002 Processor:				
5073	For expansion from 262K to 393K	120,000	-	1,800
5074	For expansion from 262K to 524K	120,000	-	2,400
5075	For expansion from 262K to 655K	180,000	-	3,000
5076	For expansion from 262K to 786K and above	180,000	-	3,600
5003-006	Direct Control Feature	9,700	12.00	194
5057-006	Selector Channels 3 & 4	67,500	80.00	1,350
5058-006	Selector Channels 3, 4, 5, & 6	135,000	160.00	2,700
5064-006	301 Emulator	25,200	40.00	360
5065-006	501 Emulator	25,200	40.00	360
5026-006	1410/7010 Emulator	25,200	40.00	360
5081-006	1401 Emulator	25,200	40.00	360
8000-013	Memory; 131,072 bytes	75,000	100.00	1,500
8000-015	Memory; 262,144 bytes	150,000	200.00	3,000
<b>RCA 7 PROCESSORS AND MAIN STORAGE</b>				
8007-001	Processor (for 262K Memory)	525,000	700.00	10,500
Expansion Features for 8007-001 Processor:				
5077	For expansion from 262K to 393K	120,000	-	1,800
5078	For expansion from 262K to 524K	120,000	-	2,400
5079	For expansion from 262K to 655K	180,000	-	3,000
5080	For expansion from 262K to 786K and above	180,000	-	3,600
5003-007	Direct Control Feature	9,700	12.00	194
5057-007	Selector Channels 3 & 4	67,500	80.00	1,350
5058-007	Selector Channels 3, 4, 5, & 6	135,000	160.00	2,700
5064-007	301 Emulator	25,200	40.00	360
5065-007	501 Emulator	25,200	40.00	360
5026-007	1410/7010 Emulator	25,200	40.00	360
5086-007	1401 Emulator	25,200	40.00	360
8000-013	Memory; 131,072 bytes	75,000	100.00	1,500
8000-015	Memory; 262,144 bytes	150,000	200.00	3,000
<b>CONSOLES</b>				
8091-000	Video Operator's Console	20,000	63.00	385
8092-000	Auxiliary Console	13,000	30.00	250
5069	Light Pen (for 8091, 8092)	***	***	***
5072	Variable Function Keyboard (for 8091, 8092)	***	***	***
8093-000	Console Printer	5,500	20.00	105
8094-000	Console Card Reader	4,700	20.00	90
8097-020	Keyboard and Printer Console	17,250	27.50	343
5060-007	Run Time Recorder (for 8097)	250	-	250**
5260-001	Special Type Slug and Key Cap (for 8097)	50	-	50**
<b>MASS STORAGE</b>				
8560-005	Virtual Memory Storage System (2.097 million bytes)	105,000	400.00	2,100
8560-008	Virtual Memory Storage System (3.277 million bytes)	166,150	609.25	3,041
8560-016	Virtual Memory Storage System (6.554 million bytes)	301,950	1,154.25	5,490
8551-000	Random Access Controller	25,500	54.25	497
5508	I/O Attachment for 8567 Drum Memory	4,850	10.00	95
5502	I/O Attachment for 8568 Mass Storage Units	8,550	18.25	166
5511	File Scan Feature (for 8551)	1,750	3.75	33
5512	Record Overflow Feature (for 8551)	500	1.00	9
5513	Multichannel Switch (for 8551)	4,850	10.50	95

\* Rental prices do not include equipment maintenance.  
 \*\* Single use charge.  
 \*\*\* Price not established to date.

## RCA 2, 3, 6, & 7 EQUIPMENT PRICES

	Purchase Price	Monthly Maint.	Rental (1-year lease)*	
<b>MASS STORAGE (continued)</b>				
8564-000	Disc Storage Unit	25,510	68.75	535
8567-008	Drum Memory (4.12 million bytes)	135,800	545.00	2,449
8567-016	Drum Memory (8.25 million bytes)	271,600	1,090.00	4,898
8568-011	Mass Storage Unit	130,000	687.50	2,625
Direct Access Storage System:				
8590-002	Controller and 2 on-line disc drives	95,340	206.25	1,945
8590-003	Controller and 3 on-line disc drives	120,190	300.00	2,420
8590-004	Controller and 4 on-line disc drives	145,040	393.75	2,895
8590-005	Controller and 5 on-line disc drives	169,890	487.50	3,370
8590-006	Controller and 6 on-line disc drives	194,750	581.25	3,845
8590-007	Controller and 7 on-line disc drives	219,590	675.00	4,320
8590-008	Controller and 8 on-line disc drives	244,440	768.75	4,795
8590-009	Controller and 9 on-line disc drives	273,790	881.25	5,355
8590-010	Controller and 10 on-line disc drives	298,640	975.00	5,830
8590-011	Controller and 11 on-line disc drives	323,490	1,068.75	6,305
8590-012	Controller and 12 on-line disc drives	348,340	1,162.50	6,780
8590-013	Controller and 13 on-line disc drives	373,190	1,256.25	7,255
8590-014	Controller and 14 on-line disc drives	398,040	1,350.00	7,730
8590-015	Controller and 15 on-line disc drives	422,890	1,443.75	8,205
8590-016	Controller and 16 on-line disc drives	447,740	1,537.50	8,680
5519	Multichannel Switch (for 8590)	5,770	14.50	133
<b>MAGNETIC TAPE</b>				
8432-001	Magnetic Tape Unit; 800 bpi, 30KB, dual drives	37,350	138.50	509
8432-002	Magnetic Tape Unit; 800 bpi, 30KB, dual drives	27,350	138.50	509
5411	7-Track Tape Feature	0	0	0
5465	7/9-Track Tape Feature	900	4.50	17
8441-001	Magnetic Tape Unit; 333/500 bpi; 16.6/25KC, dual drives	34,250	171.25	633
8441-002	Magnetic Tape Unit; 333/500 bpi; 16.6/25KC, dual drives	34,250	171.25	633
8442-001	Magnetic Tape Unit; 800 bpi, 60KB, dual drives	41,050	206.25	760
8442-002	Magnetic Tape Unit; 800 bpi, 60KB, dual drives	41,050	206.25	760
5412	7-Track Tape Feature	0	0	0
5464	7/9-Track Tape Feature	900	4.50	17
8445-001	Magnetic Tape Station; 800 bpi, 120KB, single drive	35,300	178.75	657
8445-002	Magnetic Tape Station; 800 bpi, 120KB, single drive	35,300	178.75	657
5413	7-Track Tape Feature	0	0	0
5463	Run to Beginning-of-Tape Mark Feature	450	2.25	8
8451-001	Magnetic Tape Unit; 1600 bpi, 60KB, dual drives	35,900	178.75	647
8451-002	Magnetic Tape Unit; 1600 bpi, 60KB, dual drives	39,900	182.50	664
8453-001	Magnetic Tape Unit; 1600 bpi, 120KB, dual drives	50,100	247.50	902
8453-002	Magnetic Tape Unit; 1600 bpi, 120KB, dual drives	51,100	252.50	918
8457-001	Magnetic Tape Unit; 1600 bpi, 160KB, single drive	21,500	95.00	390
8459-001	Magnetic Tape Unit; 1600 bpi, 320KB, single drive	40,900	140.00	730
8461-208	Tape Controller; 2x8; for 581 tape drives only	62,100	165.00	1,518
8461-216	Tape Controller; 2x16; for 581 tape drives only	87,300	232.50	2,134
5420	RCA 301 Code Translation Feature	0	0	0
5421	RCA 301/501 Code Translation Feature	950	950	950
8463-108	Tape Controller; 1x8; for 8432, 8441, 8442, and 8445 drives; 7/9 tracks	41,200	87.50	805
8463-116	Tape Controller; 1x16; for 8432, 8441, 8442, and 8445 drives; 7/9 tracks	67,900	143.75	1,325
5414-1	382 Tape Mode Feature	750	1.50	14
5415-1	Pack/Unpack Feature	2,450	5.50	48
8463-208	Tape Controller; 2x8; for 8432, 8441, 8442, and 8445 drives; 7/9 tracks	2,450	5.50	48
8463-216	Tape Controller; 2x16; for 8432, 8441, 8442, and 8445 drives; 7/9 tracks	88,550	187.50	1,730
5414-2	382 Tape Mode Feature	1,450	3.25	29
5415-2	Pack/Unpack Feature	4,150	8.75	81
8472-108	Tape Controller; 1x8; for 8432, 8442, and 8445 drives; 9 tracks	33,950	72.00	663
8472-116	Tape Controller; 1x16; for 8432, 8442, and 8445 drives; 9 tracks	65,500	138.75	1,279
8472-208	Tape Controller; 2x8; for 8432, 8442, and 8445 drives; 9 tracks	47,350	100.75	926
8472-216	Tape Controller; 2x16; for 8432, 8442, and 8445 drives; 9 tracks	84,900	180.00	1,656
8473-108	Tape Controller; 1x8; for 8432, 8442, and 8445 drives; 7/9 tracks	36,400	77.00	709
8473-116	Tape Controller; 1x16; for 8432, 8442, and 8445 drives; 7/9 tracks	67,900	143.75	1,325
5402-1	Pack/Unpack Feature	2,450	5.50	48
8473-208	Tape Controller; 2x8; for 8432, 8442, and 8445 drives; 7/9 tracks	51,000	108.25	994
8473-216	Tape Controller; 2x16; for 8432, 8442, and 8445 drives; 7/9 tracks	88,550	187.50	1,730
5402-2	Pack/Unpack Feature	4,150	8.75	81

\* Rental prices do not include equipment maintenance.

**RCA 2, 3, 6, & 7  
EQUIPMENT PRICES**

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
<b>MAGNETIC TAPE (continued)</b>				
8476-108	Tape Controller; 1x8; for 8451-001 and 8453-001 drives; 9 tracks; 1600 bpi	38,900	82.50	759
8476-116	Tape Controller; 1x16; for 8451-001 and 8453-001 drives; 9 tracks; 1600 bpi	70,800	150.00	1,380
5431-1	9-Track NRZ (800 bpi) Feature	12,300	26.00	239
8476-208	Tape Controller; 2x8; for 8451-002 and 8453-002 drives; 9 tracks; 1600 bpi	57,400	121.25	1,118
8476-216	Tape Controller; 2x16; for 8451-002 and 8453-002 drives; 9 tracks; 1600 bpi	95,100	202.50	1,853
5431-2	9-Track NRZ (800 bpi) Feature	14,700	31.00	285
8478-108	Tape Controller; 1x8; for 8457 and 8459 drives; 9 tracks; 1600 bpi	34,000	68.00	652
8478-116	Tape Controller; 1x16; for 8457 and 8459 drives; 9 tracks; 1600 bpi	47,500	85.00	915
8478-208	Tape Controller; 2x8; for 8457 and 8459 drives; 9 tracks; 1600 bpi	56,000	95.00	1,050
8478-216	Tape Controller; 2x16; for 8457 and 8459 drives; 9 tracks; 1600 bpi	77,000	125.00	1,425
<b>CARD INPUT/OUTPUT UNITS</b>				
8232-000	Card Reader; 300 cpm	17,700	82.00	293
5340	600-cpm Feature	2,300	12.00	38
5341-1	Mark Read Feature (vertical marks)	7,000	33.00	117
5341-2	Mark Read Feature (slanted marks)	7,000	33.00	117
204-2	Column Binary Feature	1,450	8.25	25
8234-010	Card Punch; 100 cpm	21,850	133.50	358
8234-011	Card Punch; 100 cpm (with column binary)	27,450	165.00	448
5212	Scored Card Feature	500	3.00	8
8236-010	Card Punch; 300 cpm	36,400	222.50	592
8236-011	Card Punch; 300 cpm (with column binary)	42,000	255.00	686
5215-1	Scored Card Feature	500	3.00	8
5261	Programmed Stacker Select	1,000	5.00	16
8237-010	Card Reader; 1435 cpm	31,550	180.00	526
8237-021	Card Mark-Reader; vertical marks	40,050	227.50	668
8237-022	Card Mark-Reader; slanted marks	500	3.00	8
5202	51-Column Card Feature	1,450	8.25	25
5211-1	End of File Feature	0	0	0
<b>PRINTERS</b>				
8242-030	Printer; 625 lpm, 132 positions	46,100	237.50	530
8242-040	Printer; 625 lpm, 160 positions	60,650	311.25	781
8243-030	Printer; 1250 lpm, 132 positions, 64 characters	50,950	258.75	873
8243-040	Printer; 1250 lpm, 160 positions, 64 characters	65,500	332.50	1,124
8243-051	Printer; 833 lpm, 132 positions, 96 characters	60,650	308.75	1,043
8243-061	Printer; 833 lpm, 160 positions, 96 characters	75,200	381.75	1,290
8244-100	Train Printer; 600 lpm, 132 positions	70,950	350.00	950
8244-200	Train Printer; 1200 lpm, 132 positions	73,950	375.00	1,325
8248-011	Bill Feed Printer; 600 lpm	84,750	493.75	1,330
5216	Interchangeable Chain Cartridge Adapter	3,125	-	75
8249-011	Bill Feed Printer Control	50,250	106.75	980
<b>MISCELLANEOUS INPUT/OUTPUT UNITS</b>				
8221-010	Paper Tape Reader/Punch; 200/100 cps	24,250	138.25	405
8221-011	Paper Tape Reader/Punch; 200/100 cps	25,500	145.00	424
8221-020	Paper Tape Reader/Punch; 200/100 cps	26,950	153.50	447
8221-021	Paper Tape Reader/Punch; 200/100 cps	28,250	159.75	467
5219	Advanced Sprocket 6-Level Read	2,250	12.25	36
5256	Long Block Indicator	950	4.50	17
5292	4N Terminate	1,900	10.00	32
5296	Read Kleinschmidt Format	1,900	10.00	32
5297	End of Tape	475	2.50	8
5298	Gapless Mode	475	2.50	8
5299	Punch Kleinschmidt Format	1,650	8.75	28
8224-010	Paper Tape Reader; 1000 cps	26,700	152.00	444
8224-011	Paper Tape Reader; 1000 cps	27,950	158.25	464
5264	Long Block Indicator	950	4.50	17
5273	Supply Reel Reverse	950	4.50	17
5293	4N Terminate	1,900	10.00	32
8272	MICR Sorter-Reader Controller	29,100	62.00	571
8310-021	Standard Interface Switch	4,200	8.75	81
8350-002	Switch Controller	23,100	48.75	451
8350-003	Switch Controller	27,950	57.50	544
8350-004	Switch Controller	32,800	67.50	641

\* Rental prices do not include equipment maintenance.

## RCA 2, 3, 6, & 7 EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
<b>DATA COMMUNICATIONS</b>				
8627-010	Data Exchange Control	21,900	46.75	428
8653	Communication Control	14,550	31.00	285
8656	Communication Controller—Single Channel	20,700	57.50	394
5628	Auto-Call Feature	1,175	3.25	23
8660-009	Front End Communications Processor (32,768 bytes)	61,055	209.00	1,171
8660-011	Front End Communications Processor (65,536 bytes)	87,055	209.00	1,676
8668-011	Communication Controller—Multichannel; 16 buffers	33,950	108.25	634
8668-021	Communication Controller—Multichannel; 32 buffers	43,650	138.75	814
8668-031	Communication Controller—Multichannel; 48 buffers	53,350	170.00	999
5617-1	Telex Operation	2,350	6.25	45
5618	USASCII Block Check Character	940	2.50	18
5620	Timer Restart/Interval Selector	700	2.00	14
5622	Message Separation	470	1.25	9
5623	OW-Unshift	470	1.25	9
5624	Timer Reset	700	2.00	14
5635	Synchronous Full-Duplex Operation	940	2.50	18
Communication Buffers:				
8610-000	Telegraph Buffer	1,300	3.50	24
8612-000	Telegraph Low-Level Buffer	1,850	4.75	34
8615-000	Parallel Buffer	1,850	4.75	34
8617-000	Parallel Data Set Buffer	4,700	13.25	90
5717	Auto-Call Feature	950	2.50	18
8620 Series	ADS Buffer	2,050	5.50	39
5705	Auto-Call Feature	950	2.50	18
8621-000	SDS Buffer	2,050	5.50	39
5705	Auto-Call Feature	950	2.50	18
5714	Full-Duplex Operation	475	1.25	9
8680-000	Time Generator/Buffer	5,350	14.25	102
8740-011	Data Terminal; 300 lpm, 80 print positions	37,125	162.50	695
8740-012	Data Terminal; 600 lpm, 80 print positions	46,500	188.00	870
8740-021	Data Terminal; 300 lpm, 132 print positions	40,500	175.00	760
8740-022	Data Terminal; 600 lpm, 132 print positions	49,860	200.00	935
8741-000	Card Reader; 300 cpm (for 8740)	9,000	38.75	169
5753	Card Reader Adapter (required)	1,125	5.00	21
5642	Mark Read Feature (vertical marks)	7,540	20.00	145
5643	Mark Read Feature (slanted marks)	7,540	20.00	145
Modular Video Data System:				
8751-11	Video Data Terminal	2,820	12.00	48
8751-12	Video Data Terminal	3,100	13.00	52
8756-11	Video Data Generator; for 8 terminals	10,340	40.00	180
8756-21	Video Data Generator; for 4 terminals	8,460	35.00	145
8756-31	Video Data Generator; for 2 terminals	7,520	30.00	130
5716	Data Format Feature	375	2.00	6
5721	Variable Start of Transmission	No charge	No charge	No charge
8759-011	Video Data Controller; Local	22,560	80.00	395
8759-021	Video Data Controller; Communications	15,040	50.00	265
5715	Station Selector	940	4.00	16
8752-100	Video Data Data Terminal (stand-alone)	8,325	32.25	164
5707	Station Selection Feature	850	3.50	17
5710	Data Format Feature	850	3.50	17
5711	Printer Adapter	1,700	7.00	35
8752-210	Video Data Terminal	8,325	35.00	155
8752-211	Video Data Terminal	8,325	35.00	155
8752-212	Video Data Terminal (upper/lower-case keyboard)	9,290	37.00	173
5760	Station Selection Feature	750	3.00	15
5761	Data Format Feature	750	3.00	15
5762-1	Printer Adapter	1,000	4.00	20
5764	Display Suppress Feature	750	3.00	15
5765	Screen Address/Retransmit Feature	500	2.00	10
5767	Break/Availability Feature	500	2.00	10
5771	Double Page Feature	500	2.00	10
5772	Display Expansion Feature	1,250	5.00	25
6740-11	Teletypewriter; ASR, friction feed	5,650	34.75	112
6740-21	Teletypewriter; ASR, sprocket feed	5,850	35.75	117
6741-11	Teletypewriter; KSR, friction feed	3,650	22.50	72
6741-21	Teletypewriter; KSR, sprocket feed	3,850	23.50	76
6742-11	Teletypewriter; RO, friction feed	3,250	21.25	63
6742-21	Teletypewriter; RO, sprocket feed	3,450	22.25	67
6750-11	Teletypewriter; ASR, friction feed, 15 cps	7,810	45.00	155
6750-21	Teletypewriter; ASR, sprocket feed, 15 cps	8,250	45.00	165
6751-11	Teletypewriter; KSR, friction feed, 15 cps	4,560	35.00	90
6751-21	Teletypewriter; KSR, sprocket feed, 15 cps	5,070	35.00	100
6752-11	Teletypewriter; RO, friction feed, 15 cps	4,130	30.00	80
6752-21	Teletypewriter; RO, sprocket feed, 15 cps	4,640	30.00	90

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