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BERGER-BRAITHWAITE VIDEOTESTS:
GTE SYLVANIA SUPERSOUND TV ● RADIO SHACK TRS-80 COMPUTER
SONY BETAMAX with BETASCAN

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ABOUT OUR COVER
The seemingly abstract, color-saturated image on this issue's cover is actually a cheerleader's "Pom Pom," the title of this example of video-still photography by Laurence Gartel. It was created with a TV set, video camera and 35 mm still camera plus special effects equipment. See story, "Frozen Moments in Time," on page 36.

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Arcade Alley

A Critical Look at Video Cartridge Games & Programs

by Bill Kunkel & Frank T. Laney II

The 1st Annual Arcade Awards

These days, giving out awards is part of American culture. Not to be outdone, we have decided to bestow a series of "Arkies" to honor excellence in home video games.

Although we consulted a cross-section of arcade enthusiasts, we made the final selections ourselves. Therefore, as might be expected, our choices reflect the personal tastes and preferences that have by now become familiar to most regular readers of this column.

Remember, when looking over the roll call of winners, that it is only possible to single out a handful of games for special recognition; we often found ourselves forced to choose among a great number of worthy possibilities. Really, most video game manufacturers are doing a solid job of providing arcade addicts with excellent hardware and software.

Since this is the first go-round for the Arkies, it seemed somehow unfair to ignore noble efforts just because they didn't fall neatly within the confines of calendar year 1979. Accordingly, this first set of Arkies covers everything available in the home arcade field as of January 1, 1980. Next year at this time we'll award Arkies to products newly available in 1980.

So, with an appropriate *beep-beep-be-boop* electronic fanfare, here are this year's Arcade Award winners.

★ *Best Hardware*
Magnavox Odyssey²

The games themselves are probably the most important part of any home arcade system, but well-designed components certainly add to players' enjoyment. The Odyssey² console, which features a full monoplane keyboard, is very attractive—yet rugged enough to stand up under regular play.

The Odyssey² joystick controllers are, quite simply, the best available. They require less hand strength to manipulate, too, which comes in mightly handy when playing games that call for a lot of manual dexterity.

★ *Best Audio & Visual Effects*
Bally

It beeps, it bangs, it jingles, it chimes—and the games explode off the screen in a rainbow of colors. Nothing creates that delightful arcade atmosphere like superior sound and visual effects, and the Bally system is the undisputed champ in this regard.

Decades of dominance in the pinball machine business have made Bally conscious of the fact that a truly *complete* game must sound and look right in addition to playing well. Their games are a symphony of fluid animation, vibrant color, and tasteful sound effects. It's "window dressing" like this that elevates an excellent game like Bally Football to the level of a home arcade masterpiece.

★ *Best Games*
Atari

"The play's the thing," quoth William Shakespeare, and some of the Bard's spiritual descendants must be working in Atari's design department. The folks who started it all with Pong now offer an unmatched array of the most competitive and exciting game cartridges available to the home arcade addict.

"The software's the thing," the Bard might have said. If so, Atari scoops the competition with its assortment of over 1300 video games.

Atari's line of 20 game cartridges (embodying over 1300 distinct variations) literally has something to suit every taste. Whether the gamer's choice is the continuous action of Basketball or the more leisurely and subtle Miniature Golf, Atari is ready to satisfy. The company's games excel because they are simply without being simple-minded, easy to play without being boringly easy to master.

★ *Best Pong Variant*
Volleyball (Atari "Video Olympics")

For those weary of regulation Pong, Atari has created something at least as much fun by turning it on its side. Two players, each controlling a horizontal paddle, bounce the ball back and forth over the net to score points.

A unique "spiking" feature allows players to leap for the ball and then smash it down into their rival's end of the court. The game reproduces the flavor of real volleyball by making the ball arc higher each time a player hits it more than once in a row. A four-player version on the same cartridge is also highly recommended.

★ *Best Sports Game*
Football (Bally)

This game provides arcade lovers with an amazing amount of pigskin action—including inside and outside running, pass interceptions, quarterback sacks, razzle-dazzle plays, and even a "mad dog" linebacker on defense! Would-be quarterbacks can select from a wide range of plays, with the available choices altering to reflect current field position.

The best part is that Bally wisely decided not to squeeze the whole gridiron on the screen at the same time. Instead of squinting at a tiny full-size field, players luxuriate in the detailed presentation of the 40-yard segment that is actually the focus of the action. When a play goes for an unusually long gain, the next 40-yard section automatically fills the screen.

Accepting the "Best Hardware Award—1979" is Magnavox's system. The sleek keyboard and joystick controls won the swimsuit competition in a walk, but the unit offers performance, too.

★ *Best Target Game*
Air-Sea Battle (Atari)

Whether you prefer firing anti-aircraft

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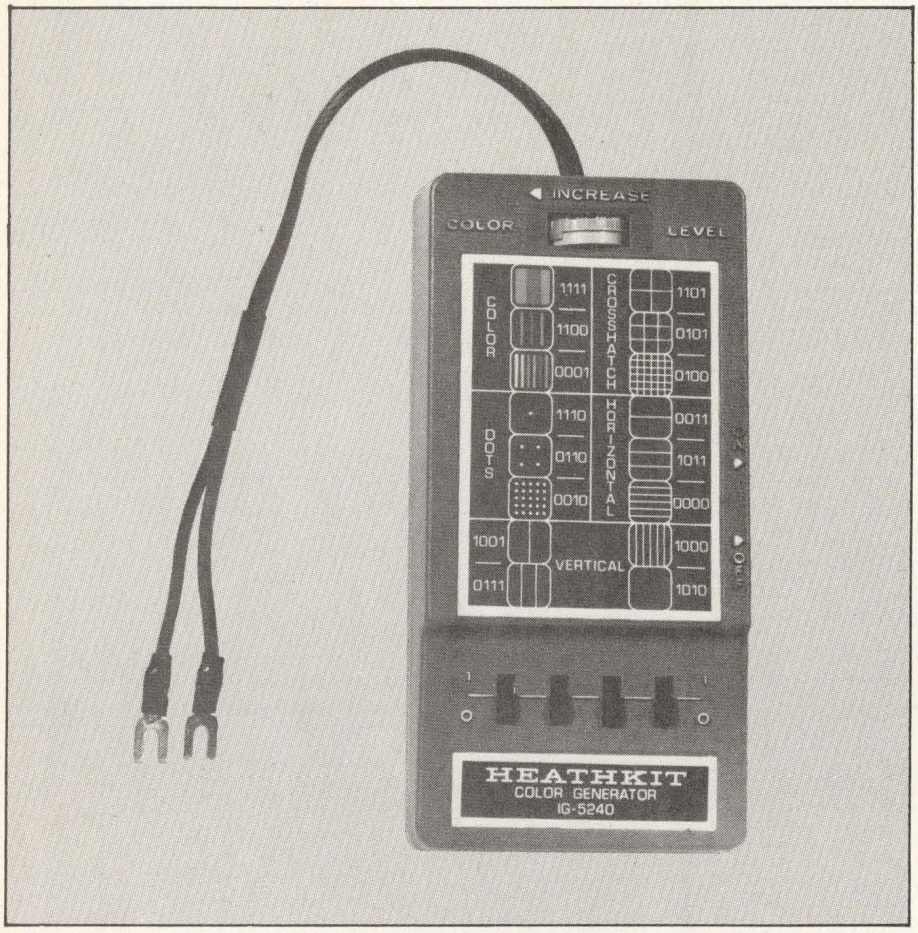
Bill Kunkel is a N.Y.-based writer and veteran video game hustler. Frank T. Laney II is a freelance writer specializing in pseudonyms.



had when you fed the bars directly into the set, you can be sure the VCR is not modifying the colors. If the VCR is causing some change, a trip to your dealer is in order (there are no user accessible controls for color balance on a VCR, so you can't make adjustments yourself).

Setting up a color camera is a little trickier. You must use either a printed color bar chart or the scene before your camera and compare with the reproduced results on the monitor. Getting an accurate match is a little more difficult because you have gone through three pieces of equipment, and the errors are cumulative. But though going through this is a little extra work, it does pay off in good color quality of your homemade tapes.

Construction from the Kit: The IG-5240 is built on two small (1½ x 2½-inch) circuit boards that, although closely packed with components, are not difficult to assemble. The hardest part of construction is working on boards that small but Heath solved that by recommending a homemade holder made with a clothespin and a piece of scrap wood. One of the boards is downright easy to build because it has on it only five capacitors, four resistors, four switches, a crystal, and an IC. The second board has quite a few more parts and they are all small, but all you need is a little patience. Of course, since the boards are small the conductive traces on the printed circuit boards are narrow and close together, so you must be careful not to bridge them with solder. Otherwise assembly is a breeze.

During assembly, which took just five hours, we made six notes. First, that the holder mentioned earlier was indeed an excellent third hand—you need it. Second, be careful when you cut wire to the lengths specified because they give you just barely enough. If you should cut a wrong length by mistake be sure to replace it with one of the same color and gauge—the color coding is important to prevent confusing the wires. Third, in one illustration a transistor is shown as having its three wires in a triangle formation but the board has the holes in a straight line. Fourth, the "on" and "off" switches are so tiny it might be worth your while to mount them in position before soldering the wires to them, even if you only mount them temporarily. Fifth, be very careful to avoid solder bridges when you attach the signal cable. And last, be careful not to bend the pins on the IC when you insert it in its socket and make sure you plug the IC into its socket with the pins going to the correct holes. (It can go into the socket in two ways, only one of which is correct; we had our test generator apart a few times and on one occasion replaced the IC incorrectly.)

The changeover from channel 4 operation to channel 3 operation requires only two part changes and is easiest done at the time of original construction. If the conversion is done later, as we did it, changing the crystal is easy but changing the capacitor is somewhat harder. Be careful not to make solder bridges.

If you enjoy construction products, this one will give you an evening of pleasure putting it together and many years of good color reproduction from your video equipment.

What Our Tests Showed: The generator gave good color bars that were useful in setting up our TV sets. We did not use it in the setup of VCRs or cameras because such a tryout would test the VCR or camera and the procedure, not the generator. We were satisfied to have some sort of standard that could be used to repeat settings but, as in anything to do with color, personal preferences come to the surface; one of us preferred a slightly cooler, bluer picture. But isn't that what standards are for? We could just match colors from the generator to those on a color chart and solve the problem of which was correct by that method.

The generator does not tell you what you should like, only if what you get out is what you put in. It is an impartial standard whose only job is to be impartial. We judge that as a constant source of color video signal the Heathkit Model IG-5240 color generator is a stable guide by which to set up TVs and home video equipment, and as such it is a useful addition to the equipment rack of any serious home video enthusiast.

Test Report: Heathkit Color Generator

DATA
Date of test: September 1979
Model: IG-5240
Suggested retail price: $64.95 in kit form; $95 assembled
Function: color generator—produces standard color bars, horizontal and vertical lines, crosshatch, and dots for aligning color TV sets
Dimensions: 1⅛ x 5½ x 2¾ inches (h/w/d)
Weight: 0.5 lbs.
Features: battery-operated portable suitable for field use; automatic shut-off battery-saving circuit

TEST RESULTS & RATINGS
Picture quality: excellent
Long-term stability: good (consistent)
Ease of operation: excellent
Ease of construction: good
Overall performance: very good

Radio Shack TRS-80 Computer

VideoTest number 46

OVER 100,000 of the sleek Radio Shack TRS-80 computers have been sold thus far, more than all other computer companies have sold since computers first appeared thirty years ago. The success is earned; the TRS-80 is not only inexpensive (starting at $499 for a complete system including computer, video monitor, and cassette recorder) but it's easy to use and easy to understand. Although it has its limitations, it is, as we shall see, good.

Like the Apple II (VideoTest #42, January 1980 VIDEO), the TRS-80 is ready to run as soon as it's plugged in. Turn it on and it talks BASIC (the most common high-level computer language in personal-computer use). You can also load programs from the cassette recorder (including programs you've written yourself and saved on tape for future use). There's also an optional floppy-disk system that saves and loads programs faster and more reliably, and also does a few other useful tricks.

General Description: The TRS-80 computer and keyboard occupy a silver-gray plastic housing with dark gray trim that measures only 3½ x16½ x 8 inches (h/w/d). A cable connects it to a 12-inch (diagonal) black-and-white monitor that's similar to a table-model TV set but has no controls save one button. It measures 13½ x 16½ x 12 inches (h/w/d). The computer's power supply is a plug-in box only 2⅝ x 2⅓ x 3¼ inches in size.

The Display: According to Radio Shack, the video monitor has a wider bandwidth than most home TV sets, for sharper display. Nonetheless, the computer can write no more than 16 rows of 64 alphanumeric characters, well within the capabilities of most home TVs. But it also can generate graphics with a resolution of 128 picture elements across and 48 elements from top to bottom of the screen. As with the Apple II, only upper-case (capital) letters are displayed.

A TRS-80 with Level II BASIC ($120 more) has an additional "graphics character" set of 61 characters, representing various combinations of six lighted segments within the basic character space. These graphics characters can be used to build up various images of your own devising, with a resolution of 256 x 144 elements.

The display is in black and white only.

The graphics programs that are part of the TRS-80's BASIC (Level I or Level II) are not as sophisticated as the Apple's (bear in mind, though, that the Apple is more than twice the TRS-80's price—and it doesn't include a cassette recorder or video monitor). Graphics programs are, however, available from Radio Shack and other sources. More on them later.

The Memory: The TRS-80 is normally sold

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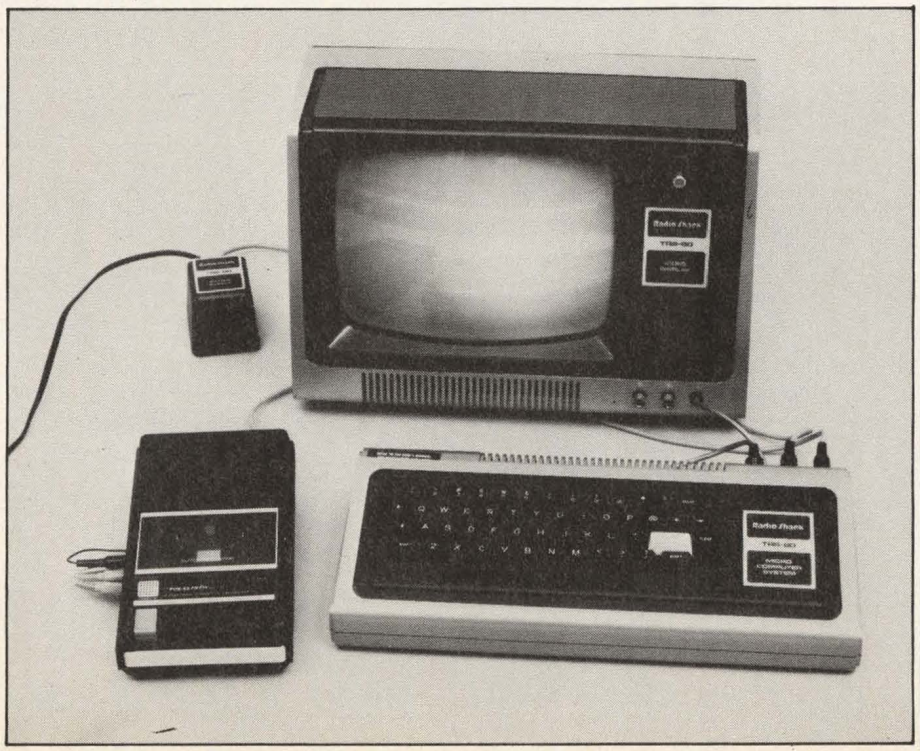

Radio Shack Computer

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with either 4096 (4K) bytes of RAM memory or, for an additional $330, 16,384 (16K) bytes. RAM (random-access memory) is where you store your programs and data while you're using them; but such memory "forgets" whenever you shut off its power. BASIC and the basic system's software (such as the routines that read the keyboard and output to the monitor) are in ROM (read only memory), which retains its contents at all times. The Level I model has 4K of ROM; the Level II, with more elaborate BASIC, has 16 K.

It's possible to add more memory but not within the the original TRS-80 unit. Additional RAM (up to 32K of it) fits into an Expansion Interface ($299 alone, $448 with 16K RAM and $597 with 32K), which supplies some additional facilities that are discussed in detail later.

Input and Output: The TRS-80 has a built-in keyboard, output to the video monitor screen, and audiocassette interface, and a 44-pin connector for use with the Expansion Interface and other peripherals.

The keyboard is a 53-key, typewriter-style unit with seven extra keys: arrows pointing up, down, and to both sides plus keys labeled BREAK, CLEAR, and ENTER. The Enter key (called RETURN on most computers) tells the computer that the command or data line you've just entered is complete and ready to be processed. The Break key interrupts the program so you can fix any errors or start a new program. The Clear key clears the screen. The left-arrow acts as a backspace, erasing each character it spaces over; this makes it easy to correct errors in the line you're writing. The up-arrow scrolls the display up, line by line, so you can (among other things) walk your way through a program listing that's too big to fit the screen.

With Level II, additional functions are added. A shift-backspace deletes not one character but the entire line you're on. A down-arrow acts as a line feed, to move the computer down to the next line of the display. A right-arrow becomes a tab key, moving the cursor (the spot that indicates where the computer is working on the display) 8 spaces at a time; a shift-tab converts the display from 64 to 32 characters per line, with larger characters that can be seen from further away. The up-arrow has no function in Level II.

Typing numbers on a typewriter's single line of number keys is much harder than entering them on a calculator's bunched keypad. Current TRS-80s therefore incorporate a numeric pad to the right of the main keyboard, with the digits 0-9, a decimal point, and a duplicate ENTER key. It can be added to older TRS-80s for $79.

The cassette interface operates at a fairly slow 250 baud on Level I machines (about one-sixth as fast as the Apple's, for example); Level II machines run at 500 baud but are much more sensitive to errors in setting the tape recorder's output level.

In additional to the Expansion Interface (which provides some additional input/output capabilities), the 44-pin connector in the rear can accept a printer interface cable ($59) for use with some of Radio Shack's printers; voice input and output devices can also be plugged in here. Other input and output devices are available from other manufacturers.

The Microprocessor: The actual computing in the TRS-80 is done by a Z-80 microprocessor chip. If you're deeply interested in programming, this is significant, especially if you're already familiar with the rather similar 8080 processor; the Z-80 uses many of the 8080's commands, adds quite a few others of its own, and can run faster (though in the TRS-80, it runs at about 8080 speed). The TRS-80 requires some rather unconventional programming techniques, so a great many of the programs written for the Z-80 won't be usable with the TRS-80, but that's not very important since thousands of programs have been written specifically for the TRS-80.

Beginning users will almost certainly program the TRS-80 in BASIC; it will matter little to them what chip lies several layers of software beneath the BASIC programs they actually have contact with.

Peripherals: In its fundamental form the TRS-80 is designed for use as a stand-alone computer; it requires no other peripherals except its cassette recorder, and it has little direct provision for any. Adding other peripherals is mainly done through the $299 expansion interface.

The interface is a silver-plastic box styled and sized (4½ x 16½ x 8 inches) to sit directly beneath the video monitor; it requires no extra table space. The interface provides output connectors for printers, disk drives, a second cassette recorder, and a standard (RS-323C) serial input/output port for use with non-Radio Shack equipment. As previously mentioned, it also holds up to 32K of additional RAM memory. The RS-232C board that mounts inside the expansion interface costs $99.

Probably the most important interfaces offered for the TRS-80 are the disk system and the printers. Disk drives greatly increase a computer's capabilities. They can save and reload programs faster and more reliably than a cassette. All parts of a disk are quickly accessible, too: to move from beginning to end of the disk, the data head must move in only an inch or two from the outside to the inside edge while many yards of tape must be wound past the head to get from one end of the recording to another. Consquently, it's possible to put long files of data (business records, for example) on a disk and reach any part of any file quickly. Disks also hold a lot. Radio Shack's, for example, hold 89,600 bytes per disk, though not quite all of that is available to the user. The disk system includes an even more powerful version of BASIC designed to take advantage of the disk's file-handling capabilities.

Five printers are available, at prices ranging from $219 to $1999. The two printers available under $500 print on special, aluminum-finish paper of limited width. The higher-priced printers use standard paper and have such features as longer printing lines, more precise paper feed, and printing of carbon copies. All these models are dot-matrix types; that is, their letters are formed from separate dots, not formed in one piece, as typewriter and printed letters are. All printers also require Level II BASIC or Disk BASIC—they cannot be used with a Level I machine. All but the lowest- and highest-priced models can, however, be used without the Expansion Interface, though a $59 printer interface cable is then required.

Other peripherals available include the Voice Synthesizer, VOXBOX, and Telephone Interface II. The Voice Synthesizer "speaks" in a gravelly, toneless voice through its own built-in speaker. You can program in combinations of some 60 "phonemes" representing speech sounds ($399). The VOXBOX ($170) does the opposite, allowing you to program the TRS-80 to respond to a few spoken words (how many depends on the amount of memory you have in your machine).

The Telephone Interface II is an acoustic-coupler modem that lets your TRS-80 communicate with other computers by telephone. It can either originate or respond to calls ($199).

A wide variety of other peripherals is available from other companies as well.

Software Support: The TRS-80 comes with built-in BASIC in read-only memory that's available as soon as you turn the system on. But you have a choice of two BASICs to play with.

Level I BASIC is less expensive but more limited. But it does allow some powerful techniques, including some graphics, data storage within the program, and modest use of strings (data treated as strings of characters without regard to any numerical value it may have; words are most often treated this way). And it has one of the best tutorial manuals we've ever seen, one that leads the beginning user by the hand from total ignorance into some pretty powerful programming techniques.

There's more power in Level II. One can, for instance, insert, delete, or change something in the middle of a previously written Level II program line (in Level I you'd have to rewrite the entire line from scratch). Level II can also insert a new line number automatically before new program lines, can take strings apart and put them together, can do mathematics to 16-digit instead of 6-digit accuracy, do trigonometric functions, and interface with the disk and printer peripherals. There's also a Trace function that shows you the flow of operations in a program, so that you can see where and why it's going wrong. When it does go wrong, it has 23 error codes instead of 3, for a more specific look at the problem.

We started with a Level I machine, then had it converted to Level II (normally a $120 charge). We'd recommend the Level II—its features are worth the extra money, not just in greater power but in such conveniences as easier editing. But we'd also recommend spending the extra $6 for a copy of the Level I User's Manual; even if you're already somewhat familiar with BASIC, you'll learn from it—and nearly all of what it says applies equally well to Level II.

Other Software: Radio Shack's most recent computer catalog lists 53 different programs, not counting such variants as payroll programs for Level I, Level II and disk. Hundreds of others have been written and sold by others.

Of Radio Shack's programs, 21 are business programs, most of them designed for use with disk. That makes a great deal of sense—anyone buying *any* computer for business purposes should consider a disk a necessity. The programs cover a wide range (those marked * are available in cassette form, too): mailing lists*, inventory control, accounts payable and receivable, time accounting, depreciation, payroll* real estate (cassette only), statistical analysis (cassette only), concrete foundation cost estimating, and word processing.*

For BASIC programmers, there are programs to renumber all or part of your BASIC programs plus double-precision (15-digit) math routines for trig functions, natural logs,

Test Report: Radio Shack TRS-80 Computer

DATA
Date of test: October 1979
Price: from $499
Components included: black-and-white monitor, cassette recorder, power supply
Process: Z-80
RAM (Random Access Memory): 4K (4096 bytes); may be expanded to 16K internatty and up to 32K with expansion interface
Inputs: built-in keyboard or cassette interface, cassette recorder (other inputs may be connected through expansion interface)
Outputs: black-and-white video to companion monitor, cassette recorder (other outputs may be connected through expansion interface)
Firmware: Level I BASIC in ROM (Read Only Memory); Level II BASIC optional
Accessories: modems, printers, voice recognition devices, speech synthesis devices, floppy disk mass-storage devices, expansion interface, serial interfaces, desks
Software: home and business programs available from Radio Shack and numerous other sources

square roots, and exponentiation. For more advanced programmers, there are machine-language assemblers, editors and monitors on tape, plus FORTRAN and an assembler on disk. (If you don't know what these mean, it's probably a sign that you don't need them yet.)

Most VIDEO readers will probably find the personal, educational, and games programs of greatest interest. The personal programs include a computerized "card-filing" system, personal finance programs, and stock portfolio analysis. Educational programs teach arithmetic, algebra, and even BASIC itself, plus a Teacher Aide program for such tasks as grade processing and averaging. Games include blackjack, backgammon, chess, checkers, and various space games and casino games.

Conclusion: The TRS-80 has its limitations: somewhat finicky tape loading, a keyboard that displays only upper-case letters, no color capability, and less expansion capability than some dedicated computer hobbyists or business users might like. But against those limitations, it has some substantial virtues: ease of use; excellent manuals for the user and technician; ready expansion into the important areas of printing, disk filing, and telephone modem communications; ready availability of so much software that a magazine has been started simply to run software reviews; a system of useful accessories that includes carrying cases, dust covers, desks and printer stands, and so on . . . all at an exceptionally low base price.

You don't have to be a technician or an expert programmer to use a TRS-80 and to learn from it; you can start cheap and expand the system as your needs expand. It is designed for home and small-business use, and it serves both very successfully.

Televiews

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change from the usual predictability of situation comedies. But though he hasn't lost his wacky touch during the second season, the program as a whole has disappointed as often as it has pleased.

ABC made an honest attempt to improve *Mork and Mindy* by revamping the cast, surrounding Williams and Pam "Mindy" Dawber with a supporting company more worthy of their talents. But that's exactly where the series has run into trouble.

Mindy's father and grandmother—acceptable if uninspired characters—are gone, replaced by a brother and sister team from New York City. The pair ostensibly went west to open a delicatessen in Boulder, Colorado, but I'd be willing to bet their neighbors' wagging tongues had something to do with their departure from the Big Apple too. Remo and Jean are just too kinkily close for words, more like husband and wife than siblings. This was all too obvious in an early episode that dealt with the joys of "kissing and making up" after a fight. The script drew absolutely no distinction between the way Remo and Jean patched things up and the way Mork and Mindy did it.

In any event, this incestuous twosome has not appreciably added to the pro-

Arcade Alley

continued from page 18

bursts, torpedoes, or depth charges, this is video war at its finest. In the anti-aircraft and torpedo games, an assortment of juicy targets zip across the top two-thirds of the playfield, shooting-gallery fashion, while players vie to see how many they can blast out of existence. Torpedo, our personal favorite, is especially lively when played with guided missiles.

Another Air-Sea Battle variation, Polaris vs. Bomber, is not for the fainthearted. One player's airplane drops depth charges over the other player's sub, which answers with nuclear missiles of its own. It takes a steady hand, indeed, to fire accurately while dodging destruction.

★ *Best Science Fiction Game*

Cosmic Conflict (Magnavox)

The incredible success of *Star Wars* has boosted the popularity of science fiction to new heights in recent years. Video game makers, responding to this upswing in consumer demand, have jumped on the bandwagon, filling home screens with enough spaceships, stars, and planets to satisfy any s.f. fan.

The best among the many excellent space games is Cosmic Conflict. This solitaire triumph casts the player in the role of defender of freedom in the galaxy, pledged to stop the invading fleet from destroying our corner of the universe. The use of two different types of targets—defenseless transports and deadly starfighters—keeps things lively throughout this fast-paced shootout in space.

★ *Best Solitaire Game*

Golf (Magnavox)

Since arcade game opponents aren't always available when you want to play, dedicated gamers should have solitaire entertainments like Golf in their collections.

A tiny on-screen golfer drives and putts around nine holes distinguished by such expected links obstacles as water and rough. Once he reaches the green, a marvelous thing happens—the playfield shifts from an overview of the entire hole to a close-up of the green.

The little golfer can blast down the fairway with the best, but he has very little patience. After a particularly inept shot, he'll bash his club up and down on the ground in a raging fury. (Does this sound like anyone *you* know?)

★ *Most Innovative Game*

Basketball (Atari)

Most video basketball games offer only two-dimensional play, but Atari wins this Arkie for adding the vital ingredient of court depth. Since the court is presented

as a trapezoid, players can move from side to side as well as up and down between the hoops. This unique concept opens up the game, introducing elements of defense and position play never before available in an arcade basketball game.

Atari builds on this excellent foundation by introducing shot blocking for defensive players and an excellent solitaire version for those lonely evenings at courtside.

★ *Best Commercial Arcade Game*

Space Invaders (Bally)

The most popular new arcade attraction since electronic games began Space Invaders first caught on in Japan; schoolchildren in that country cut classes *en masse* in order to feed their yen to this ingenious machine. Bally purchased the U.S. rights, reworked the design into a more conventional upright format, and immediately found that Americans love it too.

Players maneuver a laser cannon horizontally along the bottom of the playfield while five columns of space monsters march down the screen, firing their weapons as they come. Players have the extra advantage of four protective bunkers, but these are gradually disintegrated by incoming and outgoing fire. The game gives three rounds of play for 25¢, a round ending whenever the invaders successfully blast the player's cannon.

And there you have them, the 10 winners of VIDEO's first annual Arcade Awards. We invite you to write us, in care of the magazine, with *your* thoughts and opinions about the home video arcade scene.