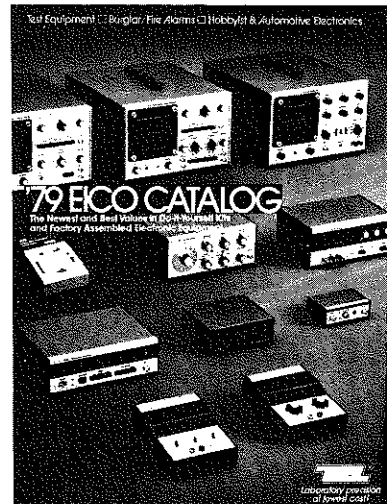


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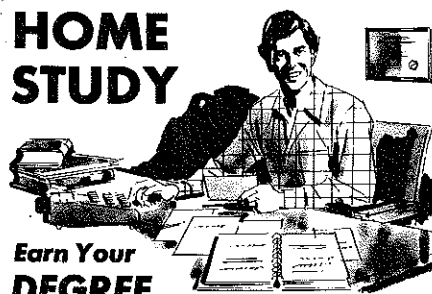
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# Hobby Scene

By John McVeigh, Technical Editor

## ANTENNA LENGTH CALCULATIONS

*Q. I am writing with reference to your article, "Choosing a Mobile CB Antenna," which appeared in the April 1978 issue. In the article, it was stated that at CB frequencies, a vertical half-wave dipole would have a length of 5.2 meters. Using the formula  $\lambda=c/f$ , with  $c=2.9971 \times 10^8$  m/s (speed of light in air) and  $f=27.0$  MHz, I come up with  $\lambda=11.10$  meters, or a half-wavelength of 5.55 meters. Working backwards, I find the frequency corresponding to a half-wavelength of 5.2 meters to be 28.818 MHz, which isn't even close to actual CB frequencies. Could you explain to me why this difference exists? I have searched through my technical references, but have been unable to come up with an answer. —Jim Sloat, Calgary, Alberta, Canada.*

**A.** Your calculations are correct, but the length of a "half-wave" antenna is not exactly one half-wavelength. Rather, a resonant dipole has an electrical length of one half-wavelength. The length of conductor required for a resonant antenna depends on several factors, including the ratio of its length to its diameter. The smaller the ratio (the thicker the conductor), the shorter the antenna for a given electrical length. Practically speaking, the diameter of the conductor accounts for a 2-to-5-percent shortening.

The end effect also reduces antenna length. That is, the strain insulators and wire loops wound on the insulators (in the case of a dipole) contribute a small amount of capacitance, which lowers the resonant frequency. To compensate, the antenna must be shortened by a few percent.

Finally, your calculations are based on a frequency of 27.0 MHz. Generally, an antenna will best cover a range of frequencies when it is tuned to the center frequency. For the 40-channel Citizens Band, which extends from 26.965 to 27.405 MHz, channel 19 at 27.185 MHz is the median frequency. That's 0.185

MHz above the frequency you used in your calculations and further explains the disparity between my statement and your result.

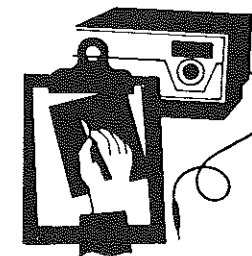
## RFI

*Q. I have amateur and CB radio equipment as well as an audio system. Whenever I'm recording an 8-track or cassette tape and using one of my rigs, my transmissions come through the stereo system and are recorded on the tape. All the components are well grounded, and I've inserted low-pass filters at the outputs of the transmitters. The problem still exists. What can I do to cure it? —Bill Columa, KA4DAP, Rocky Mount, NC.*

**A.** The space we have here is far too small to permit a detailed discussion of the RFI problem, but what basically happens is this. At some point in the audio system r-f enters and is rectified (detected), giving up the information used to amplitude modulate it. The detected audio is then processed by the rest of the system, which cannot distinguish between it and the desired audio signals.

The key to solving an RFI problem is to locate the point of entry and treat it with shielding and/or filtering. I wrote a comprehensive article on the RFI problem for the May 1977 issue of our sister publication *Stereo Review*. That article contained a methodical, step-by-step procedure for eliminating RFI, and I suggest you either locate that issue or order a reprint to the article (ask for Reprint No. 21) at a cost of \$1.50 from Stereo Review Reprints, Box 278, Pratt Station, Brooklyn, NY 11205. Residents of CA, CO, DC, FL, IL, MI, MO, NY, TX, or VT must add applicable sales tax. P.S.—I don't get royalties on reprint sales!

Have a problem or question in circuitry, components, parts availability, etc? Send it to the Hobby Scene Editor, POPULAR ELECTRONICS, One Park Ave., New York, N.Y. 10016. Though all letters can't be answered individually, those with wide interest will be published.



## Product Test Report

### CompuColor II Model 4 Personal Computer System



Has full graphics and built-in floppy-diskette drive

**A**MONG THE few small computing systems that provide color graphics is the CompuColor II from CompuColor Corp. (Address: 5965 Peachtree Corners East, Norcross, GA 30071; Tel: 404-449-5861). Several versions of this computer are available, offering a variety of optional RAM, keyboards, single and multiple disk drives, etc. These are basically two-package systems consisting of a 13" (33 cm) diagonal color monitor and disk drive in one and a keyboard/computer system in the other package. The two are interconnected via a single 30" (76.2 cm) long multiconductor flat ribbon cable.

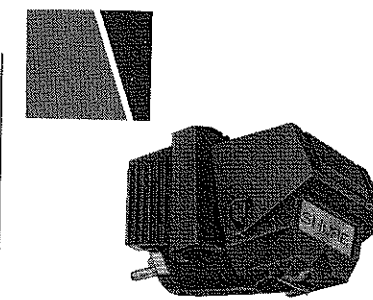
We evaluated the Model 4 version of the CompuColor II, configured with 16K of user-available RAM and a single 5¼" floppy-disk drive. The optional 101-key Model 101 Extended Keyboard was substituted for the Standard 72-key keyboard. In addition to the standard 72 keys, the Extended Keyboard has a separate four-function calculator-type cluster, and a cluster of editing keys. (There is also an optional Deluxe keyboard with

117 keys and offering extended plotting capabilities available at extra cost).

The keyboard/computer package measures 19" (48.3 cm) wide by 7" (178 mm) deep and slopes from 4" (102 mm) high at the rear to 2" (51 mm) at the front. The monitor/disk drive package measures 18" wide by 15" deep by 13" high (457 x 381 x 330 mm). Price of the Model 4 with a Standard Keyboard is \$1695, plus \$135 when substituting the Model 101 Extended Keyboard.

**Technical Details.** The computer is based on an 8080A operated with a 2- $\mu$ s cycle time. It can support up to 65K of memory, and has on-board space for 32K. There is 16K of ROM in which are the operating system and BASIC, and sockets are provided for additional 8K of ROM. The system is designed to use up to 480 I/O ports, 30 of which are implemented in the standard computer. This number includes an RS-232C serial port for printer or modem, with a broad selection of baud rates.

The graphics display features an 8-



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color selection on a 10" by 7" (254 x 178 mm) usable screen area. The 128 x 128 graphics is refreshed at power-line frequency. Alphanumerics consist of 32 lines of 64 characters/line for small-size capital letters or 16 lines of 64 characters/line with large-size caps. Lower-case letters are not included, but 64 spe-

cial graphic symbols are.

Conventional 40-track diskettes are used with an average access time of 40 ms for 40 tracks, while average latency is 200 ms. Data transfer rate is 76.8K bits per second, with a diskette storage capacity of 51.2K bits per side (both sides usable).

The basic keyboard is standard ASCII four-level with 192 codes. It uses gold crossbar keyswitches of commercial quality. CPU reset and automatic diskette loading keys are included.

In software, a complete disk operating system as well as disk BASIC are in ROM. The BASIC is similar to most other disk BASICs and has 32 statements and commands, 19 mathematical functions, nine string-manipulation functions, and 12 disk-file commands. Calculations are to five decimal places.

The operating system has 31 CONTROL-plus-key commands, 31 ESCape-plus-key codes, and 12 graphic-plot commands. There is also a full complement of CRT Terminal commands as well as full-function foreground/background color selection along with 15 plot commands. This wide variety of commands gives the user control over every possible function of the computer.

Most of the keys are assigned two functions. Switching from one function to the other is via the CAPS LOCK key. Some keys are used in conjunction with the CONTROL and ESC keys. Those keys that permit color changes are color coded with their respective colors.

A 50-pin bus connector (located on the rear) provides all addresses, data, clocks, etc., to allow the CompuColor to be extended with any upcoming peripherals. Also located on the rear apron is a connector for RS-232C signals. This latter port can also be used for a printer or modem. Each connector is fully described in the manual.

A large loose-leaf-type "Programming and Reference Manual" is supplied with the system. This manual contains 10

sections that cover full details for using the BASIC language (and covers programming examples), print formatting, and machine-level interfaces for the disk BASIC. The disk-manipulation system is spelled out in detail, as are all color and graphics techniques and the file control system (FCS).

The Manual concludes with seven appendixes that contain in-depth discussions of the disk BASIC, file control system, CRT commands, internal features of the computer, an ASCII value table, and the CompuColor alphanumeric and graphic character set, along with other documentation.

**User Report.** The CompuColor is a complete computer. Simply unpack the two sections, interconnect them via the flat ribbon cable, plug the line cord into an ac outlet and turn on the power. That's all there is to getting the system up and ready to go in either the operating system or BASIC.

To use a diskette, simply insert the diskette in the drive, close the drive door, and press the AUTO key on the keyboard. In just a couple of seconds, the disk "menu" pops up on the screen.

The graphics display was clean and sharp with bright colors. The overall quality of the graphics was excellent due to good convergence and the fact that the monitor bandwidth is better than that of a conventional color-TV receiver. One of the major advantages of the color monitor is that optically disturbing moire patterns (from nearby TV transmitters on adjacent channels or local or mobile hams and CBers) are not seen on-screen. Also, this approach provides an apparent increase in bandwidth since the monitor is not bandwidth-limited by r-f or sound circuits. The CompuColor "Sampler" program on diskette demonstrates the system's graphics capability.

The keyboard was a dream to operate. It has a positive professional "feel" and operated flawlessly.

Having had experience with other BASICs, we found CompuColor's version easy to use. It is a fast BASIC and is broad enough to easily adapt to programs written in other BASICs, except where unique symbols are used.

After working some of the programming examples given in the Manual, we typed in several game programs incorporating color graphics. This is quite easy to do, as a single keystroke can be used to change colors, flash symbols, invert and do other formerly difficult graphics "tricks." These keystrokes can

be written into the program.

We also adapted a couple of business programs to the system, making them much easier to interpret. Credits and debits, are much easier to follow and are color-coded.

The bottom line here is the addition of color to a video computer make working and playing a computer much more pleasant.

CompuColor is supporting with lots of software (diske-

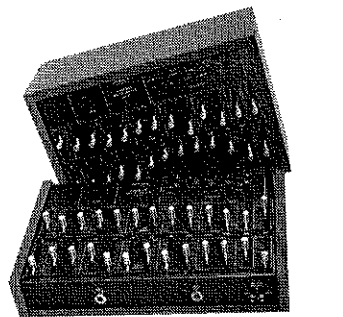
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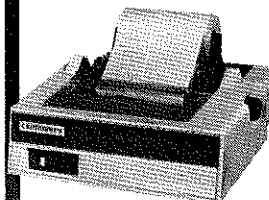
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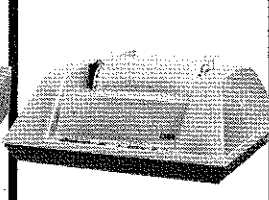
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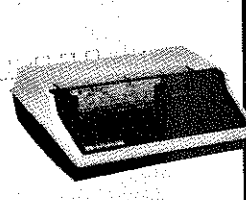
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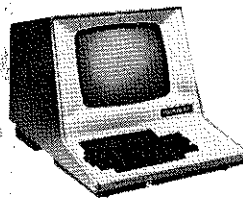
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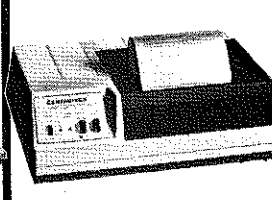
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