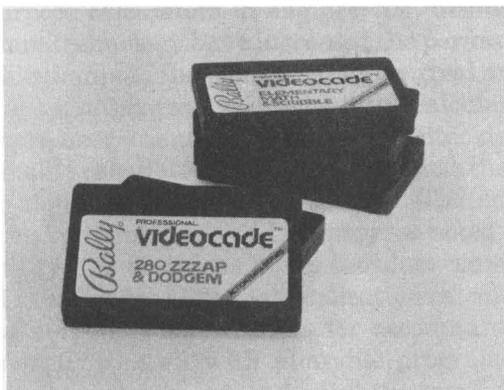


Programmable Calculators: How to Use Them

BY

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CALCULATOR INCLUDED IN BALLY VIDEO GAME — CASSETTES INCLUDE MATH EDUCATION AND ART . . .

The Bally Professional Arcade has commercial arcade excitement and fun, and that all begins with Professional-arcade games. The computer-like console comes with the popular Checkmate, Gunfight games and a sophisticated 4-function, 10-memory printing calculator built in. The Bally Professional Arcade works for its owner as well as entertains him. It's a sophisticated 4-function, 10-memory printing calculator with scroll button and entry correction, capable of reconciling bank balances, computing taxes and the like.

the screen. External electronics required are minimal. Interfacing is simple, through the antenna. The *six-on-one* chip is a standard 28-pin, plastic, dual-in-line (DIP) package . . ." And, one might add, the chips were very cheap, getting cheaper as quantities built into the millions. The competitors quickly jumped in with vicious price-slashing to ensure their own early large shares of this practically unlimited market for the masses. The market size was initially estimated at 2 million units for 1976-77, then 2.5 to 4 million, and finally to 7 million for 1977-78.

With those figures, giant RCA jumped into the market with *high-end* products based on the company's 1802 single-chip microprocessor. The RCA game is microprogrammable, like the Fairchild and Rockwell games mentioned below, with cartridges. The relatively simple "Pong" and other paddle and target games, originally selling for about \$80, were expected to be available very soon "after the (1977) holiday season for \$30 and \$40." The major semiconductor and microcomputer manufacturers sought to avoid this price erosion with the *fancier* microprogrammable — endless variety — types. The main market units were priced from \$50 to \$150, but a large and growing market from \$250 to \$1000 was expanding fast. Microprocessor-controlled electronic pinball machines and coin-operated video-display games worth \$250 million brought the total electronic games market to near \$1 billion for 1976-77, from a start of a few hundred thousand dollars 3 years earlier.

Atari, one of the makers of the Pong game, successfully sold in mass through Sears, Roebuck & Co., unveiled a line of new video games and an estimated 30 companies were in the field with competing units in mid-1976. The variety extended to airplane *dog* fights, sea skirmishes, tank battles, and a seemingly unending variety with new intrigue popping up weekly. For example, Fairchild's Exetron Division demonstrated five games at the Consumer Electronics Show, in 1976, and displayed some of the 10 or more \$19 to \$25 cartridges that plug into one game console to *program* different games, the base game selling for from \$100 to \$150. Other companies purchasing the same F-8 microprocessor offered chess games *matched against the microcomputer* at several levels of complexity, using hand-held units that have only an alphanumeric display. The head of one firm, Executive Games, Inc. suggested that the type and variety of games were limited only to the imagination of the individual company.

Names such as Bally, Ramtek, Micro Inc. and others were certain to become household words as the competition expands. Microprocessors are again, like they are in advanced programmable calculators, the *magic* since they permit game controls to be programmed and reprogrammed quickly when developing the original game concept; when offering multiple options for the user, and when building in more features for use with cartridges and tapes. Such expandable capability allows some of the suppliers to program into home games the ability to make the better games progressively more difficult as the players become more accustomed to the variable formats. This adaptability heightens the players interest longer and increases his challenge — not only to the games but also to the tools and digital products, very similar in operation and control, to these he uses at work — programmable calculators.

It was interesting to note that just as the electronic game onrush occurred, Sony (not in the games business) announced its home video cassette recorder that works with both tape and a paper-like sheet storage medium, Mabica, the potential being greater than tape or disks because it costs less than tape and is erasable, unlike disks. West Coast consumer import sources believe Sony could market versions of its Betamax recorder equipment, first sold in the U.S. in

The Rise of Home Computers as Competitors to Calculators

It is fitting that we close this chapter with a few pertinent notes concerning a rapidly accelerating movement of intelligent games and home computers as used first by hobbyists and engineers and now by professional people, students, and wide ranges of business people as well. The home microcomputer really has its origin from calculator chip development. The original microprocessor was an unplanned development by large scale integrated circuit designers (from Intel Corp. with an order from a Japanese firm) faced with designing a calculator chip with changing requirements. Unintentionally, they backed into the microprocessor (and by adding memory, control and Input-Output, into the microcomputer) by designing a universal calculator chip that could be programmed like a computer for various functions. Now, microcomputers use high level languages, control industrial equipment and consumer appliances and toys, and are incorporated into thousands of communications and automation items. When keyboards, printers, video displays, floppy disks, and other peripherals are connected to or integrated with the various microcomputers, they become complete computing systems. The discussion below of four such microcomputers attests to this, and the accompanying photographs show the range of capability and easy interface to all types of individuals . . . as they learn, play and profit.

Nearly all microprocessor families can be purchased mounted on chips or boards interfaced easily to peripheral and memory boards and usable with standard programs and code conversions through ROM or other easily programmed media. The video games by Bally, RCA, Fairchild, National Semiconductor and others are often advertised as computers because they have a computer-like memory. Thus, with the home tv as an output device, the games' calculator-type terminals as input devices, and the microprocessors in the games for control, selection, decision-making, and calculating, the *game-type* home computer will *back into* personal use rapidly. And, once used *as a computer* people will want more versatility. Many feel the home computer will then come to affect us more drastically than television did; the possible applications are unlimited. Scores of brands are available, a dozen or more personal computer periodicals have subscriber totals reaching from 35,000 to well over 100,000. Although this is a calculator book, intelligent readers will desire to be aware of some of the latest microcomputer products, and in a limited space, we shall discuss four models as being representative of the deluge soon to come.

The Heath Company Products and Competition from Apple II and Commodore's PET, a Display-Integrated System

Most *microcomputers* are 8-bit types; the larger *minicomputers* are often 16-bit types for larger word efficiency. The Heath Co. of Benton Harbor, MI. introduced one of each in late summer, 1977. The Heath Company was the first major corporation to enter the Home Computer market. All of the major semiconductor manufacturers had previously introduced board and chip systems, but they were the *bare bones* types to be designed into other products by original equipment manufacturers (OEMs), although National Semi-Conductor Corp. sold many thousands of SC/MP boards and calculator-like terminals for \$95 each as *learner* microcomputer systems. Scores of small *assembler* firms bought chips and other gear and sold complete systems to computer stores and by display ads in magazines and direct mail. The Heath company is a division of Schlumberger, Ltd. which is listed on the New York Stock Exchange. The Heath Company alone does about \$100 million in sales of Heathkits for ama-