Hello again, folks

Here's January! We can see the light at the end of the tunnel now. Our various toys seem to be humming right along, and will probably continue to do so until they break (now there's a logical statement). As a matter of distinct fact, if you'll look up at the CLOAD logotype in the upper right corner, you'll see a blot right after the word "magazine". That's an "inc." blot. As of January first, it's CLOAD Magazine, Inc. We have managed, with hard work and understanding subscribers, to arrive at that point where it's appropriate to shift from the "garage operation" form and move up to the club of True Capitalists. If only we could move out of the garage in the process...

Announcements:

The Peripheral People (Box 524, Mercer Island, WA 98040) have announced Yet Another Upper/Lower Case Conversion. Theirs has, however, an Interesting Twist. First, it is switchable, so you can return to the "normal" configuration easily. Second, all of the parts come from your local Radio Shack (RS catalog numbers are included). And third, the associated word processing software (the Electric Secretary) has a hyphenating dictionary. Bad news first: the disadvantage of this last point is that to use it, you must have a disk system. To explain the advantage of a hyphenating dictionary, we must first describe a word processor.

A word processor is a system where the writer (f'rinstance me) writes text by typing it all up on a computer screen. The computer keeps a copy of the text in memory and/or on disk and under software control, the memory contents are sent to the printer. On the way to the printer, the word processor software inserts and deletes spaces and carriage returns to "even up" the text. This allows the writer to insert a phrase in the middle of a page without worrying about making the lines "come out right". This editorial is being written on a word processing computer (confession - not a TRS-80). This particular paragraph will appear in the text that you read as "right justified". Most people like for the text to be laid out like this, but I don't.

So I just turned it off. What a hyphenating dictionary does is make the software more capable of handling this particular trick. Suppose the right margin occurs smack in the center of a word like "montmorillonite". It's too long to put on the current line, and if it's put off to the next line, the current line is spaced just about l i k e t h i s . A hyphenating dictionary allows the computer to look the word up, and cut it into two pieces at a "legal" place.

Fine. Now what I'd like to see is an auxilliary program called "spel" which looks up each word in a chunk of text, and prints out all words it can't find, so the spelling can be checked.

By the way, for those of you who might recognize the Peripheral People's address, they used to be CLOAD House.

A software tip for you level II'ers who want to run a program without changing the value of the variables already computed: Try GOTO 10 (or wherever). When you type RUN or RUN nn the computer first resets all variable space to zero. There are times when this is a pain.

For those of you with disk systems, there has been a hardware bug crawling around causing I/O errors . Turns out that there is a hardware "data holder" whose duty it is to hold data coming off the disk for up to 80 microseconds. Fine. There is also a heartbeat interrupt which will occasionally stop the central processor from its appointed rounds for up to 900 microseconds. So we have the possible conflict of a heartbeat going flubadub in the middle of a data access, getting the disk controller all upset over inattention, and routing the data to the bit bucket. There are two fixes available. Number one is to tell the software to keep on trying... POKE 16553,255 : DEFINT I,J : FOR I=0 TO 7 : READ J : POKE 18104+I,J : NEXT I : DATA 203,87,32,19,254,32,40,17 Chop this up into whatever your style is in line numbers, and execute it once at the beginning of your program. This puts a machine language patch in Disc BASIC, giving it the word to try again if there is an error. It is still (remotely) possible to have a case of discular fibrillation, though, and the only recourse short of drastic open-case surgery is to momentarily suspend the heartbeat immediately before each disk access. How? POKE 18075,243 prior to the first disk access. This instructs the Z-80 central processor to stop listening to the heartbeats while playing with the disk. The disadvantage of this technique is that the real time clock, like Galileo, uses the heartbeat as a time standard. Continued heart stoppages lead to a lethargic clock, possibly several minutes a day.

Rumors mongered here:

Tandy Corp appears to be making a parallel printer interface and an RS-232 serial interface that will not need the expansion interface.

Hardware:

This month, for our hardware talk, I'd like to start things off with the information that yes, indeed, the 8255 chip is sold by Radio Shack (catalog number 276-2555, price $9.95). A crazed but enthusiastic Tandy supporter broke into our international headquarters, beat me severely about the head and shoulders with the jawbone of a used computer salesman, and informed me of my error. 'Scuse me. One logical common place we all know about is the local Radio Shack store, so I'll try to use their parts as much as possible (I don't own any RS stock, honest).

Next I'd like to introduce the concept of voltage. Voltage, by definition, is what a flashlight battery has 1.5 of (stop moaning, you purists). It comes in two varieties, positive and negative. We connect the negative side of our voltage supply to "ground" and forget about it. When we speak of a point in a circuit having 5 volts, we are really saying that the electrical force between that point and "ground" is 5 volts. It turns out that nowadays the main power supply voltage is this single value - not long ago it was three separate supplies, but we'll get into that. Ground, for those interested, refers to the most common point in the circuit. If the enclosure of the circuit is made of metal, it is usually the ground connection. All chips have one pin which must be connected to ground, partly because ground is one of the power connections, and partly to act as a signal reference.

At this point, I should put in a pitch for Ohm's Law. It is the one which summarizes the relationship between voltage, current and resistance. A working understanding of these three entities is the basis for the field of electronics. Those who do not already know this relationship should consult a basic electronics book before actually getting to the point of building something. For this discussion we will use voltage almost exclusively, and resistance and current will have to shift for themselves. We won't get overly concerned about them at first.

There are five voltage levels which we are interested in. The first is (nominally) 5 volts. This is the main power source for the various chips. The maximum value for this supply is 5.25 volts; the minimum is 4.75. If the power supply is outside of this range, the circuit might not work. The rest of the voltage levels all refer to signal levels. Starting at the low end, we have .5 volts. This is the upper limit for a logical "0" or "low" at any output pin of a chip (74LS type outputs, for you purists). The next voltage level is .8 volts. This level is the highest that any input pin is guaranteed to accept as a logical 0 / low. We now look at the high side. 2.0 volts is the lowest voltage that any input pin is guaranteed to accept as a logical 1 / hi. 2.8 volts is the lowest voltage that any output pin will transmit for a logical 1 / hi.

These signal levels can be summarized as follows:

0	to	.5	volts - a solid low
.5	to	.8	volts - a shaky low
.8	to	2.0	volts - invalid level
2.0	to	2.8	volts - a shaky hi
2.8	to	5	volts - a solid hi

Now I'd like to discuss the philosophy of Power On Clear (POC). When starting up a system which is hooked up to motors, pumps, valves and such, the general desirability is to apply power and have the system "wait" in a relatively docile mode while the computer program is being loaded. Example - if there is a valve controlling a gasoline supply, it should start up in the closed position, and remain closed until actively commanded to open. When the controller (that's what we're hypothetically building) is turned on, the TRS-80 hooked into it may or may not be ready to start control, and the power circuitry to our motors, valves and such may or may not be "live". Sodd's Second Law states that sooner or later, the worst possible set of circumstances is bound to occur. The obvious corollary is that any system must be designed to withstand the worst possible set of circumstances. The engineers who designed the 8255 chip have provided a special pin (number 35) to reset the device. When the power is applied to our controller, we will let this pin go "high" (anything between 2.8 and 5 volts will do). After a sufficient amount of time has passed to allow the circuitry to stabilize, this pin is pulled "low" (anything between 0 and .8 volts) and the 8255 is now in its initial state - all registers cleared, and all ports in the "input" mode. Note that this does not insure that the whole project is properly initialized - each subsystem must still be considered, and if there is a "dangerous" mode of operation (to you or it), some form of initialization is required.

Why all this palaver? Isn't it enough to simply steer clear of dangerous applications? Well, I'll concede that not too many of our subscribers will be controlling bombs with their computers, but even fairly simple ideas, like door and window management in a house, have aspects which are uncomfortable if not actually dangerous. So you get one more paragraph on the subject, entitled "Fail Safe".

In any mechanism or system, there are three general categories of operation. One, working correctly. Two, working incorrectly. Three, not working at all. All systems that are presently in category one have a finite chance of becoming category two or category three systems. Sometimes it doesn't make much difference which way they go (f'rinstance your TRS-80). Sometimes it is important for them to continue to work, even if incorrectly (lights over an operating table) and sometimes it is important for them to stop completely (nuclear reactors). In these last two cases, the designer must take steps to assure that they fail in the "safe" category - thus the name. Note that we are not talking of preventing failure - we are assuming failure is inevitable. How do we accomplish this controlled failure? Let's say we are controlling a motor and we are concerned that our computer might have a heart attack and die after turning the motor on. Let's also say that, upon system failure, we want this motor off. We might design the switch circuit that turned the motor on such that it only turned it on for one second. Our program would then have to keep turning it on - at least once a second. If the computer dies, the motor gets no more commands. Suppose we're really paranoid about it - we could have two switch circuits and wire them such that they both have to be on to turn the motor on. If either one fails in the off direction, the motor turns off. If either one jams in the on direction, the other one controls the motor. How about both switches simultaneously jamming on? Suppose each switch has a one in one thousand chance of failing on a given day. Two switches would then have a one in one million chance of failing simultaneously on a given day. Three switches? One in a billion. It gets expensive sometimes, and reliability suffers (fail safe designs fail more often), but there's little excuse for a failure to do serious damage.

The 8255 spec sheet promised this week has been canceled due to its availability at Radio Shack (it comes with the chip - 12 pages' worth) and the local shortage of paper for my own form of yellow journalism. The circuit schematic that was to have replaced it has been postponed until I can verify that the circuit works. There is also a fair amount of local pressure to finish this so we can get the January issue out - February is starting to roll off the duplicator, and I'm beginning to wonder if they'll ever unchain me from this desk.

"Next Week",

Ralph 7/1/'83

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Publisher