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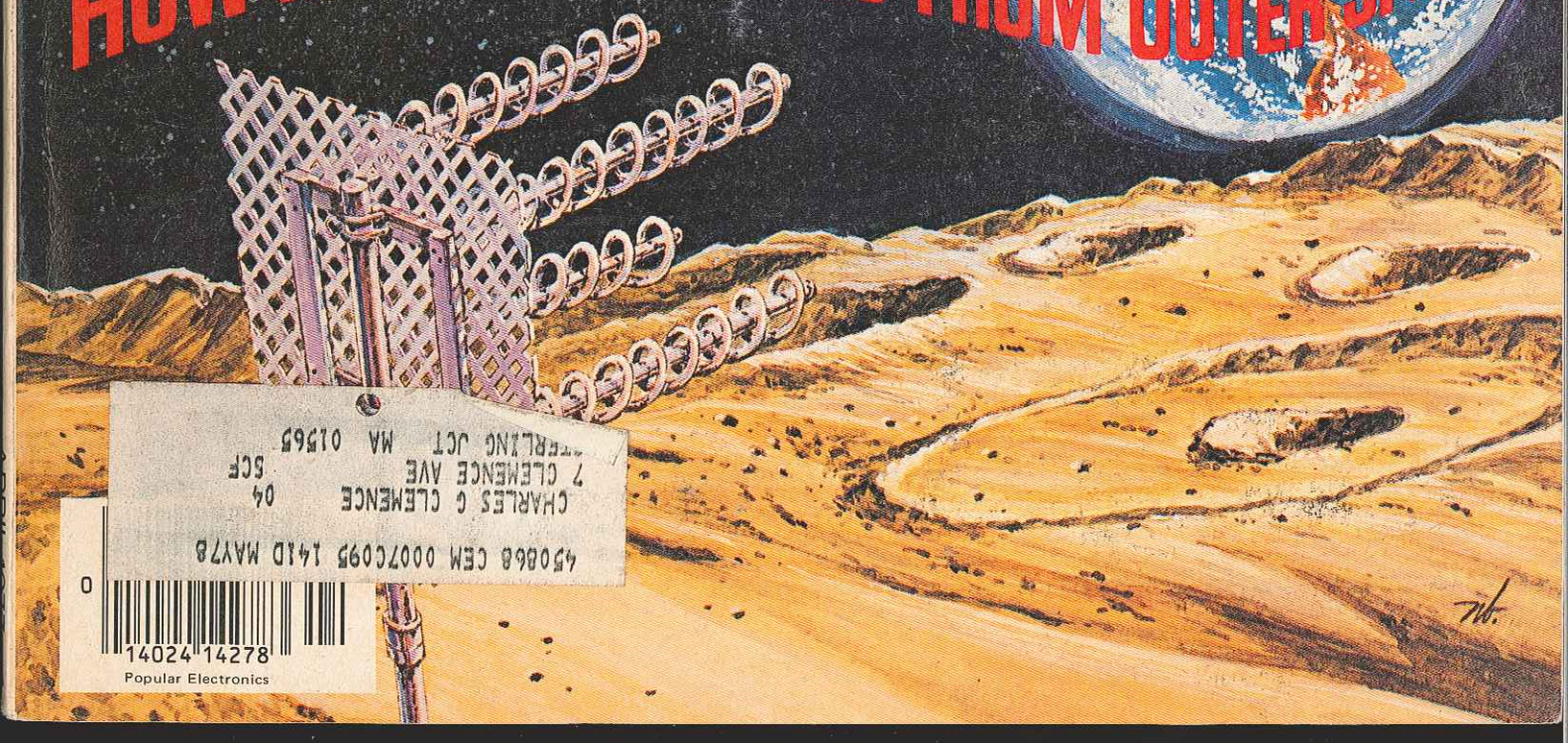

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centrated in seven major violation areas (listed here in order of importance):

- Unauthorized use of a transmitter
- Use of unauthorized frequencies
- Overpowered equipment
- Obscene language
- False distress signals
- Use of radio in a criminal act
- Intentional disruption of communications

The FCC thinks it can achieve its goal—and so do I. The KFCC-1000 operation in Norfolk has been so successful that there is almost *no* unlicensed operation in that area, even by transients on channel 19. Careful samplings country-wide show conclusively that unlicensed operation is down to less than 10%, as opposed to over 50% 18 months ago.

The most serious and commonplace violation today is the illegal use of linear amplifiers. As a result television interference (TVI) has increased by several hundred percent within the past year. At least 60% of this increase results directly from the use of linears. About 75% of all TV sets within ¼ mile of a linear will experience TVI as a result of the harmonic interference the linear creates.

In coming months, the TV public will be told the truth about TVI and how to determine when TVI is the fault of their own TV sets or of their CB neighbor. They will be advised to write the FCC in all cases where TVI is confined to channels 2 or 5, because these are strong indications that the fault lies with harmonics produced by the CB system. Two or more complaints from the same local area will soon point the DF cars directly to those linears. The game is about to become more interesting. Those CB'ers who operate legally powered rigs on a clean antenna system have little to fear. Except where linears are involved, most TVI problems result from weaknesses in the TV sets themselves. The 95th Congress is expected to consider legislation requiring TV manufacturers to build sets with greater immunity to external interference. But you must remember that the new rules require the CB'er to assume a responsibility for the elimination of TVI caused by his own transmitter.

If you have the opportunity to talk with Uncle Charlie at KFCC-1000, do so. He will tell you how your rig is performing, or he'll advise you how to get any other information you may need. ◇

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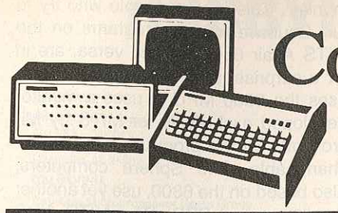

Computer Bits

By Stephen B. Gray

MONITORS, OR CONTROL PROGRAMS

AS STRANGE as it may seem, at least half a dozen hobby computers have an almost bare front panel. These include the Southwest Technical 6800, PolyMorphic Poly 88, Wave Mate Jupiter II, Veras F8, and the OSI Challenger. All have only one or two switches on the front panel—one for power on/off and perhaps one for reset.

Why, then, are there so many other hobby computers with several dozen toggle switches and LED's on the front (the Altair 8800b and Imsai 8080, for instance)? One reason is tradition: it's always been done that way in commercial computers. Perhaps the most important reason is not so obvious: using all those switches and lights provides a certain feeling of power, of controlling something. The hobbyist who selects an Altair 8800b over a Southwest 6800 is more likely to drive a stick-shift car than one with automatic transmission, for the very same reason: he wants that hands-on feeling of control.

But aren't there some things you can do only with switches? Hardly any. Almost anything you can do with the switches on the front of the Electronic Tool Company's ETC-1000, you can do with Processor Technology's bare-front SOL, using *software* (programs fed into the computer) or *firmware*. (Firmware is a word used in the world of commercial computers, but seldom if ever in hobby computers. It is a set of subroutines stored permanently in the computer, usually in some type of read-only memory, or ROM.)

Some hobby computers have front-panel switches whose functions might seem difficult or impossible to implement with software or firmware. But it turns out that Memory Protect, for instance, can be duplicated by writing a software routine to set certain areas of memory off-limits to the program. A software routine can be written to provide the Single Step function, for stepping a program through its paces one cycle at a time.

One of the few things, if not the only thing, you can do with front-panel switches that you can't do with a monitor is this: some computers can sense the position of certain front-panel switches under program control, and use this "up or down" information to perform (or inhibit) various functions.

Monitors. The firmware that enables a Southwest or PolyMorphic or Wave Mate computer to operate with a nearly naked front panel is called a monitor, or control program. This is simply a set of subroutines written in a ROM, to supervise the sequencing and processing of user programs. As Southwest puts it, their monitor is a "permanently programmed memory that contains the necessary information to configure the machine for use with a terminal."

Some computers use a standard monitor, such as the Motorola Mikbug, found in the Southwest Technical 6800 and the M&R Astral 2000. Others use monitors developed for the specific computer, and not available to other manufacturers, such as in the KIM-1 (KIM stands for Keyboard Input Monitor).

Memory Loader. A memory loader, sometimes called a "bootstrap loader," has to be put into the computer first, to guide the user programs to the proper memory locations. Beginning computer hobbyists are sometimes quite surprised to find that a program can't be read directly into an "unprepared" computer. The computer doesn't know what to do with it, doesn't know where to put it, without a loader.

On a micro without a monitor, this loader has to be fed in by hand, via toggle switches, each time the computer is turned on, before programs can be read in. The loader is short, only about 20 bytes for the Altair 8800b, for instance. On the Southwest 6800, the loader is automatically called up from the Mikbug, as soon as the 6800 is turned on. If at any time you want to use the loader or any other monitor subroutine, press RESET, the 6800 goes into restart mode, and an asterisk shows up on the screen or printer. This means the Mikbug control programs are ready for an input. Other monitors use similar "ready" indicators.

Suppose you've been developing a program and have stored it on tape. To load that program into the Southwest

6800 (for example), you put the casette into your tape reader, and enter an L on the keyboard. The monitor goes through its "Memory Loader Function," which involves several dozen bytes of subroutine stored in the Mikbug, and supervises the loading of your program into memory. After loading is completed, push RESET, which causes the asterisk to show up again.

If you want to examine and perhaps change the contents of any part of memory, key in an M and the 4-character hex code for the memory address to be examined. The terminal will print the address and its contents. To make a change, press the space bar and enter the new data. The terminal then prints the next memory address in sequence, and its contents. If you're satisfied with those contents, enter any character except a space, and the terminal will print the following memory address and its contents. Thus the monitor's "memory examine and change function" automatically displays one address after another, with its contents, for as many addresses as you wish. When you're through, press the space bar and the carriage-return key. Another asterisk will be printed.

To load hex address A000 with 9E, you press only a few keys on the terminal keyboard. Without a monitor, you'd have to set a total of 24 switches, in binary, to 1010 0000 0000 0000, and then set eight data switches, to 1001 1110.

What happens if you select an address that turns out to be in ROM, PROM or a protected area of RAM? The monitor senses that the contents of such a memory location can't be changed, and causes the terminal to print a question mark.

Looking at Registers. If at any time you want to look at the contents of the computer's registers, and perhaps change one or more, then, in the case of the Mikbug, you key in an R, which calls up the monitor's "Display Contents of MPU Registers Function," and prints the contents of the condition code register, B and A accumulators, index register, program counter, and stack pointer. And on the following line, an asterisk. Changes are made in the same way as with the Memory Examine and Change Function.

To run the program you've been developing, press the G key, calling up the "Go to User's Program Function." If your program doesn't run properly, press RESET, which places the computer back under control of the Mikbug and prints an asterisk.

Print or Punch. Once the program is debugged, or if for any other reason you want to print or punch it, enter an M and the beginning address (in locations A002 and A003) and the ending address (in locations A004 and A005) of what you want to print or punch, and after an asterisk is printed, enter a P, which initiates the "Print/Punch Memory Function." At the end of this operation, the terminal again prints an asterisk.

There you have five highly important subroutines or functions, without which the computer is useless. Although each function is called up with a single character, the firmware behind the monitor's seemingly simple functions takes up 512 bytes of ROM, and a listing of the five takes seven pages of print. All five functions, incidentally, are important when working with assembly language, but the M and R functions aren't of much use in BASIC.

Mikbug. The Mikbug was designed by Motorola for use only with the MC6800 MPU. Programs written for a Mikbug-oriented computer may not run on another computer unless it also uses a Mikbug monitor. This is why people who try to run Southwest 6800 programs on the MITS Altair 680b, or vice versa, are in for a surprise, since although the 680b uses the 6800 MPU, it uses a monitor developed exclusively for MITS by Micro-Soft. So the programs aren't interchangeable. The Sphere computers, also based on the 6800, use yet another monitor, called PDS. (The MITS Altair 680b, incidentally, works both sides of the street, since it has a monitor *and* a full set of front-panel switches and lights.)

Without Monitor. If your computer doesn't have a monitor, you'll have to insert a variety of these control subroutines to take care of reading in data from the keyboard or from tape, displaying register contents, printing output, examining and changing memory, going to the user program, etc. Either you key them in with toggle switches, or feed them in from tape, if you have a tape reader. Each time you wish to use one of these routines, you set the front-panel switches to the starting address of that routine.

In addition to making the development and running of programs easier, the monitor also permits using all of your RAM memory, since none of it has to be taken up with storing monitor-type subroutines.

Adding a Monitor. If your computer has no monitor, you can add one. Get a memory board, install enough RAM's, and use a battery to power the RAM's so that the monitor routines you write in the RAM's won't vanish when the main power switch is turned off. This method is used to protect memory in case of power failure during computer operation. For example, Seals Electronics (7338 Baltimore Ave., Suite 200, College Park, MD 20740) has an 8k memory board, with battery standby that fits the Altair bus. Processor Technology's 4KRA and 8KRA static RAM memory modules, also Altair-compatible, will "retain memory for 4-5 hours when powered by two D flashlight cells," and longer when using more powerful batteries.

Or you could use rechargeable batteries and build a separate power supply to provide a trickle charge to keep the batteries going. However, you'd need a common ground for the two power supplies, as well as a diode switching arrangement. Thus, when the computer is turned on, the RAM's are powered from the computer's power supply, and not from the batteries. ◇

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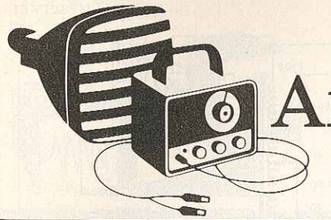
Santurce, Puerto Rico 00911



Art's TV Shop

By Art Margolis

THE ABNORMAL TEMPERATURE CAPER

From the front of the shop a voice yelled, "Art, it's happening—come quick!" It was Charles from the next store, the Hair Emporium. He ran toward the back room, where I had been washing up. Waving his arms frantically, he shouted, "That #×$% color set is acting up again!" (He had recently had an RCA CTC53 color receiver installed to entertain his patrons while he worked on their tresses. Not too long after that, it had developed an intermittent condition.)

Sure enough, as I entered his shop, I could see that the picture had narrowed from the top and bottom, with a few inches of black space showing. I calmed Charles down, patting him on the shoulder. The repair looked simple enough. A 13GF7 dual triode in the CTC53 receiver performs the vertical oscillator and output functions. It was probably drawing a little too much current, dropping voltages and reducing gain. I took the back off the receiver, I installed a new 13GF7, and full vertical sweep returned. Charles beamed.

Since the trouble had been intermittent, and the receiver was on a shelf out of harm's way, I left the cheater cord attached and the back off. I explained to Charles that it might not be fixed yet, so we'd better let it play for the rest of the day before buttoning the receiver up into its cabinet.

"Aw, it's fixed. Just look at it!" he said. After a further explanation, he went along with my suggestion. I left the receiver on and went back to my shop.

About three hours later, I was greeted with a blaring, "Art, Art—it's doing it again! It's doing it again . . . "

I sighed, picked up my caddy and the RCA CTC53 service manual, and reviewed the situation in my mind as I walked over to Charlie's place. The symptoms were clear-cut—not enough vertical sweep. This certainly indicated trouble in the vertical oscillator/output area.

Further, the trouble was probably heat-related. The receiver worked fine at first, and shrinking really didn't start for about three hours. I knew for sure that it wasn't the vertical tube, because I had just installed a new one. However, the same situation was still coming back. It could be that a capacitor starts leaking a bit when the heat gets to it.

So, one approach would be to spray an aerosol coolant on the capacitors

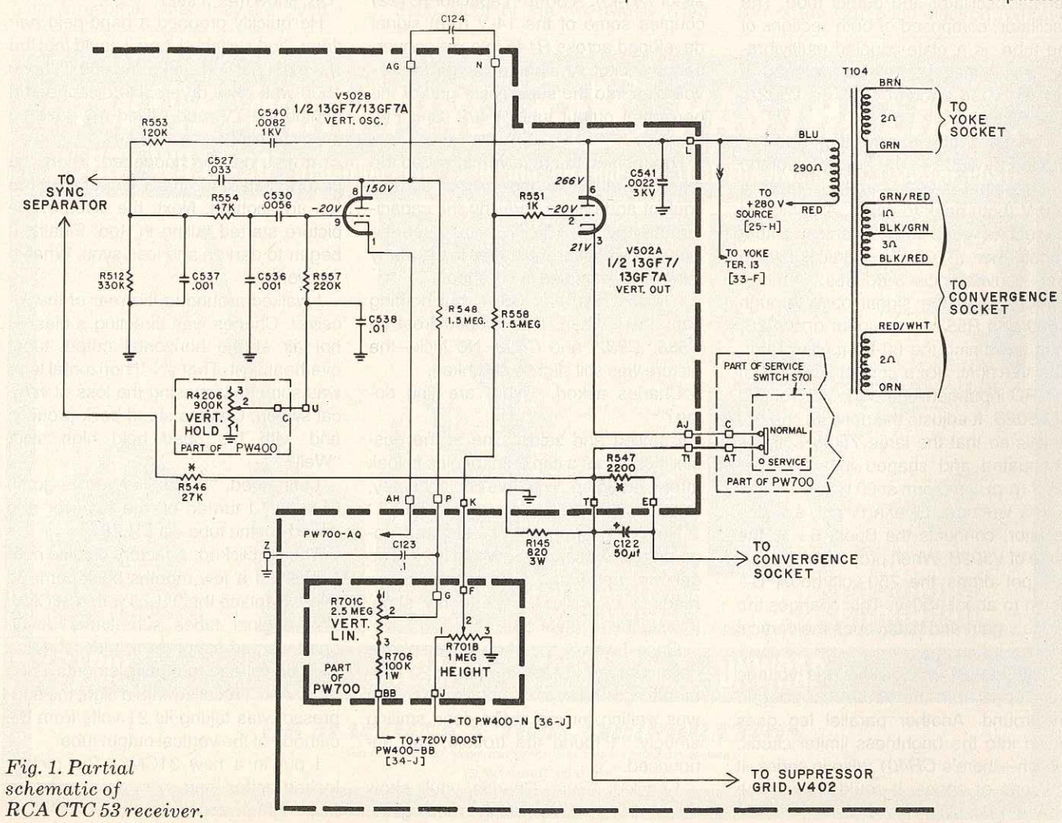


Fig. 1. Partial schematic of RCA CTC 53 receiver.