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TERRY KEPNER'S

portable 100

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With over 47 issues, and hundreds of articles, *Portable 100* is THE source for information, programs, and applications for your Tandy Portable Computer. But how do you find what you need among all those issues? The answer is the *Portable 100 Article Index*. Covering every issue from September 1983 to the combined July/August1988 issue, the index is designed to make it simple for you to find what you need. And at a cost of only $7.00 (postage and handling included), you should buy one today!

And what do you do when you find an article you want? Easy. First check the back issue chart below for back issue availability. If the issue is available, just order it using the handy order form in the index. If it isn't, don't despair. Photocopies of any article cost just $1.75 each. Simply list the article, or articles, by title, author, and issue, enclose payment, and in just a short time you'll have the articles in hand.

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Month	83	84	85	86	87	88	89
January			NOT PUBLISHED				
February							
March			OUT		NOT PUBLISHED		
April		OUT					
May		OUT					Not Available Yet
June		OUT					
July		OUT		OUT		combined July/ August Issue	
August							
September	Premier Issue						
October		OUT		NOT PUBLISHED			
November							
December						OUT	

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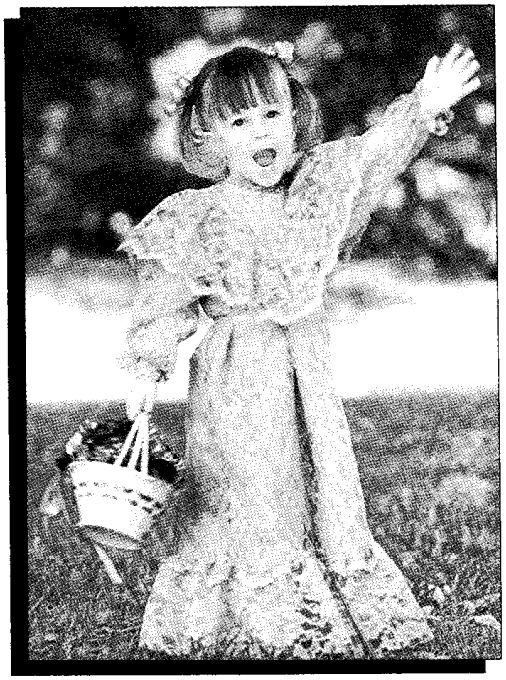
VOL. 6, NO. 4
April 1989

ON THE COVER:
Shannon. Concept by Mike Nugent, with some help from her mother.



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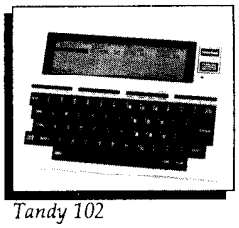
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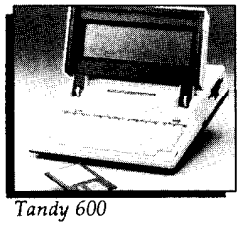
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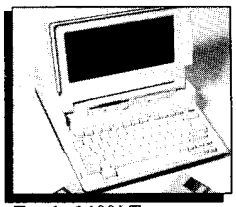
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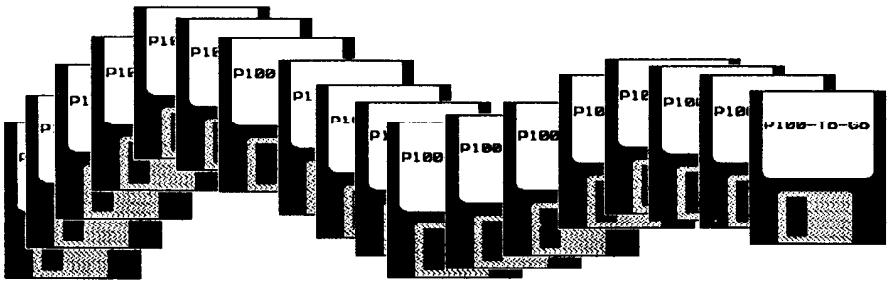

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ROM WITH A VIEW

May Fools!

Well, we resisted—just barely—the urge to fill your April issue with April Fool's jokes. (Isn't an April issue arriving in May enough of a joke?) Too bad, too, because I had some nifty things in mind. Like a "P100-To-Go Kit" (we send you a magazine and a blank disk). Like an ad for single-sided Moebius disks that store an infinite amount of data. (The double-sided ones hold twice that!)

I wanted to announce Lucid 4-D, the product that lets you do your spreadsheets some*when* else. And the *BASIC* misinterpreter I developed for folks who can't program anyway. Those products, plus my latest word processing software—it even *left* justifies, and when it can't justify, it rationalizes—were going to be bundled on a next-generation laptop so tiny it comes attached to a keychain. (If you misplace it, just clap your hands, and it whistles.)

I especially wanted to show you the photos we *didn't* use for our covers and laugh about some of those photo sessions—sort of a "*P100* Outtakes and Bloopers," with such tidbits as how to make a dog eat a computer (September), what E.T. *really* looked like (November), creative use of editors for photographic background (March). We really should do that someday.

Instead, with only two teensy little exceptions (one's on p. 13, Guerri), we've spared you all that nonsense and filled the magazine with useful information.

Let's welcome Bill Brandon to *P100*'s pages. Each month, starting with this issue, Bill's *FULL POWER* column will provide information, advice, and "basic training" for beginning and intermediate laptop users, programmers and non-programmers alike. Even "old hands" will learn a new trick or two.

Next month, we'll add *THE IDEA BOX*, in which Michael Daigle will philosophize, inform, and amuse with his non-technical (and sometimes offbeat) focus on the relationship between us and our lapwarmers.

Other good things are in the works, one of which is Ultrasoft Innovations' *Ultra Graphics Adaptor* (see Oct. '89 *P100*, p. 23), the 80-column by 25-line video interface. Having overcome unexpected contractual and design snags, Ultrasoft is expected to announce the UGA's release next month. And watch for more new products and advertisers as well.

Finally, remember that *P100* will continue to arrive late for a while. But that's not the worst of it.

No, the worst of it is that I wrote a phony product announcement for PICO magazine's April issue three years ago. They had to kill it, because an unusual (but real) product appeared that month, and they feared that my phony piece would make readers think the real product was a fake, too. So they held mine "until next year," at which time they forgot they had it and again failed to run it. Now, three years later, I'm the editor for P100, and if I say it runs, it runs (at last!). So when you read the *NEW PRODUCTS* section, you'll see my April Fool's joke. On myself, that is—I forgot to run the darn thing!

Maybe next year....

-Nuge

Toolbox

Manuscripts were typed into Microsoft Word 3.0 on a Tandy 1400 LT, where they were edited, spell-checked, and had basic format instructions inserted. From there they were loaded into a Tandy 4000 (80386 CPU, Tandy EGA Monitor, Tandy LP-1000 LaserPrinter) desktop computer and placed into Aldus' IBM PageMaker 2.0a. There they were put into a rough approximation of the magazine's final appearance. Here, pull quotes are placed, headlines, intros, and bylines are sized and positioned, and advertisements positioned.

Next, the magazine was ported over to our Art Director's Macintosh II, using the 1400 LT and Mac-link. She then went over the publication using Aldus Macintosh PageMaker 3.01, making final design decisions on photo, figure, and listing sizes and placements. She precisely placed the text and added all the little things that go into making a nice looking publication.

Page previews were output from her Laserprinter. When everyone was satisfied with the appearance, the Macintosh disk was sent to Colorite Corp. in Wisconsin for final output directly onto photographic paper. The finished magazine was then delivered to the printer, who printed it, labeled it, and mailed it to you.

TERRY KEPNER'S **portable 100**

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TECHNICAL EDITOR
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PROPERLY WIRED

I just wanted to say thanks for your November issue. "Getting Wired" made it possible for me to use my modem for the first time in three years.

Richard Pietras
Portable BBS
Message to SYSOP

SHORT CIRCUIT

Contrary to your admonishment that "Ya can't hurt nothin'!" ("Getting Wired" Feb. '89), I managed to. The cable wasn't seated properly the first time I tried to get on. When I called, nothing happened. Worse yet, the keyboard locked. The only way out was to cold start—ouch! So you see, nothing is foolproof; we're just too smart for ya!

Joe Zammarelli
Portable BBS
Message to SYSOP

DISAPPOINT.100

PUZZLE.BA was a real disappointment, especially the response to J.R. Hankey. Do you have any idea of how much frustration you caused many of your readers by having absolutely no mention of the easily obvious M100/T200 compatibility? What is the name of this magazine, anyway? And written in the same issue with the puzzle, a letter of response to Dan Babin of Sherman, Texas: "When applicable, we list compatibility information above the article's title and any required changes at the end, and whenever possible, we test programs before publication." I'm not going to oppose your program testing theory, but I do stress applicable compatibility.

Quoting from "Calling All Peeks and Pokes" by Greg Susong (*Portable 100*, May '86): "Probably the best method for making programs run on either the 100 or 200 is to design the program so that it will make the necessary conversion itself...With this alteration, it makes no difference to the user on which machine the program is used. This is far superior to forcing the user to interpret the program and change it. All he or she wants to do is use the program. (Take note, programmers!)"

Shame on you. Would it not have been easier to follow your own programming/publishing ideals than to tell an obviously patient reader "No," only to change your mind in the end? Just to sell a Tandy phone cable and a subscription to CompuServe. Shame, shame, shame.

The changes are: In line 49 change *Y*32* to *Y*16* in two places. In line 50 change *Y*160* to *Y*30* in one place. In line 52 change *30* to *14* in two places, and change *62* to *30* in two places.

And one final thing: The 1400LT is an MS-DOS machine. They already have a library of magazines. Leave them alone and concentrate on quality programs and ideas that can work on the PORTABLE 100.

Thanks for the support.

Michael Trippard
Dallas, TX

Contrary to your admonishment that "Ya can't hurt nothin'!" ("Getting Wired" Feb. '89), I managed to.

PUZZLE.BA *was for CUSTOM 200 and, as its intro stated, was purposely short, to leave space for another article. This precluded even considering listing a Model 100 version. As a service, we made it available both on disk and on the Portable BBS. In this instance, space, not compatibility, was our concern.*

It's extremely gratifying when a submitted program adjusts itself to any host machine. It's equally rare. Which leaves us (me!) to make it run on all Tandy, NEC, Kyocera, and Olivetti models—and here's the key phrase—"whenever possible." There's rarely enough time. (How long did you work on PUZZLE.BA*? Now multiply that by five. Now multiply that by the number of programs in an average issue. Now consider that it's only one small part of my job.) I think you get the idea.*

I replied to J.R. to remind readers that we cannot mail out program listings. As a favor, I sent him the only PUZZLE.100 *listing we had. I recommend GEnie and CompuServe because they offer a wealth of programs, help, and info that no magazine can adequately provide. They don't advertise here, so there's no pecuniary interest. In fact, many* P100 *articles tell users how to get results without spending money on commercial products and programs.*

And finally: Despite its name, Portable 100 *is mainly about Tandy laptops. The 1400LT is a Tandy laptop, so we cover it, and Tandy advertises. When we stop, Tandy stops, Portable 100 stops, and your concerns above become irrelevant. That's not going to happen.*

Thanks for the PUZZLE.100 *changes, Mike! (When you get the NEC, Olly, and Kyo mods happening, I'll be ever so grateful!)*

-MN

L.A. VOID

I, too, like many other subscribers, enjoy the excellent quality of your publication. Since there are no user clubs existing in the Los Angeles area for 100/200 owners, your magazine fills a great void. Maybe *Portable 100* might provide the incentive for 100/200 people to form such groups in the major cities.

I am the proud owner of a 200 and am now just getting acquainted with it. I have purchased, in addition, the bar code reader, bar code writer, bar code driver, Tandy code, and *Text Power 200* as extras.

I need education on how to use these products on my 200. Whatever information you and your readers could provide would be most appreciated. I am sure there are other "beginners" out there who could benefit from such knowledge.

Keep up the good work!

Marianne Friedman
Alhambra, CA

HORSE SENSE?

The evaluation of the horse racing software ("And They're Off...", Jan. '89) seems to indicate that it is almost as reliable as tomorrow's newspaper, in that it picked 9 winners out of nine races.

With information such as this, you should be able to turn a profit at the race track. However, it seems that the author needs some pointers on how to bet.

Statistics from approximately 15,000

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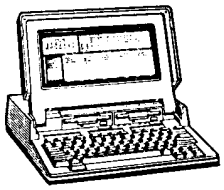

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INPUT/OUTPUT

races show the following is true:

- Favorites win one-third of all races.
- Second choices win 20 percent of all races.
- Third choices win 14 percent of all races.
- The first three favorites will win 67 percent of all races.
- Favorites win first or second in 50 percent of all races run.
- One of the first three favorites will run second or better 90 percent of the time.

Using the above statistics, along with a reliable computer program thtat can pick a winner 90 percent of the time, will take the gambling out of horse racing and make it safer than playing Wall Street.

Here are some rules on placing bets:

- You will restrict your investment in each race to one of the first three favorites. That is, the three horses with the best odds.
- You will not play daily doubles, exactas, quinellas, trifectas, etc., for this is gambling.
- You will make win and place bets only; you will never bet to show.
- You will always bet the same amount of money on every race.
- You should use this plan on consecutive days.
- Do not bet all races, such as maiden races and races that show even odds between the first two horses.

Note that this plan is a low return at low risk, and if you make only two-dollar bets you will probably not make expenses at the races. I would suggest a minimum base of $200 and would wager ten percent of this base on each race in the following manner:

After selecting, from your computer program, the horse that will win the race, you would bet ten dollars on that horse to win and ten dollars on that horse to place. You should stay with this plan until your winnings reach $100. Then you should change your base to $300, and bet fifteen dollars to win and fifteen dollars to place. Change your base again to $400, etc., each time using ten percent of your new base—five percent to win, five percent to place.

I would suggest that serious wagerers read "Investing at the Race Track" by Scott. Good luck!

H.M. Cook
Chantilly, VA

AMATEUR RADIO

I haven't seen any applications of the Model 100 laptop to amateur radio topics. Most "hams" seem to use the Commodore or the IBM compatibles for packet radio, code interpretation, and other such projects. I'm wondering if any of your advertisers or readers might have access to some software that might help those of us with the M100. The M100 would lend itself better to "Field Day" and emergency service applications better than any other computer that I'm aware of. So this makes for a viable area for development.

Clark Thayne
W6RZU

Notebook computers are ideal for such uses; I've used my own M100 in amateur packet radio applications. We've had several requests like yours, along with several promises to submit articles, but so far, none of those promised submissions has arrived. (So how about it you ham/writer types?) Meanwhile, CompuServe's HAMNET may have some M100 programs you might find useful.

-MN
WB8CLQ

We would like to list our BBS600 on-line times to help notify Model 600 owners of Club 600.

BBS600 HOURS

We would like to list our BBS600 on-line times in order to help notify Model 600 owners who may not know of our efforts and of Club 600. Our current BBS600 hours are as follows: Fridays—7 PM to 10 PM, Saturdays—8 AM to 10 PM, Sundays—8 AM to 10 PM.

When we get our new telephone line and computer, we can expand our support and eventually run 24 hours a day, six days a week. Currently we are set up to handle different levels of access, and PC users will have a separate area to work from. BBS600 will have the capabilities of 300/1200/2400 baud rates, when we get our modem fixed. For now, it defaults to 300 baud, 8 bit word, no parity, and one stop bit. Call 713-933-0542.

Thank you for the fine job and efforts put forth to help our club move forward. Stay tuned—we have more to come before this year is over!

Dennis C. Rogers, Pres.
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?IO—CORRECTIONS

That's the last time I ever let my dog, Hayashi, do the proofreading! Lest you get your Euro-dates mixed up (Mar '89 DEFUSR, reply to Jean-Luc Michaud), you must change both occurrences of MID$(DATE$,3,2) to MID$(DATE$,4,2).

-MN

OOPS, AN ERROR IN THE LISTING

In reference to the Tubman/Hansen Letter in the March '89 I/O, there was an error in the listing in the June '88 article which creates the CODE-C/CODE-V problem. The seventh byte of the eighth line should have been OCEH instead of OBDH. This is easily corrected by typing *LOADM "MENUTL"* and pressing *ENTER*. The screen will show:

```
Top: aaaaa
End: bbbbb
Exe: aaaaa
```

Now type *POKE aaaaa+201,206* and press *ENTER*, then *SAVEM "MENUTL",aaaaa,bbbbb,aaaaa* and press *ENTER*. I have'nt figured out the rename problem yet as my copy does the same thing.

Russ Wesp
San Francisco, CA

We welcome all letters from our readers, whether critical or complimentary. We print as many letters as space permits (some are edited for space considerations). Address your correspondence to: Portable 100, I/O Dept., P.O. Box 428, Peterborough, NH 03458-0428.

MORE ON "A NOTEBOOK DATABASE"

I was delighted to read, in the February issue of *Portable 100*, the clever use of *TEXT* by Ross Brochhagen to obtain "A Notebook Database." For some years I have been looking for a really convenient database for bibliographic purposes. I tried this one out, but at first it failed to work.

After typing each line, I pressed *ENTER* in the usual way. This printed on the screen the triangular characters that represent carriage returns. On eventually pressing *PRINT* for the screen dump, the printer rendered each of these returns as the tall *X* that my Tandy DMP-200 prints for characters that it cannont recognise: not nice-looking nor at all like the figures 1, 2, and 3 shown in *Portable 100*. Presumably this does not happen for the author, because his printers are IBM Quietwriters and behave differently.

I find that the difficulty with my DMP-200, and presumably with other Tandy printers, can be avoided by never using *ENTER* until the end of the record. Instead, I press *TAB* enough times to bring the blinking cursor from the end of the line just finished to the beginning of the next line. There may be a limit to doing this, but as an experiment, I have typed eleven lines of notes without trouble arising.

My particular application needs separate lines, sometimes two, for: author(s) with year of publication; title; name of journal; city; and a reference number. Then follow as many lines of keywords as are needed to aid in finding a wanted reference from among many others.

From all records, I expect to print out only those that refer to a particular topic, in alphabetical order of authors. Topical records are found by setting the *Find* string first to one, then to another of the relevant keywords. Once found, a record can either be printed out or *Copy*'d to a new file for further editing, as done by Brochhagen.

The records selected from one keyword will only be printed in alphabetical order if they were already arranged in this way. The Model 100 does not incorporate a *SORT* program. What can we do?

Based on earlier experience, I type any new record directly into its correct alphabetical position: an author "Child" among the authors "C." When searching for the place, in order to avoid finding a "c" from within any word, we need to pinpoint authors. This can be done unobtrusively by inserting a non-printing character at the head of the "author" line. I use decimal 181, *CODE-[*. This prints on the screen as a tilde but on paper as a blank. Having marked authors throughout with a ~, in order to find one whose name begins with "B," one presses *Find*, sets the string to *CODE-[B*, then *ENTER* brings up the first of the authors wanted. Further *Find*s and *ENTER*s bring up more, if there are any, in the order already present in the file. Thus, a new record for a new author, "Burgess," can easily be typed in after the already existing record for "Brochhagen."

Printers other than the DMP-200 may have different non-printing characters that can be used. They can be found by comparing the list of ASCII character codes given in the computer manual (Model 100, pages 211-216) with a similar list from the printer manual. I pencilled the printer's character alongside the screen character for every decimal value after 33. For example, *CODE-'*, *CODE-R*, and *CODE-;* all print a character on the screen but a blank on the DMP-200's paper. Quite apart from the present purpose, I find this invisible tilde extremely useful for tying the parts of a date or name together so that they are never split between the end of one and the beginning of the next line. To actually print the tilde, one uses the other square bracket, *CODE-]*.

Apart from editing becoming slow as the file approaches 15K in length, the limit to number of records is set by the size of available memory. My Model 100 accepts only sixty of my rather lengthy records before free memory is too small to transfer the file. Entry of records is so quick and easy this way, however, compared with squeezing them into the fields of fixed length needed by *Lucid Database* or *pBase*, that I should like to find some way of handling a large file other than by breaking it into shorter sections.

Robert M. Organ
Bethesda, MD

Contrary to Ross Brochhagen in the February 1989 issue, I don't have three printers to use, so must make do with what is available. However, my Seikosha SP-1200AI at home gives me fits when I try to print out labels from a *TEXT* program. The triangular character that indicates a carriage return on the screen appears to be a decimal 15 code, which automatically put the printer into condensed mode after the first line. My question is, to what memory location can I poke a different graphic character for the carriage return so that my printer will not recognize it as a command?

William H. Reiter
Penn Yan, NY

The triangular graphic character giving you trouble is actually a decimal 143. Your printer (and many others) ignores the high bit of characters it receives, effectively subtracting 128, thus leaving the decimal 15 that shifts the printer into condensed mode.

Although there's no way to change the ASCII 143 character, nor to keep it from appearing, there is an easy solution. While typing in your records, immediately after pressing ENTER, *press* GRPH-; *before typing anything else. This produces a little double-arrow character, ASCII 146, at the beginning of each new line of text. When the printer receives it, stripping the high bit and subtracting 128, that leaves 18 decimal, which your printer will interpret as the code to cancel the condensed mode.*

So effectively, the carriage return turns on the condensed mode, and then the GRPH-; *immediately cancels it, restoring everything to normal. Voila!*

-MN

Forum is where you can show off your expertise and help your fellow readers! Address your tips, hints, and techniques to: Portable 100, Forum Dept., P.O. Box 428, Peterborough, NH 03458-0428.

COMPATIBILITY: Tandy 100/102, 200, Olivetti M10, Kyocera KC-85

Not for Beginners Only

Use your Tandy every day without learning to program.

by Bill Brandon

This column is devoted to helping you make better use of your Model 100 or 102 (and when possible, other notebook computers). Each month, as long as Terry and Nuge and you readers can stand it, I'll focus on one or more of the built-in programs and unique capabilities of our laptops. I promise to keep things as simple, basic, and non-technical as possible. Life is too complicated already; writing technical manuals gives me headaches; and you have other things to do.

Much of what has been written for the Model 100 community in the last two or three years seems to be addressed to programmers. I think that's about ten percent of the owners of these machines. The community can't survive if this goes on. New users are still coming into the fold, and machine language is a bit beyond most of them at this point. Not only that, but owners of Model 100's and 102's can get discouraged by the lack of new applications that they can use. Let me be clear about it: I think the Model 100 and 102 cover one hundred percent of the computing needs of a broad group of people. It would be a shame to see this group either give up entirely on personal computers or go to the high-dollar machines that do not serve their needs as well.

The Model 100 and 102 cover 100% of the computing needs of many people.

I'm writing this mainly for business people and students who don't want to program, who don't have time to program, and who don't know how to program anyway. I'm writing it for people who have computing needs better met by the design of the 100/102 than by the design (and cost) of desktop computers and their overdesigned, allegedly laptop, offspring. I'm writing it for owners who don't want to put much money into peripherals, can't afford the peripherals, or who work in environments where the peripherals would be impractical.

All you need is a Model 100 or 102 (essential!), some form of mass storage to keep the programs on (a cassette recorder is plenty), and a printer. I assume you have read the first two sections of the owner's manual and know how to turn on the machine. I will be making every effort to provide you with no-frills programs and utilities that can enhance your use of your laptop. Word processing, file recovery, uncomplicated calculators, and practical business utilities will come first, since I believe these are of the most interest.

This month begins the series by spotlighting the "Little Black Book" features of the Model 100: the *SCHEDL* and *ADDRSS* programs. These are electronic versions of the ordinary appointment book and address list. However, they are far more flexible than their paper counterparts.

I'll show you some ideas for the use of *SCHEDL* and *ADDRSS* that come from five years experience with them, in a business setting. You'll see simple aids that you can use without any programming. (Next month you'll get a straightforward *BASIC* program to make consistent entries in the *NOTE* and *ADRS* files. And you'll get another *BASIC* program that applies the power of *SCHEDL* and *ADDRSS* to files other than *NOTE* and *ADRS*, even though the owner's manual never told you this could be done.)

BETTER USE

Let me define what I mean by "better use." This term doesn't imply that anything is wrong with any one person's way of using the Model 100! It just refers to matching the features built into the machine to problems or needs for information that come up in your daily life.

If you are an accountant in internal audit, your needs for "black book" functions are different from those of the person who runs a small business, those of a person in sales, those of a student, and those of a home user. Not only do users store different kinds of information in *NOTE.DO* and *ADRS.DO*, they probably have to retrieve this information under different circumstances: in an office or on a construction site, while working alone or in a meeting or while talking on the phone, sitting on the deck by the pool or sitting across the desk from a prospect. The speed with which the response must be obtained from the machine will vary too: a salesperson needs to quote stock availability and price on the spot, while the inventory control manager in the same company may find a somewhat slower response to an order point inquiry acceptable if it gives her the information she needs.

So the first meaning of "better use" is that you will be using the machine's features to solve your problems. The "better use" solution is the feature that works for you over some other that does not address your needs.

Second, "better use" means less time spent on typing information into the *ADRS* and *NOTE* files. The computer should do *some* of the typing for you, after all! Toward this end, you can use simple aids (called *templates*), or you can use programs written in *BASIC*.

"Better use" also includes getting more mileage from the built-in programs. You can use *SCHEDL* and *ADDRSS* to keep and print your expense reports, to print letterheads or to do other repetitive typing chores, and to simplify such tasks as inventory and ordering. As I mentioned, you are not restricted to the use of *NOTE* and *ADRS* as your data files.

WHY BOTHER?

You might easily ask at this point, "Why bother?" The answer is to save time and money while gaining convenience and flexibility. Consider:

- Using built-in programs means you don't have to buy software. Personally, I find a simple approach to personal organization works best. The bells and whistles found in some commercial time-management software cause the program to run slowly, eat up memory needed for other purposes, and either don't do what the user needs or—worse—actually get in the user's way.
- Making better use of the built-in programs means you don't need to carry that old diary/appointment book/project folder/address book any more. Even better, you don't have to pay $3 for a half-dozen printed forms every few weeks. If you have to have forms, you can print them out directly from *SCHEDL* or *ADDRSS*. If someone else needs a copy of your itinerary, you can print it for an hour, a day, a week, or any other period.
- You can save time by automating your diary-keeping. Many people type faster than they write. With everything in your 100 (which stays constantly at your side), you no longer have to lose time and look disorganized as you search in four different locations for all your appointments, to-do lists, phone numbers, and project schedules. Because the *ADDRSS* and *SCHEDL* programs do not specify a rigid format for data, you can be flexible in setting up and maintaining files.
- The Model 100 is the height of convenience when you've matched its capabilities to your unique way of working. You can get an address or other information from the Model 100 in a fraction of the time it takes to use a paper notebook. And with no power cord to plug in, no screen to open, no DOS to load, and no unforgiving operating system syntax to put up with, the 100 beats any MS-DOS laptop from a standing start.

The Model 100 is the height of convenience when you match its capabilities to your unique way of working.

Let's begin with a brief, functional view of the two programs. *SCHEDL* and *ADDRSS* are basically the same program. The biggest difference is that they pull information from different files. Both programs find items in their respective files, according to specifications that you provide. And both programs either show these items on the screen, or print them on paper instead.

However, these programs are not limited to retrieving appointments and addresses. You can certainly keep other kinds of lists in *ADRS.DO* and *NOTE.DO*. In fact, you can keep many different kinds of lists in each, simultaneously, as long as you can find some way to make all entries for one kind of list different from every other list. You can, for example, keep both a list of stock order points and an inventory in *NOTE*, and get into each one separately. I know of people who keep their running grocery shopping lists in *NOTE*, right along with engineering project management matters or court dates.

You can also use *Lfnd* to perform jobs that have little to do with printing "to-do" and phone lists. For example, you can print letterheads, recurring forms, and keep expense records.

SETTING UP

The key to getting your money's worth from these programs is the way you put *NOTE.DO* and *ADRS.DO* together. They must be set up to provide you with the information you need, in the form you need it, and in a way that makes it easy to add new entries or information.

In the *ADRS* file, the best thing you can do is to standardize your entries. You want to have the same pieces of information in each entry. Order the information the way you need it on the job, and don't include information you don't need routinely. This saves space and makes *ADDRSS* easier to use. For example, a person who does only telephone sales and uses the Model 100 to store prospect or customer lists is more likely to need names and telephone numbers before addresses. If the sales person is working former customers, key words describing the typical products and quantities purchased might also be useful. That way, if a special deal is being offered on Perlite Beads this month, the sales person can quickly find and call those customers who use this product. On the other hand, a person looking for a new job and using the 100 to organize her research of companies and contacts will probably want to include contact titles and addresses, along with information found in business directories as such as Standard Industrial Classification codes and last year's revenues. The job-seeker's entries can be longer because there will be fewer of them and because time is not as critical. The salesman has many entries and must work fast. A standard format that worked for one would not work for the other.

In the *NOTE* file, organization of entries by category (memo, to-do, meetings, phone calls to return, etc.) is critical for the effective use of *SCHEDL*. Think in terms of the smallest number of categories that cover your use of *NOTE*. For most people, three is the minimum and five categories is the practical limit. Assign a graphic symbol to each category to simplify finding and listing the entries in it. I like to use the *GRPH* key and the unshifted first letter of the category name (hold down the *GRPH* key and press the letter key). For example, *GRPH-p* (which conveniently creates a graphic character that looks like a telephone) identifies the phone calls I need to make. *[Olivetti characters differ. See owner's manual.–Ed..]* This has the advantage of being easy to remember and, since I touch-type, easy to stroke on the keyboard. Finally, you should set up a standard entry for each category to match your needs.

In both *ADRS* and *NOTE*, make your standard entries so you can use the cursor-control keys (*SHIFT-left arrow* and *SHIFT-right arrow*) to move from one element to the next. That is, leave spaces between words. This sounds like a small thing, but when you have to update large numbers of entries in your files, you'll be glad you did it! Another small practice that can make your life easier later on is to use a comma to separate the elements of each entry, instead of *TAB*s (as Tandy suggests) or special symbols (as some homebrew efforts do). This enables you to transfer your files easily some day to an MS-DOS or Apple machine and then use more powerful database programs to manipulate the information in them, or to write *BASIC* programs that can pull information directly out of your Model 100 files.

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```
(For events) EVENT GRPH-e DATE: , TIME: , PLACE: , DESC/KEY:
(For to-do's) TODO GRPH-t PRIORITY: , DATE: , DESC/KEY:
(For memo's) MEMO GRPH-m HEADS UP!: , KEY:
(For calls) PHONE GRPH-p CALL: , AT: , BECAUSE: , KEY:
```

Figure 1. Some Example templates for ADDRSS

USE A TEMPLATE

The simplest way to organize your files into standard entries is to use a template. This sounds like a big deal, but it isn't. A template is just an aid to help you repeat a given pattern the same way every time. Think of it as a form, or a stencil, or a blueprint. Here's an example of a template I use in *ADRS*; it's pretty simple because I nearly always use *ADRS* as a phone book, not to store addresses:

NAME - , :( ) - < >:, Keyword -

This line is the first entry in my *ADRS.DO*. When I add a phone number, I use the *COPY* and *PASTE* keys in *TEXT* to create a copy of the template at the bottom of my list. Then I type the new party's name after the first dash, type the area code between the parentheses, put the phone number into the appropriate spot, stick a log-on sequence into the brackets if it's a bulletin board service (BBS) number (the colons allow me to autodial from *TELCOM* if I want), and finish it off with a keyword to make it easier to find (TRS-80, prospect, etc). Notice that I use only commas between elements, use only colons before and after the phone number, and leave spaces in strategic places.

Now I'll admit this may be a simple-minded example. But what if I need to keep information in two or three different forms in *ADRS*? In other words, for some folks, I need addresses and titles and a record of the last purchase they made from me, while for others I need special notes? It would be difficult to remember the standard organization for each of these without the templates, which would mean frustration when trying to use *ADDRSS* on the job.

Figure 1 has some example templates. These are the first four entries in my *NOTE* file. I copy and paste the template only from the graphic symbol to the end, to save space. The advantage to this system is that I can easily retrieve and display or print just those items needed at any time. For example, to give my wife a list of my appointments and trips for the month of April (so she can plan when to have me wallpaper the guest bathroom), all I do is go into *SCHEDL*, select *Lfnd* (function key *F5*) and type *E: 04/* in response to the prompt. If I want to list all my top-priority action items, it just takes *Find: Y:1* (press *F1* and type *Y:1* after the *FIND:* prompt on the screen) to do it.

To get all the action items, in all priorities, all I need enter is *Find: GRPH-t*. And so on.

The simplest way to organize your files into standard entries is to use a template. This sounds like a big deal, but it isn't.

Templates are labor-savers because much of your typing is already done. They are easy to tailor to your needs, and they don't put much demand on memory (yours or the machine's!). Using templates makes sense when your needs are simple and your lists are short, or when you are doing a lot of the same kind of entries at one time. If you are going to use templates, here is the way I recommend you go about preparing your own personalized set:

- Decide what information you want to have in the *NOTE* and *ADRS* files. The only way to do this realistically is to think about how you will be using your Model 100 on the job. What elements must you have, and how much memory can you afford to use? Less is more, but you need enough there to guide you. In *NOTE*, keep the categories down to five or less.
- Decide in what order you want the information to appear. This is purely for your convenience—the Model 100 doesn't care, and will show you the entire entry no matter what word or characters you use in response to the *Find:* prompt.
- Decide what symbol to use between elements in each entry. I strongly recommend using the comma, but you may prefer a graphic symbol or an *umlaut*. The main thing is to be consistent.
- For *NOTE*, decide on the symbols to use for each category. Choose symbols and key combinations that are easy to remember and fast to type.
- Type your templates leaving spaces so you can use *SHIFT-arrow* keys effectively when entering information. Using the arrow keys alone to move through entries is a real drag. You don't want to spend the rest of your life doing an update to your address list.

MEMOS AND REPORTS

If you use your Model 100 to write memos, or to produce standardized reports, keep another kind of template in *NOTE* or *ADRS*. This template is intended for use only with *Lfnd*, and it can be convenient. It gives you a standard letterhead or formatted report without any other software, and without taking up another slot on your Model 100 main menu (when the menu is full, you have to start deleting files).

Suppose you have a project that requires you to track expenses (travel, postage, express or messenger service, and so on) to be billed to the client. At the end of your *NOTE.DO*, you can keep an expense form for this project, by name or project number. You create the expense form by entering *NOTE* and using *CTRL-down arrow* to get to the bottom of the file. Count the letters in the project name and divide by two. Then subtract this number from 40, space over that many columns on the screen, and type the project name. Ignoring word wrap, hold the space bar down until the cursor is at the right edge of the screen on the second line down from where you started. This will be the top line on the form. **Do not press *ENTER* yet!**

Continue to press the space bar 33 more times, type *EXPENSE REPORT*,

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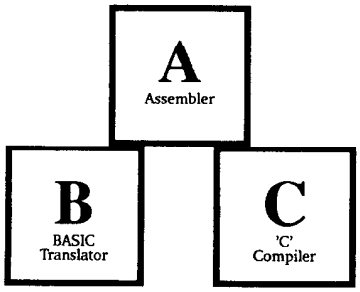

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and space 33 more times to the right edge of the screen again. **Don't press *ENTER* yet!** As you can see, the right edge of the screen is the center of what will eventually be a printed page, and two screen lines count as one line on that page. If a reporting period is required, repeat this centering process again to place the dates below the title. **Don't press *ENTER* yet!** Hold down the space bar to put two blank screen lines into the template below the title and dates.

When you have the cursor at the left edge of the screen again, space 10 times, type *DATE*, space 5 times, type *AMOUNT*, space 5 more times, and type *REASON FOR EXPENDITURE*. If you wish, you can go down another line and place dashes below each item in the form heading. **Now you can press *ENTER*!**

Print the form by entering *SCHEDL*, selecting *Lfnd*, and typing *expense report* in reply to the prompt. Go back into *NOTE* and add or delete spaces as needed to get everything to line up right. As you have expenditures on the project, return to the form in *NOTE* and add the details, being careful to line up your columns and to not use *ENTER* anywhere in the report.

When it is time to submit a report, go into *SCHEDL*, select *Lfnd*, give the project name or number that appears at the top of the form, and the program will print out your expenses neatly, with centered title, headings, and columns. Letterhead and memo forms can be created the same way. If you have created a form as you read this, you know that it is much easier to do than to describe!

It is much easier create a form than to describe how to do it!

Some users, however, do not like to use templates. They may have special needs that make templating awkward or impractical. They may want the machine to do all the finding, cutting and pasting, to save wear and tear on the function and arrow keys. Whatever the reason, you may want to use a program to add new entries into *ADRS* and *NOTE*. Next month I'll give you a program that you can type in. It opens ADRS or NOTE and adds information in the formats I've used for years. I'll keep it simple and well commented so that beginners can learn from it.

Nearly all users eventually wish they could use the power of ADRS and SCHEDL on other lists. Well, you can! I'll give you another program next month that lets you do just that.

That's it for this installment!

Valeas, qui legis quod scripsi! (May you fare well, who shall read what I have written!)

Bill Brandon is an independent developer of adult training programs and a freelance instructor. He got his Model 100 over five years ago "as a personal reward for quitting smoking. As an incentive, my wife gets to shove the Model 100 in my ear if I ever start up with the ciggies again." Bill is the assistant Sysop of the DP Trainer's Forum on CompuServe; you can reach him there, through Portable 100, *or at the address shown in the program listings.*

COMPATIBILITY: Tandy 100/102, 200, NEC 8201/8300

The Book of Revelations

The Secrets of ROM Revealed: *This book unveils the mysteries of the option ROM.*

by "Skateboard" Stan Wong

Turn your Model 100/102/200 on its back and open the option ROM compartment. If you're like me, the option ROM socket will stare back and cry "feed me, feed me ..."

After a year or so of listening to the plaintive wailings of my trusty Model 100, I finally broke down and purchased a commercial multi-function ROM. My machine's personality was transformed! How, I wondered, could this ROM turn my mild-mannered notebook computer into a data processing marvel? Why, it could do some things easier and better than my desktop computer. Most of all, how could I use this extra 32K of code space for my own programs?

What I discovered was that there is a dearth of information about how to develop programs for the option ROM socket. Option ROM programming for the Model 100 has been a closely guarded commercial secret. I spent a year-and-a-half poking around the machine, gleaning a few bits of data here and there. I hung around the Model 100 Forum on CompuServe and picked up a few more tidbits. I even disassembled the code inside a commercial ROM to see what made it work. There were so many tricks and nuances that it took me a long time to figure out how to do it. I finally made my own ROM that worked! Sort of.

M.J. (Mo) Budlong of King Computer Services, Inc. has written a book, *The Secrets of ROM Revealed*, that presents everything you need to know about developing option-ROM programs. This book is not for beginners, however. The intended audience are those assembly language programmers who want to have their programs run from the option ROM. It assumes a fair amount of experience with the Model 100 computer and assembly language programming. You also need access to an IBM PC-compatible or CP/M computer. Familiarity with electronics, knowing how to use an EPROM programmer, and knowing how to solder, are also useful skills. While none of the equipment mentioned is required, using the Model 100 to develop an option ROM program would be very difficult, though not impossible.

TOPICS COVERED

The book has fifteen chapters and covers everything you wanted to know about option ROM's. And it includes a few extra goodies thrown in for good measure. Some of the topics covered include:

- switching between standard and option ROM's
- how to call system ROM routines from the option ROM
- variable storage
- handling interrupts

It could do some things easier and better than my desktop computer.

- a universal "header" file
- source code(!)
- hardware resources
- NEC PC-8201A and Model 200 tips

HEAD(ER) OF THE CLASS

The book explains several option ROM strategies: how to get back and forth between system ROM and option ROM without sending your machine into the deep freeze (programmer lingo for *cold start*).

All the secrets of the option ROM are distilled into an option ROM *header* file, *ROMHD.ASM*, in the book. Stick the *ROMHD.ASM* assembly language source code in front of your program, assemble, and bingo—you've got an option ROM program. At least that's the theory. I chose a particularly tough example to test for this review.

An important element of option ROM strategy is how to use system ROM routines, which are well tested and can save you a lot of time. You use the *STDCALL* function (contained in the *ROMHD.ASM* header) to access the system ROM and return to your option ROM program. *STDCALL* is invoked via the 8085's *RST 6* instruction. The following code fragment illustrates this:

```
RST     6
DW      7662H
```

This would call the *BEEP* routine in system ROM and return to the instruction following the *DW* pseudo-op. I have examined several commercial ROM's from different companies, and they all use *RST 1* to access system ROM. *RST 6* seems to work equally well.

FIDDLING WHILE ROM BURNS

Once I finished reading the book, I couldn't wait to start writing my own ROM-based program. For those of you who can't wait either, the book includes a working ROM program. *SandR* is a "Search and Replace" utility. The program source code is quite lengthy and worth the extra $10 to get it on an MS-DOS diskette. I assembled the *SandR* on my PC, downloaded the code into an EPROM, and turned on my Model 100. Imagine my surprise when the familiar Model 100 menu had a *SandR* entry. I placed the widebar cursor over it, pressed *ENTER* and—presto!—I was in. What could be easier?

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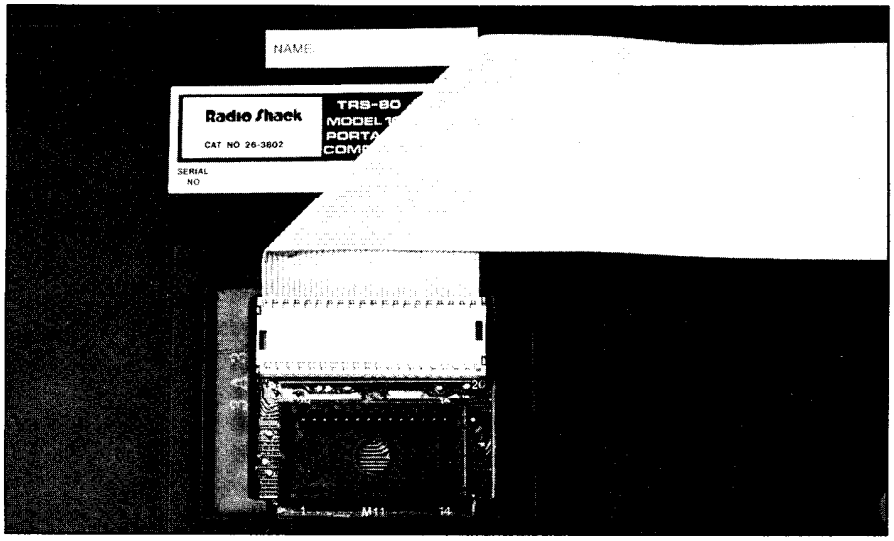

The option ROM socket. Free up extra RAM in your Model 100 by putting your favorite programs on a ROM with the help of Secrets of ROM Revealed *by Mo Budlong.*

To make your own ROM you first need an 8085 assembly language source program. Then you need something to translate the source program's instructions into the Intel hex codes used by most EPROM programming equipment. After that you mount the EPROM to an adapter that fits into the Molex-type option ROM socket used by the Model 100.

The equipment I used for the review was:

- IBM PC/XT compatible computer
- *Z80MU* CP/M emulator
- *ASM*, a CP/M 8080 assembler
- EPROM programmer for the PC
- TSI 8-Rompak

I wanted a low-bucks approach for experimenting. I already had an IBM PC and the EPROM programmer. The *Z80MU* package from Computerwise Consulting Services emulates a CP/M environment on the PC. The package is in the public domain and is available from information services such as GEnie and CompuServe, as well as from public domain disk publishers. The last step was to go to my local software liquidator and buy a CP/M system disk for a couple of bucks. Each CP/M system usually comes bundled with the *ASM* assembler. *ASM* produces the required Intel hex codes for my EPROM programmer.

The option ROM socket is made to accept ROM's in a Molex-type carrier. The pin arrangement of an EPROM is different from that of the option ROM socket, which is made for a mask-programmable ROM. Tandy sells an adapter board onto which you solder your EPROM and then plug the circuit board into the option ROM socket.

You can obtain the Expansion ROM/Board Conversion Kit from Tandy National Parts Service. Call (800)442-2425 or (817)870-5662 and order part number AXX-7113. The part costs $10.02. King Computer Services also sells a similar EPROM carrier.

MY TEST SETUP

Developing a ROM-program can be-

What's an EPROM?

One type of read-only memory device (ROM), also known as a mask programmable device, is programmed at the factory and, once manufactured, cannot be changed. Because it is factory-made, large production runs are feasible and are also economical.

But what if you want only one ROM? Enter the Electrically Programmable Read-Only Memory (EPROM), a specialized type of ROM on which the user performs the personalized programming for each individual unit. Its advantages are that you can program only as many as you need, and you need to stock only one type of device, no matter how many programs you have. The drawback is that the EPROM is more expensive on a per unit basis.

Before I go further, let me inject a note about jargon. Engineers use several different verbs to describe the act of placing the binary 1's and 0's into the EPROM. Mo Budlong prefers to use the word *burn*. Lest we be thought of as arsonists, I prefer the word *program*. Being thought of as a nerd is better than being thought of as an arsonist—or a terrorist, since another common phrase is "to *blow* an EPROM."

The most common EPROM used for Model 100 applications is the 28-pin 27C256 EPROM, also known as a UVPROM. Once programmed, the programming can be erased and a new program written into the device. The erasure is by exposure of the part to ultraviolet light through a quartz window on top of the EPROM. After programming, the window is usually covered with an identifying label. If the window is left uncovered, there is enough ultraviolet radiation in normal sunlight to erase the EPROM over prolonged periods of time.

All commercial ROM's from third-party vendors, such as Traveling Software and PCSG, are programmed onto EPROM's, then mounted into carriers to fit the Molex option ROM socket used in the Tandy notebook computers. This allows them to program only enough to meet sales volume. Minor changes to the code can be incorporated into the next batch without waiting until the current warehouse full of ROM's is sold, as would be the case with a mask-programmed ROM.

come expensive using the development procedure described above. Each time you program an EPROM, you must then solder it to an adapter board. Unless you have the equipment to unsolder the EPROM you'll be forced to start over with a new EPROM and adapter board.

I have an 8-Rompak from Traveling Software, Inc. The unit contains four Tandy-style Molex sockets plus four 28-pin EPROM sockets. Although unavailable now, the 8-Rompak was sold with the *Sardine* spelling checker, which occupied the four EPROM sockets. I was able to buy it with *TS-DOS* in EPROM so that three EPROM sockets are unused.

These three sockets are normally inaccessible, because the ROM-based *TS-DOS* ignores attempts to access those sockets. But with a minor modification to the *ROMPAK* access program I can now access two of the three unused EPROM sockets and use them for testing.

Back to *SandR*. It worked as advertised, with one minor glitch. On exit, the program returned to a strange place in the *ROMPAK* driver instead of to the Model 100 main menu. To remove the Rompak from suspicion I copied the contents of a commercial ROM into EPROM. The commercial program ran as usual, and when I pressed *F8* to exit, I was returned to the Model 100 main menu. The obvious conclusion is that my test setup interacted strangely between the *ROMPAK* software and *SandR*.

A call to Mo Budlong confirmed that everything works fine in his setup. I did not make a "normal" option ROM for test, so I conclude that the *Secrets of ROM* headers are not completely general. Commercial ROM's working normally out of the 8-Rompak EPROM sockets proves this.

CONVERTING A PROGRAM

After seeing *SandR* work, I couldn't wait to put my own program into a ROM. I grabbed my latest project, the *TextStar* program (see March '89) and sat down to make the conversion.

The conversion process wasn't as easy as I thought. You must keep in mind a number of issues when designing a program to run in option-ROM space.

The first problem I encountered was that of where to store local variables. Most assembly language programs set aside a few bytes in the program address space for temporary storage. But once a program is cast into ROM, its bytes can't change. Therefore, variables must be located somewhere in RAM. *Secrets of Rom Revealed* discusses variable storage strategies. For small amounts, about 300 bytes or less, the *TELCOM* back page (*ALTLCD*) at FCC0H is recommended. This means redoing the variable equates (if you followed good programming practices), not a hard problem to fix.

One alternative is to use some storage just below *HIMEM*. Another is to use the stack for storage, but that can get messy, as you constantly need to calculate stack offsets. For instance, to load the A register with a byte from local storage you would typically code something like:

```
LXI  H,LOCVAR    ;put address of
                 variable in HL
MOV A,M          ;now load A with
                 the LOCVAR
          .
          .
LOCVAR  DB   0   ;allocate one byte
                 of storage
```

With stack addressing the above might look like:

```
   LXI  H,0       ;clear HL register
   DAD SP         ;HL<-stack pointer
   LXI  B,10D     ;assume LOCVAR
                  is 10 bytes down
   DAD B          ; in the stack.
   MOV A,M        ;load LOCVAR
```

But SandR is proof.

TextStar relies heavily on calling system ROM routines. The following is a code fragment from my conversion effort:

```
;  JMP    Text      ;enter TEXT pro-
                    gram
   PUSH   H         ;+
   LXI    H,Text    ;+
   XTHL             ;+
   JMP    STDON     ;+
;  CALL   65ECH
   RST    6         ;+
   DW     65ECH     ;+
   POP    PSW
;  JC     6501H
   JNC    A1        ;+
   PUSH   H         ;+
   LXI    H,6501H   ;+
   XTHL             ;+
   JMP    STDON     ;+
A1CPI     127
```

The commented-out statements are from the original program. Statements with the plus at the end of the line are the conversion statements.

Notice that the first *JMP* statement is to an address in system ROM. In the book, the *STDCALL* function returns you to option ROM after the call to the system ROM. I didn't realize until I was almost finished writing this article that I could have defined *RST 5* (or some other unused *RST*) as a *STDJMP* function, something *TextStar* does a lot of. The code fragment above would become:

```
   RST    5         ;JMP Text
   DW     Text
   RST    6         ;CALL 65ECH
   DW     65ECH
   POP    PSW
   JNC    A1        ;JNC 6501H
   RST    5
   DW     6501H
A1CPI     127
```

No technical problems prevented me from completing the conversion; I just got lazy. But *SandR* is proof enough that programs can indeed be written for the option ROM in a straightforward way.

CONCLUSIONS

This book breaks new ground for Model 100 software development. What was once a closely guarded secret of commercial software companies has now been revealed, documented, and explained by Mo Budlong. I suspect that we will see a new wave of applications for the Model 100 in the near future. Watch the ad space in this magazine for developments!

This book is highly recommended for those with commercial ambitions or for us hackers who simply want to understand the souls of our machines.

Even knowing the "secret," developing ROM's is still not an easy task. You still must first have a good idea and then write the program. With Mo's book, though, if you are serious about option ROM development, you should be capable of putting it all together and making it work.

The book is available for $39.95 from King Computer Services, Inc., plus $10 for the DOS diskette.

Stan Wong is a programmer in the defense electronics industry. Programming the Model 100 is his way of maintaining his sanity. His CompuServe ID is 70346,1267. He can sometimes be reached on GEnie as STAN.WONG and MCI Mail as SWONG.

MANUFACTURER'S SPECIFICATIONS

The Secrets of ROM Revealed—$39.95
IBM DOS diskette—$10.00
King Computer Services, Inc.
1016 North New Hampshire
Los Angeles, CA 90029
(213)661-2063

COMPATIBILITY: Tandy 100/102, 200, NEC 8201/8300

Sardine Reviewed

This product goes with more than cheese and crackers.

by Kenneth F.T. Cust

Sardine, from Traveling Software, is a dictionary and spelling checker. It comes in two versions, a ROM version and a 3.5-inch disk version. The ROM version comes with one ROM chip, a 3.5-inch disk, two manuals, and a copy of the *Random House American Dictionary*. With the ROM version of *Sardine* you also get *T-Word*, Traveling Software's word processor.

With the disk version you get two disks, one manual, and a copy of the *Random House American Dictionary*. The disk labeled *Sardine* contains four files, including the *Sardine* operating program and *SR-OFF.BA*, used to install the operating program in high memory, thus making it available for use. The other two files, *RELOC.CO* and *RELOC.BA*, are programs for those who use *Sardine* while having other machine language programs loaded. These programs relocate *Sardine* in high memory to avoid conflict with other programs. The second disk contains the dictionary. Note that the disk version of *Sardine* does not contain the word processing program.

Traveling Software supplies versions of *Sardine* for Tandy 100/102/200 and the NEC PC-8201A/8300 laptop computers. The disk version regularly sells for $99.95, while the ROM version regularly sells for $169.95. Note that both were advertised at sale prices, $59.95 and $99.95, in the January '89 issue of our favorite magazine, *Portable 100*. For this review I used ROM version 1.34 in a Model 100 with 32K RAM and a Tandy Portable Disk Drive.

Installation of the ROM chip was a snap! You just pry off the cover on the back of the M100, press the chip into place, enter *BASIC* and type *CALL 63013,1*. However, caution dictates that you should first ensure that you back up any precious files prior to installing any ROM chips. If something should go wrong, you may have to cold start the computer, thus losing all your files.

Sardine, *a spell-checker by Traveling Software, comes in both a two-disk version and a ROM version.*

Once you've installed *Sardine*, you'll notice three new files on your opening menu, *CONFIG.DO*, *WORD.DO*, and *TWORD+*. The first of these new files, *CONFIG.DO*, lets you customize *T-Word* for your printer and assign new values to the print menu settings. The *WORD.DO* file is a supplemental dictionary file, which means you can add words that *Sardine* doesn't have. For example, in my writing as a philosopher, I frequently use words, such as *epistemological* and *metaphysical*, that *Sardine* doesn't recognize. I can manually add these words to the *WORD.DO* file, or *Sardine* will add them automatically via its "learn" feature. The third file, *TWORD+*, is the word processing program.

To use the ROM version of *Sardine* you must first be in *T-Word*. To enter *T-Word*, select it from the main menu by moving the cursor over its name and pressing *ENTER*. *T-Word* gives you a list of all document files, and you select the file you want by moving the cursor over the file name. You can either enter the file directly by pressing *F4* or, if you press *ENTER*, it gives you the choice of modifying various default settings and then entering the file you have selected.

Sardine offers the user the choice of checking the spelling of a single word or an entire document. You can use either the ROM dictionary or the disk dictionary. As you would expect, the ROM dictionary is much faster than using the disk dictionary, but it also contains fewer words. The ROM dictionary, according to the documentation, contains 7,000 of the "most frequently used business

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words compiled by lexicographers at Wang Laboratories." The disk version contains 33,000 words, supplemented by the list of words compiled by Wang Laboratories. Hence, depending on the type of writing you are engaged in, you may find the ROM dictionary sufficient for your needs. On the other hand, you can use the disk dictionary if you need it. Moreover, since *Sardine* adds words to the *WORD.DO* file, you can build a supplemental dictionary to match your needs.

To check the spelling of a single word, put the cursor on the last letter of the word and press *GRPH-W*; to check an entire document, press *GRPH-F*. In either case, *Sardine* offers you the choice of using the ROM or the disk dictionary.

If you are unsure of the spelling of a single word and want to check its spelling, you can begin by typing the word, say, the first three letters of *achieve—ach—* and then press *GRPH-W*. *Sardine* presents a list of words that begin with those three letters, *achieve, achieved, achievement, achievements,* and *achieving*. To insert the word directly into the text you need only select the word by moving the cursor over it and pressing *F4*. *Sardine* returns you to your document with the correctly spelled word inserted. If you capitalized the first letter of the word, it will capitalize the word on your return to the document. But the cursor remains in the middle of the word rather than at the end of the word where you would expect it to be. Thus, in the example, *Sardine* returns you to your document but the cursor is over the *i* in *achieve*. If the word is too long to fit in the line, the cursor remains where it was when you pressed *GRPH-W*, and it inserts the word on the next line, thus forcing you to press extra keys to get the cursor to the end of the line so you can continue typing.

The procedure for checking an entire document is similar: Press *GRPH-F* and select the ROM or the disk dictionary. *Sardine* alphabetically sorts all the words in the file prior to checking the spelling. When *Sardine* has finished checking the spelling it gives you the number of words in your document and the number of suspected errors. After you press a key, it presents you with the first suspected error and gives you the following options: Press *F1* (*OK*), the word is spelled correctly and continue with the next word; *F2* (*Cntxt*), you can see the context of how and where the word was used; *F3* (*Dict*), use the dictionary to find the correct spelling, or simply change the spelling if you know it; *F4* (*Prev*), view the previous misspelled word; *F5* (*Next*), see the next misspelled word; *F6* (*Lern*), *Sardine*'s learn feature where it automatically enters the word in the *WORD.DO* file; *F7* (*Spel*), allows you to correct obviously misspelled words and to change all occurrences of such misspellings in the document, or to confirm each suspected occurrence of the error, or to quit; *F8* (*Text*), returns you to your document.

MANUFACTURER'S SPECIFICATIONS

Sardine
Two-disk version—$99.95
ROM version—$169.95
Includes copy of *Random House American Dictionary*
ROM version includes *T-Word* word processor

Traveling Software
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Bothell, WA 98011
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During the spelling check, *Sardine* also finds doublets, words that occur twice in succession, such as *to to*, and gives you the choice of fixing such occurrences.

You can use *Sardine* to replace abbreviated words throughout your document. Say, for example, I was writing a philosophical paper on Aristotle. Rather than typing Aristotle's name each time, I could abbreviate it to *Ar* and then have *Sardine* replace each occurrence of *Ar* with *Aristotle*, thus saving me numerous keystrokes.

The ROM dictionary is fast! I checked a file of 6971 bytes using the ROM dictionary in just less than 30 seconds, 29.27 seconds to be exact. It counted 1215 words and found 45 suspected errors. Checking the same file using the disk dictionary took 3 minutes and 8 seconds and found 36 suspected errors.

Sardine can be relocated in memory and therefore should not present a problem for those users who have other machine language programs loaded into their machine at the same time as *Sardine*. It's compatible with such software as *Ultimate ROM II, ROM-View 80,* or *TS-DOS*. The instructions for ensuring compatibility with these programs and others that reside in high memory is well documented in the manuals.

Though not copy protected, the *Sardine* disk dictionary, the manual warns, is specially formatted to speed operations, thus making it very difficult to make a back-up copy of the disk. To circumvent the potential loss of the master disk, Traveling Software offers a back-up copy of the dictionary disk for a nominal fee of $4.95, quite reasonable, to say the least.

All in all, *Sardine* is a valuable addition to a writer's arsenal, especially when you consider that with the ROM version you get Traveling Software's excellent word processing program, *T-Word*. I know I haven't said much about *T-Word*, but its numerous word processing features could only be an invaluable asset to anyone who uses his laptop for word processing. Just to mention one caveat about *T-Word*—and this is especially important for academic writers—it includes no footnoting capability. However, let me note that the manual does say that you can use the *footer* command to enter footnotes. Since this review covers *Sardine* and not *T-Word*, I have not tried using the footer command to make footnotes, nor have I commented on any of the other numerous features of *T-Word*. My initial impression of *T-Word* is that it is quite good.

Sardine's documentation is clear, the installation procedure a snap, and I found no obvious bugs. Note only a few minor caveats, none of which should preclude the purchase of this excellent product from Traveling Software. First, the ROM chip does not have a ribbon attached to it for easy removal from its socket. Second, a minor irritation but nevertheless an irritation, the cursor ends up in the middle of a word after you check the spelling of a single word, thus necessitating extra keystrokes before you can continue with your writing. The only other caveat is that *Sardine* disables the Model 100's automatic shut-off feature, so if you forget to shut the machine off, you could find yourself running out of battery power.

COMPATIBILITY: Tandy 1/102, 200, NEC 8201/8300, Olivetti M10, Kyocera KC-85. Untested: Cray IIa

Z88 to Model 100

You don't have to choose between convenience and convenience.

by Daniel Grotta

Whenever my wife Sally and I travel on assignment, we usually carry two entirely different photographic systems. Our catalog of camera equipment consists of: for one system, four Nikon bodies, one motor drive, two zoom lens, one macro lens, and one telephoto lens; for the other system, two Leica bodies, one ultra-wide lens, one wide-angle lens, one normal, one portrait, and one medium telephoto lens. Added to this is a rather extensive complement of filters, lens hoods, strobe lights, tripods, light meters, and the like. To carry it all are two camera cases, with a folding cart to haul them through airports, on ships, and into hotels.

Now to those who know cameras, Nikon reflex lenses simply do not fit Leica rangefinder bodies, and vice versa. So you might naturally ask: Why do we bother carrying two entirely different, totally incompatible, 35mm systems?

Like a golfer carrying a series of woods, irons, and putters in his bag, or an artist using different sized brushes, we have to match the camera lens or body to specific shooting situations. For instance, we use the Nikons for long shots, close ups, quick action, and portraits. The Leicas are superior for architectural photos, candids, low light situations, and those potential cover shots that demand the highest quality resolution and magnification possible.

Of course, there is a lot of crossover, and whenever Sally and I go on separate assignments, she usually takes the lighter Leica outfit and I carry the Nikon equipment.

Although we can't exchange the camera bodies, lenses, filters, and motor drives between the Leicas and Nikons, we use the same flashes, tripods, cable releases, and of course, film for both systems.

HALF THE ANSWER

The point of this oversimplification is to explain why we also carry two different laptop computers with us on those same assignments. (At present, Sally and I are doing a book on cruise ships, and we also write articles and sell photos to newspapers and magazines on the various cruise ships and ports of call.) One machine is our old trusty-and-true Model 100 (or sometimes our back-up equivalent, an Olivetti M10), which has accompanied us everywhere from Glacier Bay, Alaska, to Nelson Sound, New Zealand, from the steamy Amazon to the Great Wall of China. The Model 100 combines portability with an easy-to-read screen, fairly good battery life with the kind of ruggedness that has survived tropical downpours, frigid Arctic winds, a desert sandstorm and being dropped on a sidewalk from a height of nearly three feet. And when combined with Traveling Software's *Lap-Link* (an early version, unlike more recent ones), it becomes a relatively easy matter to edit text, print out files, and save to Tandy's portable disk drive. In addition, by using *LapDOS* (also Traveling Software), we can quickly transfer any files saved on the 3.5-inch drive directly to one of our IBM AT's by connecting the Tandy drive to a serial port.

The Z88 is (theoretically) poised to blow Tandy 100/102 out of the water

Until last summer, we used to take the Model 100 and the Olivetti M10 on assignments, sort of as a his-and-hers matched set. Since we both write, we need two machines, period. However, as versatile and valuable as the Model 100 is, there are some vexing limitations that used to make us long for another machine. The screen is small—too small for full-blown word processing. Thirty-two K of RAM is fine for a week at a time, and when the disk drive is working perfectly, but cripples us whenever we're away longer than that (which is often) or when the disk drive is down (which, alas, is even more often). And lastly, although it is a small and light machine compared to any MS-DOS compatible portable, transportable, or lunchbox computer, it still seems too large and bulky for one-on-one interviews, slipping into a camera case for photo identifications or on-the-fly notes, or simply carrying it around for an entire day without feeling strained or constrained.

We tried, for a time, schlepping a DataVue MS-DOS-compatible laptop with us, hoping that its full IBM compatibility would add considerably to our productivity. However beneficial it might have been, the trade-offs in initial cost, size, weight, and useful battery life were more than we were prepared to pay.

Then we got the Cambridge Z88 laptop computer.

A BETTER LAPTOP?

At first glance, the Z88 is (theoretically) poised to blow Tandy out of the water. At less than two pounds and an inch thick, it's not only smaller than the Model 100, but small and light enough to slip into a camera bag, replace a clipboard, and generally be taken along almost everywhere, even those places where the Model 100 is just too inconvenient. It has a screen that displays more characters than the Model 200, has more than a half-dozen built-in applications programs and functions, uses EPROM packs to load in additional software, has an optional key click, and a weatherproof, rubberized, chiclet keyboard. By

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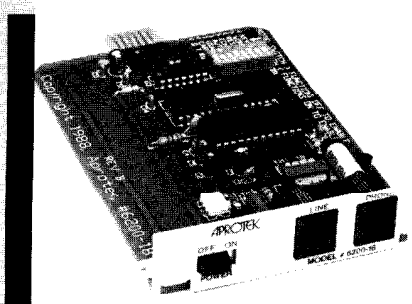

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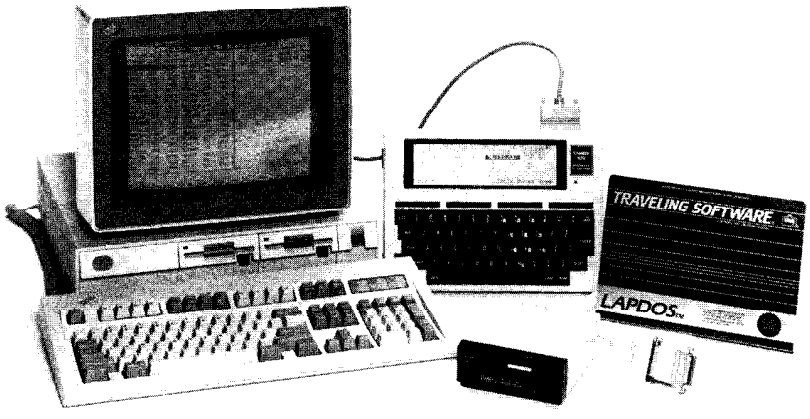

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using an optional EPROM program called *PCLink* and a special cable, you can easily transfer files to and from any IBM-compatible or Macintosh computer. But the biggest advantage of the Z88 over the Model 100 is RAM capacity—you can expand it up to a phenomenal three megabytes of low-powered CMOS memory, which can remain non-volatile for up to a year on one set of (four) AA alkalines.

But before you throw away your Model 100, consider the Z88's long list of irritations and limitations. Its word processing program, *PipeDream*, is more like a Dantean nightmare, the documentation would have made George Orwell's newspeak seem like an exercise in clarity, you can't plug in a 6V transformer to conserve battery power because none is available and the technical specifications seem to be a state secret. *[See Editor's note.]* The special printing cable that converts from serial (the Z88's one and only port) to parallel scrambles every tenth character, assuming that you can format your text correctly with the monumentally screwed-up word processor, which you probably can't). You must type slowly or risk key bounce (so the option key click is almost mandatory, which cuts your maximum battery time by almost two-thirds). And the help menu is almost totally, absolutely useless for anything other than raising your blood pressure.

In short, the Z88 is great for taking notes, writing first drafts, and doing quick-and-dirty work on Lotus 1-2-3-type spreadsheets, but only slightly short of a catastrophe for more extensive or detailed work.

The upshot of all this is that Sally and I use two entirely different, semi-incompatible systems, each with its own special abilities and limitations.

BRIDGING THE GAP

Fortunately, we have found a relatively easy and inexpensive way to bridge some of those incompatibilities, and that is to transfer files to and from the Model 100/M10 and the Z88 by way of the Z88-to-PC cable that comes with Cambridge's one and only superb program, *PClink*. (Actually, all you need is a plain old serial cable and a null modem adapter but if you get *PClink*—which I strongly recommend—with your Z88, you have what you need already.) We also need a 25-pin male gender adapter to mate the Model 100/M10's female RS-232 connector to *PClink*'s female cable connector.

First we configure *TELCOM* in the Model 100 with the these parameters: *88N2E*. The Z88's default values are correct, but if we have changed them for any reason, we must go into *PANEL* and make certain that the baud rate is set at *9600*, parity at *NONE*, and the XON/XOFF is set at *YES*. Then we connect the cable between the two machines' serial ports, If we plan to move files from the Z88 to the Model 100, we must save them first—it will not work with files simply suspended in memory. We do this by pressing ◆ *FS*, and then giving the file an eight-letter name. One note: we must be certain to save the file as plain text. Another note: before writing a file, we go to the Options menu, press *ENTER* for Options page, and then change *Wrap* from *Y* to *N*. Otherwise, we'll get a carriage return every 80 characters (or whatever the width is set at) in addition to normal carriage returns, when we try to print it out from any other computer. Once we've saved the text in the correct format, we press □ *X*, or return to the Z88's main menu and select the *Imp-Export* program. Depending on whether we're sending or receiving files, we press either *S* or *R*, and *ENTER*. (Don't bother with batch file transfer, at least with the Model 100.) Our Z88 will then prompt us for the name of the file. If sending, we type the file name, or if receiving, we assign it a name. The Z88 is now ready.

On the Model 100, we press *TELCOM* and, assuming that its status is already set at *88N2E*, we press *F4* (NEC-*F5*) to put the laptop in the terminal mode. If planning to download (receive) a file from the Z88, we press *F2* (NEC-*F5*), type a six-character file name, and press *ENTER*. If uploading (sending) a file, we press *F3* (NEC-*F4*) type the correct name, press *ENTER*, and then press *ENTER* again (without assigning a specific width). By now the files should be zipping along. If sending to the Model 100, we'll see the text whiz by on the Model 100 screen as it downloads, and if sending to the Z88, we'll see the number of file blocks transferred on the left part of the Z88 screen (the numbers stop when the transfer is completed). That's all there is to it. Now we just close out the programs, turn off the computers, disconnect the cable, and we have the same file on both machines.

Once the Model 100 files are on the Z88, we can kill them on the Model 100 to free up valuable RAM space. Normally, when we have access to an IBM with a serial port, we use the Z88 and *PClink* to transfer all our files to a 3.5-inch or 5.25-inch floppy, or directly to our hard disk. On the other hand, the Z88 files transferred to the Model 100 can be edited and printed on our Brother HR5 portable printer far, far easier than on the Z88.

In this way, we have the best of both worlds, and the ability to link two otherwise incompatible systems to select the best one for certain tasks. It's not a foolproof system, and the few minutes of transferring files can be inconvenient, but until something better comes along, we'll keep using it, just as we still carry both our Leicas and our Nikons.

Editor's note: Though sometimes difficult to obtain, AC adaptors are available. Also, the standard Tandy AC adaptor (#26-3804) for Tandy notebook computers can be modified for the Z88 simply by reversing the polarity on the 6V connector.

The RS-232 settings mentioned in the article were determined by trial and error. My tests showed the more common 88N1E setting to work as well. For NEC computers, use 8N81XN.

-MN

Before you throw away your Model 100, consider the Z88's long list of irritations and limitations.

A Standing Project

Make a Plexiglas™ cover/stand for your Model 100.

by Albin Hastbacka

The Model 100 portable computer is a fine machine for a variety of applications. However, it has one drawback; the keyboard is not slanted at a comfortable typing angle. To overcome this problem, you can try several solutions. One method of elevating the computer to a more comfortable angle is to use dowels that plug into the openings on the bottom of the Model 100. This solution may be satisfactory when the computer sits on a table top but is not very satisfactory for use on your lap. The dowels dig into your legs.

As an attractive and functional solution, you can make a Plexiglas *integrated stand and cover* (ISAC). The ISAC elevates the Model 100 to a convenient angle for typing or data entry. The elevation angle provided by the stand also improves the legibility of the display under most operating conditions. Then it acts as a cover for the unit when you store it or transport it.

You can use the ISAC in three modes. See Photo 1 illustrating

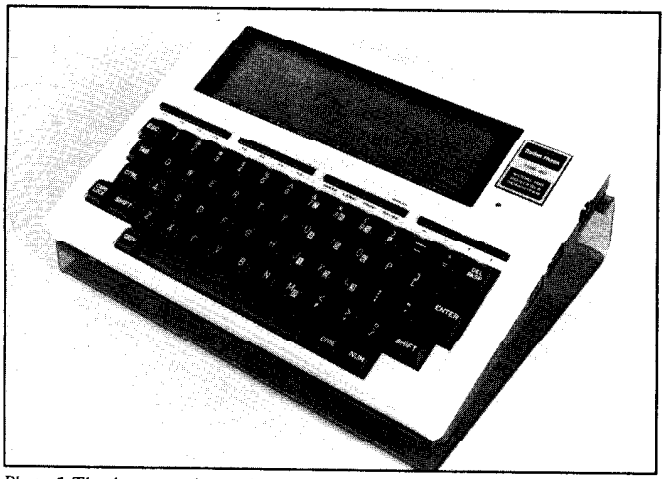

Photo 1.The integrated stand and cover, here, used as a stand to angle the computer at a more comfortable typing position.

the first mode, where the Model 100 is on the stand ready and angled for use. You can also use the stand to protect the connections and ports at the top of your computer while you're using it, as shown in Photo 2. The third mode, shown in Photo 3, inverts the cover so it protects the display surface and keyboard, as well as the connectors and ports.

Plexiglas™ is a registered trademark of Rohm & Haas

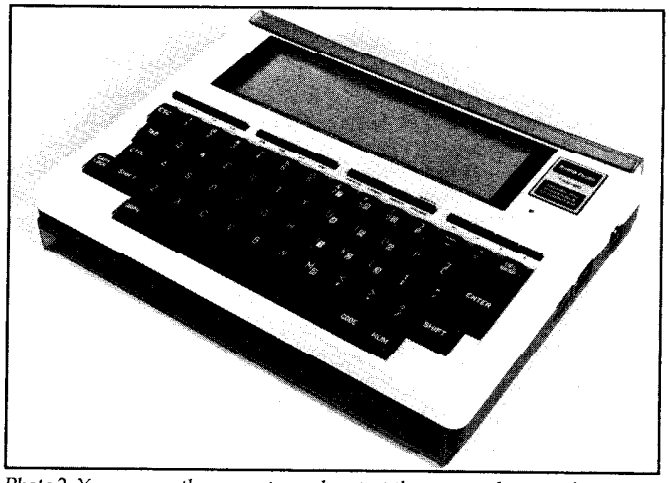

Photo 2. You can use the computer and protect the ports and connections on top with the ISAC.

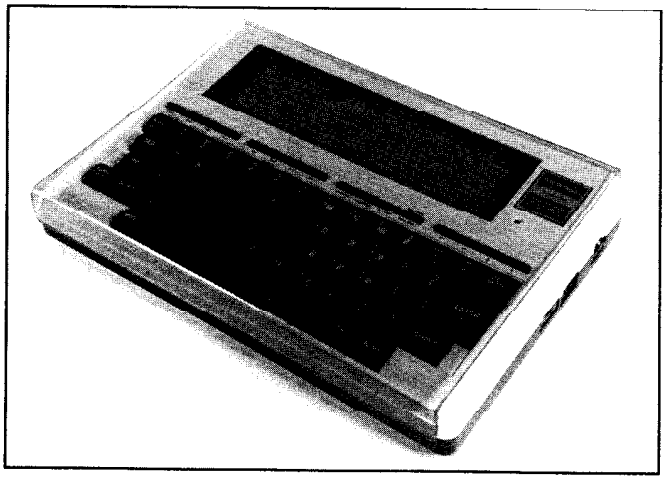

Photo 3. When you're not using your Model 100, the ISAC protects the display screen, the keyboard, and the ports and connections.

THE CONSTRUCTION DETAILS

The ISAC is made from a sheet of one-eighth-inch smoke or clear Plexiglas, cut to a size of 12 inches by 11.25 inches with a

DVORAK KEYBOARD SYSTEM

Give your laptop the Rolls-Royce of keyboard systems. The *Dvorak* key arrangement eliminates wasted motion, reducing finger travel by more than 90%! Type faster and more accurately. And it feels better-more natural, more relaxed. So there's less effort, less error, less fatigue. And learning to type is much easier on a Dvorak keyboard. No hardware! Just run the program once and forget it. Uses less than 500 bytes of RAM. Works in *BASIC, TEXT, TELCOM*, etc., just like it came from the factory that way! (Tandy 100, 102, 200, and NEC-8201) **$32.95**—Portable Disk Drive Disk. **$35.95**—Standard Tape. US Postage and Handling included. The DVORAK Keyboard System for notebook computers, from:

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P.O. Box 651
Peterborough, NH 03458-0651
Please allow six to eight weeks for delivery.

Circle 29 on reader service card.

CONSTRUCTION

table saw using a fine tooth plywood type blade. Sand the Plexiglas edges with fine grit (220) paper to remove saw marks. Follow this with a finer grit of 320 wet-or-dry paper and with a final sanding with a wet 400-grit paper. If you want the edges finished further, buff with a buffing wheel loaded with Plexiglas buffing composition.

You can use a Briskeat RH-36 heating element mounted on a 36-inch strip of plywood (as described in the literature accompanying the unit) to bend the Plexiglas. This type of strip heater is available at many locations where acrylic Plexiglas sheet is sold.

See Figure 1 for the locations on the sheet of Plexiglas for the bends. I found that the easiest way to get the proper bend is to mark the three bending locations on the Plexiglas with a felt pen. Then lay the Plexiglas sheet on the strip heater so that the line of the first bend is centered over the heater. Allow the Plexiglas to heat for approximately 5 minutes before attempting to bend the sheet. When the Plexiglas softens at the bend line, bend the sheet to an angle of approximately 100 degrees as shown in Figure 2. After letting the Plexiglas cool (while holding the bend at the 100-degree angle), put the sheet back on the strip heater to soften it at the second bend line. The second bend is a 100-degree bend also. Again, hold the Plexiglas in place until the sheet cools. Put the Plexiglas sheet on the strip heater again to complete the third and final bend, also at a nominal 100 degrees.

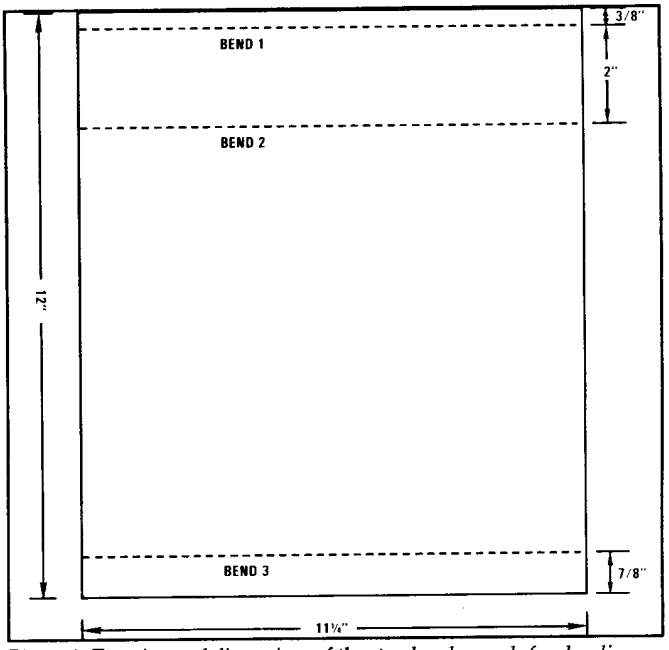

Figure 1. Top view and dimensions of the stand and cover before bending.

To use the ISAC as a stand, place the Model 100 in the unit as shown in Photo 1. For use as a cover, place the Model 100 into the ISAC by slipping the top of the computer under the lip of Plexiglas formed by bend 1 and pulling the lip formed by bend 3 over the bottom edge of the computer. An alternative method of putting the ISAC on as a cover is to slide the Model 100 edgewise into the ISAC.

Naturally, you can make ISAC's for other notebook computers by following these instructions but recalculating the bending locations.

If you don't want to attempt this yourself, you can order an ISAC from Albin Hastbacka by sending a check or money order for $20 to Albin Hastbacka, 10304 Greenwood Place, Oakton, VA 22124. Specify either Model 100 or Model 102 ISAC's.

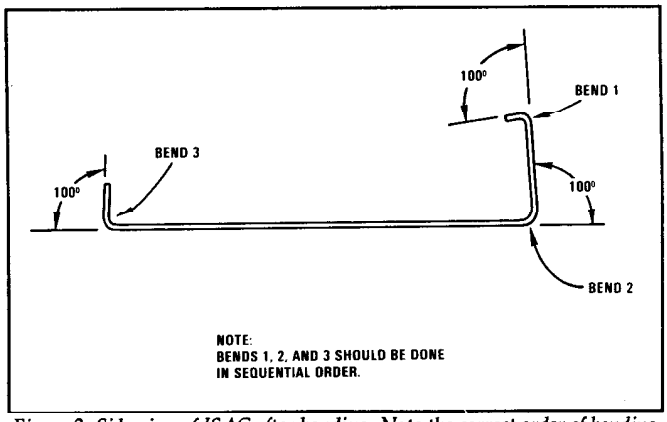

Figure 2. Side view of ISAC after bending. Note the correct order of bending.

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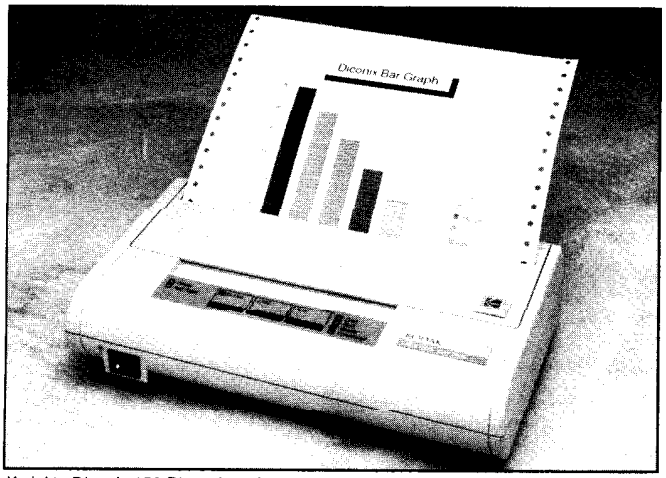
Kodak Introduces Enhanced Portable Printer



Kodak's *Diconix 150 Plus* printer is a portable ink-jet printer roughly the size of a standard office dictionary.

The Kodak *Diconix 150 Plus* printer features improved quality for text and graphics, 20 percent faster output, and the ability to print on plain paper.

The battery-powered ink-jet printer weighs 3.1 pounds (excluding batteries) and measures 2.0 by 6.5 by 10.8 inches. It prints on single-sheet or continuous-feed computer paper at speeds up to 180 characters per second in draft mode. Models for either serial or parallel interfaces are available.

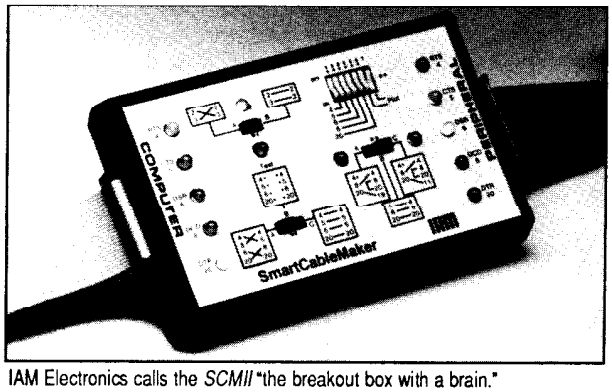
The Diconix 150 Plus offers print resolution of up to 192 dots per inch. New fonts, optimized for ink-jet printing, were created for the printer, using both 10-pitch (pica) and 12-pitch (elite) type sizes. Draft, near-letter-quality, quality, condensed and superscript/subscript modes are offered, for more than 100 different font variations. Print modes may be selected from the operator panel, or under software control. The number of international character sets supported has been expanded from eight to fourteen. Any of these may be chosen by changing DIP switches inside the printer.

The Diconix 150 Plus printer offers emulation of the IBM Proprinter and Epson FX Series printers, with single-, double-, and quad-density graphics. Users may choose normal graphics mode or expanded graphics mode. Fonts may be selected from the front panel of the printer using a built-in switch and LED indicator lights.

A new, wider slot paper exit allows 9.5-inch wide continuous form paper to be fed with the cover closed. The replaceable ink-jet printhead cartridge can print from 300 to 500 pages of text before a change is needed. The printer uses standard "C" size rechargeable batteries and will print about 150 pages before the batteries need recharging. New to the 150 Plus is its ability to be recharged while in use. Software senses when data is being received from the computer and discontinues charging temporarily to allow printing to occur. After data from the host is printed, charging resumes to complete the original cycle. The chance of accidentally overcharging the batteries has been eliminated.

Suggested retail price of the printer is $499.00 (serial interface) and $519.00 (parallel interface). For more information, contact Zero-G Computers, Inc., 48 Maple Lane, Blauvelt, NY 10913 (914)496-5199. *Or circle #64 on your Reader Service Card.*

Smart Cable Maker II for RS-232 Solutions



IAM Electronics calls the *SCMII* "the breakout box with a brain."

IAM has released the *Smart Cable Maker II* (SCMII) for serial asynchronous RS-232 solutions. Just plug the SCMII into the serial port with all switches in the test mode and it automatically and instantly evaluates all lines. Specially designed, patented, electronic internal circuitry senses line levels, evaluates transmission and reception signals and instantly makes the proper connection—just plug and go.

IAM has added a seven-position DIP switch for any non-standard applications, which provides pull-up voltages for all major Control and Handshake lines. It includes a special Plotter Interface connection to ensure compatibility with all types of devices. This allows instant communications between any devices that use an RS-232 asynchronous port.

The SCMII creates a graphic display of all connections so you can easily and quickly replace it with an inexpensive flat cable for permanent connections. The SCMII is equipped with both a male and female DB-25 connector *at both ends.* No gender changers, jumper wires, or batteries are needed (the SCMII gets its power from the signal line).

Three switches give you complete control of data lines, handshaking protocol, and all control lines, covering the entire range of RS-232 formats. It is priced at $169.95. For further information, contact IAM, P.O. Box 2545, Fair Oaks, CA 95628 (916)961-8082. *Or circle #62 on your Reader Service Card.*

Recording Cash Register Uses Model 100/102

An inexpensive recording cash register has been developed by King Computer Services, Inc., using the Tandy Model 100/102 as the screen, keyboard and portable interface device for a cash register. Transactions are recorded on the computer during a sale and can be uploaded to a host computer or PC for sales reporting and inventory update. The system supports UPC and 3 of 9 barcode reading, and a receipt printer as well as a locking cash drawer.

Prices start as low as $300.00 for the software. A complete system will cost around $1,350.00. For further information contact King Computer Services, Inc., 1016 North New Hampshire, Los Angeles, CA 90029 (213)661-2063. *Or circle #60 on your Reader Service Card.*

COMPATIBILITY: Tandy 100/102, 200 (Other computers; consult your owner's manual for codes, Morse probably won't work).

Embedded Printer Commands

Use these for Epson or similar printers.

by Laurence J. Lavins

Most of the newer "intelligent" dot-matrix printers incorporate a wide variety of commands. Embedded printer commands typed into a document like any other text can eliminate the need for special word processor programs for many routine text printing jobs, thus conserving valuable RAM space and, perhaps, dollars.

You can embed printer commands easily into Model 100 text files, as described in the user manual (page 60). But a printer can execute them only if you use the general device command *SAVE TO:LPT:*. If you attempt a printout by using the more common *SHIFT-PRINT* keys, the printer won't recognize these embedded printer commands. Instead, it will print them as it would any other ordinary text.

Unfortunately, when you use the *SAVE TO:* device command, both the *Width* and word wrap features of *TEXT* become inoperative. And consequently, the formatting of the printed output becomes more clumsy, if not impossible.

A BETTER WAY

Here's the good news. I have discovered a simple, alternative method of embedding printer commands, using an Epson printer, whereby the printer WILL execute these commands when using the *SHIFT-PRINT* keys. Moreover, the *Width* and word wrap features continue to work normally. The method I describe here should also apply to the Tandy Models 102 and 200.

Two system design features provide the basis for this technique, one in the Epson printer and the other in the Model 100.

The technique works with Epson printers because of the way the Epson treats special characters. The first byte, or character, of all Epson printer commands has a code value in the range between 0 and 31. Characters in this range are the first 32 of the 128 low-range characters, including the backspace, "beep," escape characters and others. You can't type them in *TEXT* and expect a symbol to appear on the screen. Yet you must embed them in a text file in order to send them to the printer for, say, underlining or changing margin settings. Fortunately, the Epson provides a way around this problem by using other graphics characters on the Model 100.

Instead of using the first 32 characters from the 128 low-range characters, the Epson can accept the first 32 characters from the 128 *high*-range characters simply by ignoring part of the code, known as the most significant bit (MSB), as it is sent to the printer. You often need to send the printer special characters from the low range, where the MSB is zero, such as the twenty-eighth character, the escape character, code value 27. You can, instead, send the twenty-eighth character in the high range, where the MSB is one. To produce it on the Model 100, press *GRPH-k* (hold down the *GRPH* key and press the lower case *k*), code value 155. When the printer receives the *GRPH-k* character, it ignores the MSB (pretending it's zero) and interprets the character as an escape character.

For any desired low-range code, you can find its high-range equivalent simply by adding 128 to its value. For example, adding 128 to the escape character's value (27) gives you 155 (27 + 128 = 155). Look at the ASCII code table in your

KEYBOARD ENTRIES FOR FREQUENTLY USED COMMANDS
(Using Epson FX-86e command set)

SINGLE-BYTE COMMANDS

Abbreviation	ASCII Value (Decimal)	Purpose	Keystroke
BEL	7	Beeper	*GRPH-t*
BS	8	Backspace	*GRPH-1*
HT	9	Horizontal tab	*GRPH-r*
LF	10	Linefeed	*GRPH-/*
FF	12	Formfeed	*GRPH-'*
SO	14	Turn ON double width (1 line)	*GRPH-i*
SI	15	Turn ON condensed mode	*GRPH-e*
DC1	17	Select printer	*GRPH-u*
DC2	18	Turn OFF condensed mode	*GRPH-;*
DC3	19	Deselect printer	*GRPH-q*
DC4	20	Turn OFF double width (1 line)	*GRPH-w*
ESC	27	ESCape code	*GRPH-k*

The last code (ESC) is used as a prefix for all multi-byte commands.

Table 1. Frequently used single-byte (single character) commands for Epson printers or printers that use the Epson character set.

WANTED!

New hardware, new software, new ideas for the growing Tandy marketplace.

Ultrasoft Innovations (you've seen our products advertised and reviewed in this magazine) is looking to expand our product line. If you have a program or hardware device that you want advertised and distributed, or if you have an idea for a product that's needed in the marketplace, write to Richard Eckerlin, Ultrasoft Innovations, P.O. Box 247, Champlain, NY 12919 or call (514) 487-9293 (9-5 EST). This could be your ticket to fame and fortune! (Well, maybe at least fame in the Tandy community and some extra Christmas Club spending money.)

Model 100 user's manual (p. 214), and you'll see that ASCII 155 is the *GRPH-k* character (a left-pointing arrow on the *TEXT* screen). By ignoring the MSB upon receiving the character, the printer, in effect, subtracts the 128 you added. What's left is the original low-range value (27) you wanted to send.

This handy MSB-ignoring talent may appear in many other printer brands that emulate the Epson printers or use a similar command structure.

The computer's capability to allow direct easy keyboard entry of high-range codes (128-255) provides the other prerequisite for this embedding technique. You'll find the complete list of all 256 codes, together with their keyboard entries and resulting Model 100 screen characters, in Appendix D of the Model 100 Users Manual, pp 211-216.

To summarize, then, you cannot send to the printer, in an appropriate format, normal command bytes in the 0-31 range, since they won't be recognized as commands when using the *SHIFT-PRINT* keys. But you *can* easily substitute bytes from the high range, exactly 128 higher in value, which the printer will correctly interpret and execute. One caveat: The character graphics (CG) mode included in some Epson models must NOT be selected, because that mode uses special graphics characters in the first 32 bytes of the high range (codes 128-159) instead of duplicating the 32 low-range bytes.

You may have to study your user manuals and experiment a little to determine whether this technique will work with your particular printer. If yours lacks a MSB mode, try switching manually to 7-bit mode (probably using a DIP switch), if possible, as a feasible alternative technique for similar results. In 7-bit mode, the MSB of any byte received by the printer is converted automatically to zero. Consequently, you can use the same high-range substitution technique, but there is one limitation in this mode: Since the MSB is always made zero, legitimate high-range bytes will not be interpreted as such, thus making it impossible to use any commands that might incorporate legitimate high-range numbers (128 through 255).

One additional tip: I recommend using the *Ultrascreen* program from Ultrasoft Innovations, which converts a Model 100 screen from the normal 8- by 40-character display to 10 by 60. By using *Ultrascreen* and formatting the printout for a width of 60 columns, you can compose in the same screen format as will ultimately be printed out. See Figure 1 for a sample skeleton letter form showing how easily you can do this.

SINGLE-BYTE PRINTER COMMANDS

Here are two examples of simple, one-byte commands. Such commands always have a value in the range 0 to 31. Of these, codes 7 to 13 seem to be standardized in

MULTI-BYTE COMMANDS

Remember—don't include the commas between keystrokes! Commas shown below are for clarity only.

DOUBLE-STRIKE MODE	
Double-strike ON	*GRPH-k,G*
Double-strike OFF	*GRPH-k,H*
DOUBLE-WIDE PRINTING	
Double-wide ON	*GRPH-k,W,1*
Double-wide OFF	*GRPH-k,W,0*
EMPHASIZED MODE	
Emphasized ON	*GRPH-k,E*
Emphasized OFF	*GRPH-k,F*
INITIALIZE PRINTER	*GRPH-k,@*
ITALICS MODE	
Italics ON	*GRPH-k,4*
Italics OFF	*GRPH-k,5*
JUSTIFICATION (for NLQ print mode only)	
Left justify	*GRPH-k,a,GRPH-p*
Centering	*GRPH-k,a,GRPH-m*
Right justify	*GRPH-k,a,GRPH-f*
Full justify	*GRPH-k,a,GRPH-x*
MARGIN SETTINGS	
Set left margin	*GRPH-k,l,GRPH-a*
(Note: the third byte shown here sets left margin at column #5. You may change this to any other column number.)	
Set right margin	*GRPH-k,Q,F* or *GRPH-k,Q,CODE-e*
(Note: the third byte shown here sets right margin at column #70. You may change this to any other column number.)	
MOST SIGNIFICANT BIT CONTROL	
Set MSB to zero	*GRPH-k,=*
Cancel MSB control	*GRPH-k,#*
NEAR LETTER QUALITY PRINT MODE	
Select NLQ mode	*GRPH-k,x,1*
NLQ OFF (default)	*GRPH-k,x,0*
NLQ FONT SELECTION	
Roman (default)	*GRPH-k,k,GRPH-p*
Sans serif	*GRPH-k,k,GRPH-m*
PITCH SELECTION	
Elite (12 cpi)	*GRPH-k,M*
Pica (10 cpi, default)	*GRPH-k,P*
PROPORTIONAL MODE	
Proportional ON	*GRPH-k,p,1*
Proportional OFF	*GRPH-k,p,0*
SKIP OVER PERFORATION	
Skip perf ON	*GRPH-k,N,GRPH-h*
(Note: the third byte shown here specifies skip of 6 lines. You may may change this for any skip distance.)	
Skip Perf OFF	*GRPH-k,O*
SUBSCRIPT/SUPERSCRIPT	
Select subscript	*GRPH-k,S,1*
Select superscript	*GRPH-k,S,0*
Sub/superscript OFF	*GRPH-k,T*
UNDERLINING	
Start underlining	*GRPH-k,-,1*
Stop underlining	*GRPH-k,-,0*

Table 2. Frequently used two-byte commands for Epson printers. Be sure to use upper or lower case as shown.

CRDFIL.ROM

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Standard pinout EPROM: **$59.95**
Mounted on carrier board to fit Tandy's Molex socket: **$74.95**

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CUSTOM EPROM BURNING

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Send for list of other new ROM-based software.

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Reno, NV 89506

Circle 145 on reader service card.

PRINTER CONTROL

all ASCII printers, while meanings of other codes in this range are more or less unique to each brand.

- Standard ASCII command *BEL* (Code 7, or 07 Hex)

As we've discussed, there's no direct way to enter the printer command code 7, but you can enter code 135 (87 Hex), exactly 128 higher, by keying in *GRPH-t*. A graphics character (a squarish figure with a *T* in the center) will appear on the screen, but the printer will ignore the MSB and interpret this code the same as if it were 07H, and it will sound the printer's beeper.

- Standard ASCII command *FF* (Code 12, or 0C Hex)

Similarly, adding 128 to code 12 gives code 140 (8C Hex). Press *GRPH-'* to generate it. This code causes the printer to execute a formfeed, advancing the paper to the top of the next (logical) page.

TWO-BYTE PRINTER COMMANDS

Two-byte commands normally consist of the *ESC*ape code 27 (1B Hex) followed by one other byte. To enter escape, you must key in *GRPH-k*. (Remember this one; it's used most frequently.)

The second byte is always a standard ASCII character code in the value range 32-127. With a few exceptions, these are all normal keyboard entries including alphabetic, numeric, punctuation characters, and the like (where 65 = *A*, 97 = *a*, 49 = *1*, etc.)

Two-byte commands aren't standardized, but most brand names have standardized across their own models, and many duplicate the Epson or provide an Epson emulation mode.

Following are two typical examples using Epson commands also used by several other brands. Important: The commas are for clarity only, to separate the bytes. When typing these commands into your text, do not type the commas!

- Set MSB to 0: *ESC,=* (Codes 27 and 61, or 1BH 3DH)

This puts the printer into 7-bit mode, discussed above. Type *GRPH-k*, followed by =, which appears on the screen as a left arrow and an equal sign. This causes the printer to convert to zero the MSB of all bytes received from the computer. This is equivalent to setting the appropriate DIP switch for the same function.

- Turn emphasized mode ON: *ESC,E* (Codes 27 and 69, or 1BH 45H)

Type in *GRPH-k* followed by an *E*. You should see a left arrow and an uppercase letter *E*.

There's no direct way to enter the printer command code 7, but you can enter code 135 (87 Hex), exactly 128 higher, by keying in GRPH-t.

MORE COMPLEX PRINTER COMMANDS

Finally, we'll look at more complex printer commands of three or more bytes in length. The third and successive bytes are always numerals, although in several cases the printer also lets you substitute ASCII characters *0* and *1* (code values 48 and 49) for the corresponding numeric codes (values 0 and 1). It's preferable and much more convenient to do so, wherever allowed. When you can't, you must use a keyboard entry for the exact numeric value (e.g., *A* = 65, Z = 90, etc.). As we've seen, numbers in the range 0-31 cannot be entered directly. For these, the MSB mode or 7-bit mode must be set beforehand, and then high-range characters should be typed as substitutes. As described above, the printer then converts the MSB to zero, the same as subtracting 128. For the numbers higher than 31, you should key the equivalent standard ASCII characters. Refer to the ASCII character code tables on pages 211-216 of the user manual (for Tandy 200's, see pp. 73-83 of the *BASIC Reference Guide* and for the NEC PC-8201A, see the appendix, pp. C-3 through C-7, of its *User's Guide*) to see the keyboard entries and video displays for all 256 byte values.

The following illustrates typical three-byte commands, using commands from the Epson FX-86e set:

- Select near letter quality (NLQ) or Draft mode: *ESC,x,n* (Codes 27,120,n)

  when n = 1, turn on the NLQ mode
  when n = 0, restore draft (default) mode

For these commands, the manual states that the ASCII characters *0* and *1* may also be used for n, in lieu of numeric codes.

This is the preferred and easier method:

- To turn on NLQ mode: Type *GRPH-k*, then *x*, then *1*
- To restore draft mode: Type *GRPH-k*, then *x*, then *0*

An alternate method uses numeric codes:

- First, set MSB to 0: Type *GRPH-k*, then =
- To turn on NLQ mode: Type *GRPH-k*, then *x*, then *GRPH-m*
- To restore draft mode: Type *GRPH-k*, then *x*, then *GRPH-p*

Note that I substituted high-range numeric codes 129 (*GRPH-m*) and 128 (*GRPH-p*) here for numeric values 1 and 0, which you can't type directly. Again, the printer changes these values back to low-range by setting the MSB to zero.

It's also a good idea to cancel MSB control immediately after these last sequences if it's no longer needed:

- Cancel MSB control: Type *GRPH-k*, then #.

Other commands of this type use similar inputs. After you experiment a bit with your own printer, it shouldn't take you long to become proficient at it.

```
GRPH-qLTRHD.DO                Rev: Apr 15, 1988
GENERAL USE PERSONAL LETTERHEAD

PRE-SELECTED FX-86e PRINTER SETTINGS

Left margin...7    Right margin...68
Print mode..NLQ  MSB...Set to zero

Print 60 lines per page (skip 6 lines between pages)
All other options are default states

Set print WIDTH at 60, when prompted by Model 100
(FX-86e de-selected—this header will not print)

-------------------------------------------------

GRPH-u,GRPH-k,=,GRPH-k,l,GRPH-t,GRPH-k,Q,D,GRPH-k,x,1,
GRPH-k,N,GRPH-h
   Laptop A. Letterwriter
   100 Model Avenue
   Tandytown, US  zzzzz

   Type date here


Addressee's name & address or salutation, etc.

Continuation of letter ...
```

Figure 1. An example of the keystrokes you need to embed printer commands into a typical letter to be typed on an Epson FX-86e printer.

REFERENCE AID

A small card with some commonly used printer commands might be useful as a reference aid. See Tables 1 and 2 for some of these frequently used printer commands, together with the corresponding keyboard entries for the Epson FX-86e command set.

TEST YOUR SYSTEM

At this point, you probably should go to your Model 100 and create a short text file with several lines of text. Then type a few simple, one-byte and two-byte printer codes for whatever printer you have, and observe how this test file prints. After experimenting enough to acquire some useful experience, continue with more complex multi-byte commands.

SAMPLE SKELETON LETTER FORM

Figure 1 is a sample skeleton letter form, or template, like the one I keep in RAM and on disk as *LTRHD.DO*. Make a similar file using your own name, address, and initial printer setup. To prepare a letter, just rename (or copy) this file to an appropriate name. Then fill in the date and start writing. Do not use hard carriage returns (i.e. do not press *ENTER*) at the end of each line within a paragraph. Use them only at the end of each paragraph. Keep a copy of the skeleton on disk or tape so you can load it into RAM after using and renaming the previous *LTRHD.DO*. Obviously, you can adapt this procedure to any kind of text file, not just letters.

Note that commands used in this header are shown here as keyboard entries rather than codes, for illustrative purposes only. The entry on the first line de-selects (turns off) the printer so that the header reminder data won't be printed. Then, on the 14th line, the printer is selected (turned on), MSB is set to zero, margins are set to 7 (left) and 68 (right), NLQ print mode is selected, and printing is set for 60 lines per page (skip 6 lines between pages). Also remember: Don't type the commas between the characters in any one command. The commas shown here are for clarity only.

Obviously, you can adapt this procedure to any kind of text file, not just letters.

Note particularly that margin settings at 7 (left) and 68 (right), plus a Model 100 *Width* of 60, provides consistent formatting between the 60-column *Ultrascreen* video and the subsequent printout format. These settings also provide equal margins on both the left and right sides if the paper is installed so that the printer automatically prints a half-inch left margin with standard 80-column printing—that's how I usually install my paper. You may need some trial and error here to decide on the best numbers for other circumstances.

For many letters, you don't need further printer commands. If a need arises, you can type additional commands, such as underlining, at any points in the text file.

Good luck!

Larry Lavins is a long-time TRS-80 user. He's a board member of the Philadelphia Area Computer Society (PACS), and also the leader of the PACS Tandy SIG. He can be reached via the Claim Board BBS in Philadelphia: (215)878-9611, or by mail at P.O. Box 1503, Havertown, PA 19083.

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Oh, Those Sexy Portables!

An answer to computer dating?

by Dan Gutman

Some people use personal computers for word processing. Others use them for desktop publishing. I recently discovered what computers are best for—picking up girls.

If you're like most of us guys—bad skin, no money, go-nowhere job—the thing you need most to meet the girl of your dreams is a portable computer.

These "laptops" as they are called, are literally people magnets. The things have been on the market for years now, but amazingly, the average person on the street still hasn't seen them. When you're using a laptop, people look at you like you're from some future civilization.

The first time I ventured outside with my Radio Shack Model 102 was on a flight from New York to Chicago. Nobody looked at me twice for most of the trip, but as soon I pulled out the portable, I became the center of attention on the plane.

The stewardesses, knowing that fast track movers and shakers use laptops, looked at me with new respect. The businessman sitting across the aisle was casting secret sidelong glances at me, wondering what high-powered business deals I was cutting. A couple of tourists walking down the aisle stopped and asked me what the "contraption" was.

On another occasion, I was sitting under a tree in a park writing a column on my laptop. A couple of nubile frisbee-throwing nymphets came over, plopped down in front of me on the grass and spent half an hour asking questions about the "adorable" little machine I was using.

It was at this point I realized I had stumbled on to something big. Forget about singles bars, personal ads, and blind dates. Get a portable computer. Women think they're incredibly sexy.

Unfortunately, this advice comes too late for me. I got married before the laptop was invented.

But if I were single today, I can just imagine what it would be like ...

I'm in Hollywood, writing a script for Steven Spielberg's next megablockbuster on my portable in Ma Maison. Ally Sheedy is sitting at the next table with Rob Lowe, or some other brat packer. Ally spots me while she's scanning the room for casting agents. She can't take her eyes off my laptop.

I run my fingers seductively over the keyboard, and I can see it's getting to her. She's ignoring Lowe completely. When he gets up to use the men's room, Ally leans her head over to me and whispers, "How many bytes that thing packing, you big hunk?"

"32K," I say, as goose bumps appear on her forearm. "It's got built-in word processing, scheduler, and eight function keys."

"Ooh," she swoons, "You can press my function keys any old time."

"Not only that," I whisper suggestively, "but the AA batteries will last nine continuous hours."

Ally just about passes out.

"Do you have a printer for it?" she asks, breathing heavily.

"Letter quality," I say. "Back at my place. Wanna come over and see my graphics?"

Before poor Rob Lowe has the chance to dry his hands, I whisk Ally back to my apartment in Santa Monica. We stay up all night manipulating spreadsheets and downloading software from remote databases.

This article was taken from Dan Gutman's column in St. Louis Computing *(January '88).* ☆

1400LT Tips

Here's an addendum to Jim's March compendium.

by Jim Berg

Editor's note: Last month our hero, the author, offered you a compendium of tips for using the Tandy 1400LT with a hard drive.. Unfortunately, Jim had more tips than we had space. So with a begrudging go-ahead from our publisher we'll return you to those thrilling days of yestermonth when Jim was saying ...

Tip #1—To turn the backlit display on and off, enter the following commands from *BASIC*:

OUT 250, 134 - turns the display off
OUT 250, 140 - turns the display on

Tip #2—Pinouts for the external floppy drive port are as follows (use a Tandy 37-pin "D" connector):

Not Connected: 1, 2, 14, 16-23, 33-37
Ground: 3-7, 28-32
Side Select: 8
Direction: 9
Write Protect: 10
Read Data: 11
Write Data: 12
Write Enable: 13
Drive Select External: 15
Index: 24
Track 0: 25
Step: 26
Motor On: 27

Pinouts for the external floppy drive (standard IBM type) using a Tandy 34-pin edge connector are as follows:

Ground: all odd numbers
Side Select: 32
Direction: 18
Write Protect: 28
Read Data: 30
Write Data: 22
Write Enable: 24
Drive Select External: 12
Index: 8
Track 0: 26
Step: 20
Motor On: 16

Tip #3—To install a math co-processor, use a 8087 chip available through the Tandy Express Order service (cat. no. 90-2121). The co-processor socket on the main PCB assembly is IC9. There are no jumpers to move; simply change the "setup" entry of the 1400LT. Tandy recommends installation by an authorized Radio Shack Service Center. ☆

DEFUSR appears monthly to answer your questions about Tandy notebook computers.

Send your queries to: DEFUSR, PORTABLE 100, P.O. Box 428, Peterborough, NH 03458-0428. Please enclose a stamped, self-addressed envelope for our reply.

SPREADSHEET TRANSFER

I frequently move my Tandy 200 word processing files to my *Appleworks* Apple II word processing program. I do this via a null modem and a telecommunications program. But is it possible to also transfer a spreadsheet?

Joel Perlish
Havertown, PA

I'm afraid we're unfamiliar with Appleworks. The Tandy 200 can save files in the SYLK format for transfer to other programs, so if Appleworks can handle the SYLK format, you should be able to swap spreadsheets between the T200 and the Apple. Otherwise, I'm not sure what to tell you. (Apple-type readers, can you offer suggestions?)

-MN

DOWNLOAD TO DISK?

Is there a way to direct incoming data during a *TELCOM* download to the disk drive on my Tandy 102?

J.J. Rechany
St. Petersburg, FL

Using the Portable Disk Drive, which also uses the RS-232 port, it is simply not possible. Both the modem and the drive use the same electronic chip in the Model 100. Switching from the modem to the drive, saving data, and then switching back to the modem would take so much time that the other computer would think you had hung up the phone, so it would disconnect itself and hang up its phone.

-TK

J.J., if you do any programming, you might be able to do something using the helpful technique shown by Larry Kayser in the February '89 FORUM. It keeps the Model 100 from dropping the telephone line, so you can switch between the RS-232 port and the built-in modem.

I think Larry's tip is a real "sleeper" that opens the door to some great possibilities if programmers take an interest in experimenting with it. (That's a hint to you hacker types out there!)

-MN

HOW MUCH RAM?

How can I determine the amount of RAM in my Model 100?

R.E. Thomas
Queens Village, NY

One way is to go into BASIC, *type* PRINT PEEK(64192) + 256 * PEEK(64193), *and press* ENTER. *It will print a number on the screen. That number will be 32768 on a 32K machine, 40960 on a 24K machine, 49152 on a 16K machine, and 57344 on an 8K machine.*

The amount of free RAM (i.e., RAM not occupied by files or used by the operating system) appears in the lower right corner of the Model 100 main menu. And when you first go into BASIC, *it's displayed on the third line of the screen, below the Microsoft copyright notice. There's slightly less free RAM in BASIC than at the main menu, because BASIC grabs a few hundred bytes for its own use, returning them when you exit BASIC.*

-MN

Will the Gold Card eliminate all this reloading?

HIGH-TECH SOLUTION

I've read and re-read with great interest your article about the Gold Card (Oct. '88). I'm considering expanding my M100, and this Gold Card is certainly worthy of consideration.

I use Ultrasoft's *Disk Power* with a PDD-1 and the *Text Power 100* word processor with good success. Sometimes I goof and must do a cold start, a lengthy procedure, starting with *IPL.BA*, then going from *FLOPPY.CO* into the loading procedure for *Disk Power*, as well as flipping switches on the drive.

In your article, you said, "Just keep your DOS and other important programs on the Gold Card, and after a cold start, they're just a *BASIC CALL* away." And of course, the added memory will save on the disk drive use. Sounds good to me. Will the Gold Card eliminate all of this reloading *[stuff]*?

I'd appreciate your reply and suggestions. I am an appliance user, not a "high-tech jerk." Thank you.

Kyle Pugh
Spokane, WA

Yup, thanks to the high-tech jerks at SoundSight! After a cold start, just load Disk Power's INSTAL.CO *and* LOADER.BA *from the card and run 'em. No more switch-flipping and all that other cold start—umm—stuff! You're welcome.*

-MN

JUNK THE OLLY?

I have an Olivetti M10 which, I understand, is like the the Tandy Model 100. I would like to know what the differences are and whether there is a way to use Model 100 products on the M10—or in other words, can you effectively turn the M10 into an M100, or would it be better to junk it and get a Model 100?

Lynn D. Ikenberry, M.D., Ph.D.
Chapel Hill, NC

Lynn, the Olivetti M10 is quite similar in

Four Model 100 Books!

① **The Model 100 Program Book** by Terry Kepner and David Huntress. 51 useful BASIC programs for home, office, and education: bar graph, depreciation, annuity, pie chart, forms creation, invaders game, memory scan, touch typing tutor and many others-$14.95.

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many ways to the Model 100, but there are some major differences as well. Most Model 100 BASIC programs will run just fine without modification. If you look at the compatibility boxes above most P100 *articles, you'll see that the Olly is included more often than not.* TEXT *and* TELCOM *operate similarly, too.*

Unlike the Model 100, the Olly has no built-in modem. With the availability of several small, battery-operated external modems, that's not necessarily a problem.

Because M100 and M10 system ROM's differ you can't run Model 100 machine language programs or BASIC *programs that* CALL, PEEK, *or* POKE, *unless you modify them to use the equivalent M10 addresses. Also, the graphics character sets differ somewhat, but again, that's not necessarily a problem.*

There is no available disk operating system (DOS) to allow the M10 use of the Tandy Portable Disk Drive. Traveling Software used to sell one, but they no longer do. If you plan to use only cassette storage (and many people do), then there's no problem. Otherwise, maybe you can buy a copy of the DOS from someone who no longer uses their M10.

As long as you already have the Olly, there's no rush. Why not play with it for a while and see how you feel about it? Some software is available on the on-line database services like GEnie and CompuServe, and even a little bit on our Portable BBS. Perhaps the Olly will suit you just fine. If not, you've lost nothing.

-MN

LINEFEED FIXES

I received the latest issue of *Portable 100* and read the letter from the chap with the linefeed problem. This was the first problem I also encountered and wanted to send along the easy fix for this.

To add a linefeed to the modem (this is necessary when using the Model 100 as a Telex terminal), go into *BASIC*, type *POKE 63066, 1* and press *ENTER*. To eliminate the added linefeed, the command is *POKE 63066, 0*.

To add a linefeed to the printer, type *POKE 64228, 127: POKE 64229, 248* and press *ENTER*. To eliminate the extra linefeed, use *POKE 64228, 243: POKE 64229, 127*.

I have these commands taped to the bottom of my Model 100, just in case of a cold start.

Robert Kizer
Houston, TX

Thanks, Robert! Due to a time squeeze, I can't print the equivalent POKE's *for the Tandy 200, NEC, Olivetti, and Kyocera machines, but I'll have 'em next month for users of those machines.*

-MN

APPEND TO THE PASTE BUFFER!

It wasn't quite in time for our last issue, but now it exists. Thanks to the programming wizardry of James Yi, there's now a stand-alone utility that appends your Cut *and* Copy*'d text to the paste buffer. Called* ADDCLP.100 *and* ADDCLP.200, *you can get it on CompuServe's Model 100 Forum.*

Moreover, it has a no-wrap option, so you can choose to force TEXT *not to wrap words around to the next line. Perfect for working with columnar material in* TEXT.

-MN

WISH UPON A (LAP)STAR

Do any of your readers know what happened to *Lapstar*, the Model 100 version of Wordstar marketed by CISS Corporation?

Lapstar was the niftiest of text editors. It was not only a great word processor, it also gave you ten line of 60 characters, something like Ultrasoft Innovations' *Ultrascreen*, only better. There was no annoying character lag when typing.

CISS Corporation's last address was 3780 Manor House Dr. N.E., Maricetta, GA 30062, but they must have moved. My letters come back "Return to Sender." The reason I ask is a problem I have with loading addresses. Let me explain.

When *Lapstar* first came out, you loaded it at the top of memory and left it there. That was okay until *FLOPPY.CO* came on the scene. It needed the top of memory, too, so CISS came out with *DSKSTR* (DiskStar), which loaded between 55188 and 59400. That was fine until Ultrasoft's *Disk Power* came on the scene offering twice the power and stealing only half the memory. However, it sat at the bottom of memory, so the memory freed up by killing *FLOPPY.CO* could not be used. It just sits there above DSKSTR, 2.56K of wasted RAM. It irks me.

If *DSKSTR* were relocatable, I would move it higher, but it seems not to be. With a *SAVEM* at some higher address, executing *DSKSTR* causes the Model 100 to cold start. Annoying. On my cassette tape there is supposed to be a second version of *DSKSTR*, called *LAPSTR*, for use by M100's without disk drives, and it is addressed to higher RAM, but for some reason, it is not included on my tape.

Does anybody know where CISS is these days? Or does anybody have a late version they are willing to share?

Clifford Grinling
36 Forest Road
St. John's, Newfoundland
Canada A1C 2C1

We've been unable to locate CISS Corporation, too. It may be possible to relocate DSKSTR *using programs available on GEnie and CompuServe. One that comes to mind is* HXFER.100 *on the Model 100 Forum.*

A word of caution: Most likely, DSKSTR *contains machine language data tables. Relocator programs cannot automatically take such tables into account, so you'll have to manually make corrections. I'd suggest that you (or someone else familiar with assembly language programming) do a disassembly to determine where those tables are located within* DSKSTR. *With that information, it might be just as easy to reassemble the program at the desired address.*

-MN

Budget Bank Revisited

About a year ago James Yi (CompuServe ID 73327,1653) began a project whereby a single 32K CMOS RAM chip could be used in place of an expensive 24K module, when installing the Tandy 200 option RAM banks. I had the Tandy 200 service manual and was able to provide the needed details about the RAM module socket. I also installed this project (temporarily) for beta testing, and so I could write about it with working knowledge of the procedures.

This project was presented in the pages of *Portable 100* about a year ago in two parts (the update had corrected a minor flaw in the first article). With the massive increase in RAM prices, I thought it might be of value to present this project again, in its corrected form. I'm also going to provide a RAM test program to determine if your Tandy 200 has a bad RAM bank.

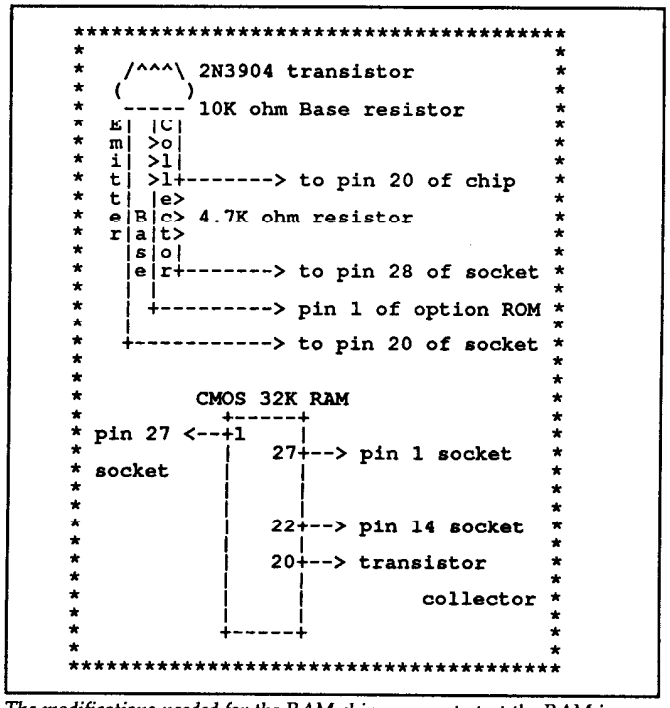
With all the new information available about bank switching, peeking/poking, and chaining across banks, it seems inconceivable that anyone would settle for a one-bank Tandy 200. Here's a do-it-yourself project that will provide those extra RAM banks for about $25 apiece.

You will need a 32K CMOS RAM chip, some wire, a soldering iron, a 2N3904 transistor, a 10K-ohm resistor, and a 4.7K-ohm resistor (per bank).

First, see if you can identify the three terminals of the transistor: Emitter, Base, and Collector. Looking at the transistor's flat side, the Emitter is the leftmost pin, the Base is the center pin, and the Collector is the right-most pin. Then follow this procedure for each chip (see diagram 1).

With the massive increase in RAM prices, I thought it might be of value to present this project again.

- Before soldering the wires together, plan how you are going to lay out the parts in the memory compartment, and prepare wires of the proper length.
- Because the chip is CMOS, take proper caution so that it won't be zapped by static electricity. Moistening your fingers and hands may lessen the chance of static build up.
- With a long-nose pliers, bend up pins 1, 20, 22, and 27 of the chip so that they stick straight out horizontally.
- Using a grounded, low-power soldering iron, attach pieces of wire about 1 inch in length, to pins 1 and 27. Attach a piece of wire about 2 inches long to pin 22.
- Flip the Tandy 200 over, turn the MEM switch off, and open



The modifications needed for the RAM chip you use to test the RAM in your banks in the Budget Bank.

```
;MEMCHK.CO by Paul Globman (c) 1988
;
;This is a non-destructive RAM test
;that tests all of RAM, including the
;locations where the program is loaded
;to run.  It tests all bits in all RAM
;locations for reading and writing and
;will beep 5 times upon finding a bad
;RAM location.  If no problem RAM is
;found, then 1 beep is sent.
;
;
RAMSTA: equ AØØØH       ;1st byte ram
ALTLCD: equ 63574       ;alt lcd buffer
BEEP:   equ 4F45H       ;send beep
;
        org altlcd
        entry
;
        di
```

continued

Listing 1. The assembly language source code for MEMCHK.CO. *A program that tests your RAM banks for integrity.*

```
        jmp memchk
;
MEMCH2: lxi d,0          ;end of RAM + 1
next2:  mov a,m          ;HL=adrs tested
        mov b,a          ;byte in B
        cma
        mov c,a          ;complmnt in C
        mov m,a          ;chnge RAM bits
        mov a,m          ;look at byte
        cmp c            ;bits chnge ok?
        mov m,b          ;restore byte
        jnz bad          ;no? error
        mov a,m          ;look at byte
        cmp b            ;bits chnge ok?
        jnz bad          ;no? error
        inx h            ;next address
        rst 3            ;end of ram?
        jnz next2
        jmp done
;=====================================
MEMCHK: lxi d, memchk
        lxi h,ramsta
next:   mov a,m          ;HL=adrs tested
        mov b,a          ;byte in B
        cma
        mov c,a          ;complmnt in C
        mov m,a          ;chnge RAM bits
        mov a,m          ;look at byte
        cmp c            ;bits chnge ok?
        mov m,b          ;restore byte
        jnz bad          ;no? error
        mov a,m          ;look at byte
        cmp b            ;bits chnge ok?
        jnz bad          ;no? error
        inx h            ;next address
        rst 3            ;memchk yet?
        jnz next
        jmp memch2
;=====================================
bad:    call beep        ;5 beeps means
        call beep        ;bad ram...
        call beep
        call beep        ;1 beep means
done:   ei
        jmp beep         ;all is well
;
        end
```

End of listing.

the memory expansion lid.

- You'll see that if you try to plug the chip in the socket, the socket is too wide, that is, if you try to insert it in the outer contacts. There are inner contacts (insert the pins of the chip between the metal contact and the plastic of the socket), where the chip will fit. Before plugging in the chip, first insert the wire lead from pin 1 of the chip into the outer contact of pin 27 of the socket. Then insert the wire lead from pin 27 of the chip into pin 1 of the socket, and the wire lead from pin 22 of the chip into pin 14 of the socket.
- The circuit (Figure 1) is installed between pin 20 of the chip and pin 20 of the socket.
- Connect the transistor's collector to the chip's pin 20. Also connect one end of the 4.7K-ohm resistor to the chip's pin 20.
- The other end of the 4.7K-ohm resistor goes to the socket's pin 28.
- Connect the transistor's emitter to the socket's pin 20.
- Connect one end of 10K-ohm resistor to the transistor's base.
- Connect the other end of 10K-ohm resistor to the option ROM's pin 1 (+5V power supply, located at the lower left hand corner, as you position the computer so that the 32k chip's labels look upright), carefully, so that it doesn't interfere with inserting and removing the option ROM.
- Then carefully insert the chip into the socket.
- Make sure that bare wires or component leads do not touch any pins or terminals, and secure the components with tape or glue. Put the lid back on and turn on the MEM switch.

I hope you have had some experience with a soldering iron and handling CMOS. This project may not be for just anyone to try, but a good project for the hardware buffs, or the bold and curious!

The chip I used was a TC55257PL-10, but the project was developed using a HM43256LP-15, which you can get from JDR Microdevices, 110 Knowles Drive, Los Gatos, CA 95030. Their phone number is (800)538-5000, and the chip can be mail ordered for $17.95 each plus $3.50 for ground delivery, or $4.50 for UPS air.

Be sure the chip you use is LP (low power). The *LP* might be part of the chip number.

RAM TESTING

MEMCHK.CO is a "bare bones" RAM memory test with minimal diagnostics, and will help you determine if data is written to, and read from, memory correctly.

This is a single pass RAM test that is looking for a "solid" failure, and makes no attempt to create non-trivial failure circumstances. A more elaborate scheme might repeat the procedure 10 or 20 times at each RAM location, before incrementing the address counter. That might catch those intermittent heat sensitive problems, but *MEMCHK.CO* was not designed with that in mind.

Another aspect that was factored out of the test was elaborate failure reporting. Admittedly, the bit pattern of failures (as well as address reporting) could reveal problems that might trace back to data line or address line buffer problems. Those problems are rare, and if they occur, failures would occur in all RAM banks (not just one). So a little common sense would tell you that

```
1 '************************
2 '*  MEMCHK.CO           *
3 '*    by Paul Globman   *
4 '*  Copyright (c) 1988  *
5 '************************
10 FOR I = 63574 TO 63650
20 READ X:POKE I,X:SM=SM+X
30 NEXT
40 IF SM = 10858 THEN 60
50 PRINT"error in data":STOP
60 SAVEM"MEMCHK.CO",63574,63650,63574
1000 DATA 243,195,117,248,17,0,0
1010 DATA 126,71,47,79,119,126,185
1020 DATA 112,194,147,248,126,184,194
1030 DATA 147,248,35,223,194,93,248
1040 DATA 195,159,248,17,117,248,33
1050 DATA 0,160,126,71,47,79,119
1060 DATA 126,185,112,194,147,248,126
1070 DATA 184,194,147,248,35,223,194
1080 DATA 123,248,195,90,248,205,69
1090 DATA 79,205,69,79,205,69,79
1100 DATA 205,69,79,251,195,69,79
1110 REM       END OF DATA
```

End of listing.

Listing 2. MEMCHK.BA. *This* BASIC *program loads the executable machine language program* MEMCHK *into memory.*

if the test fails in one bank but not in others, then the one bank of RAM is bad.

MEMCHK.CO is designed to check every bit of every byte of RAM, including the RAM that the program runs in. Starting at the beginning of RAM, the data byte is read into the accumulator, and stored in register B. The accumulator is complemented and stored in register C.

Next the complement is written back to RAM and then read back into the accumulator. The accumulator is compared to register C, and the zero flag is set if the byte written equals the byte that was read. The original byte is then restored, and if a problem was detected in the comparison then the program exits to label *BAD:* and announces a problem.

Next the restored (original) byte is read back into the accumulator and compared to register B, thus ensuring that each bit of the RAM location was successfully read and written. Again, a faulty compare will exit to *BAD:*. The HL register pair is then incremented to point to the next RAM location. This is done for each RAM address from A000H to FFFFH.

You can't really test the RAM containing the executable code WHILE it is executing.

Since any alteration of the instructions being executed will cause some undesired results (like a possible cold start), you can't really test the RAM containing the executable code WHILE it is executing. By having this routine in two areas of RAM, the program can simply jump to the second copy of this code when testing the area that the first copy executes in. Examination of *MEMCHK.CO* (Listing 1) should provide most machine language programmers with the answers to any questions I have not covered in this description of how *MEMCHK.CO* works.

MY OWN TANDY 200

I have heard some questions regarding *my* Tandy 200, so I thought I'd offer a brief description of my system. Although I did construct the Budget Bank for testing, the two additional RAM banks in my system are from Purple Computing.

I use the 8-ROM Expansion Pak by Traveling Software (SAFE by PG Design) with the following ROMS:

1) *ROM2/Cleuseau* by Polar Engineering
2) *Ultimate ROM II* by Traveling Software
3) *Super ROM* by P.C.S.G
4) *TS-DOS* by Traveling Software
5) *Sardine Plus* by Traveling Software
6-8) *Sardine* dictionary also by TSI

My RS-232 connects to a Heath 121 (A/B type) switch box, which allows me to select between the Tandy PDD-2 (200K disk drive) or a WorldPort 1200 modem. I also have a SHOOTER EPROM programmer, an RS-232 device.

I use a Riteman II printer for most of my print chores and an Epson MX80/FT (with dots perfect) for "near letter quality" jobs. I also have a TTXpress printer for those portable needs that sometimes arise.

... AND A MODEL 100 TOO

As a "backup system," I have a 32K Model 100 with a Booster Pak by Traveling Software. My Booster Pak contains about 256K RAM along with Traveling Software's *Sardine* plus *T-Word* (4-chip set), *ROM2/Cleuseau* by Polar Engineering, and *Super ROM* by PCSG (Portable Computer Support Group).

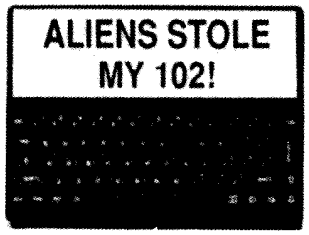
The Booster Pak software includes *TS-DOS* built in, along with *X-TEL* by Sigea Systems. This Model 100 has almost the same set of ROM software as my Tandy 200 and can function in its place. It's easier to take the Model 100/Booster Pak than the Tandy 200/Tandy PDD-2.

For smaller storage needs, the Tandy 200 can use *XBASIC.CO* to open, read, or write to files in the "option" RAM banks using them as RAM disks (see Sept. '88 *Portable 100*).

In the coming issues of *Portable 100*, I will be discussing a project that requires all three (3) banks of RAM to be installed. If you don't feel comfortable constructing the Budget Bank yourself, you might find a technician who will install the project for a reasonable fee. Even if you pay the higher price for the commercial module, it will be worth it to have the utilities that will soon be published.

by Paul Globman

Paul can be reached by modem on CompuServe (72227,1661) and GEnie (P.GLOBMAN). Or by mail at 9406 N.W. 48th St., Sunrise, FL 33351 (please enclose SASE if you're requesting a reply).



Mojave Desert, June 15, 1988—I was on my way to another conference on adolescent substance abuse; my acne was acting up and my hangover was killing me. The road ahead was desolate. Suddenly I saw a bright flash... .

I awoke in a harshly lit, white room, feeling as though someone had done a cold start on my brain. I sat up and immediately felt worse. I grabbed my 102 carrying case, stood up, and looked at the door. It had no handle. I sat down to wait. With nothing better to do, I reached for my computer.

But my trusty old 40-column Tandy was gone! In its place was a machine so sleek and light that I could hardly believe it. It was a Z88. Where had it come from? Who made it? It had a built-in word processor, spreadsheet, database, diary, calculator, and a bunch of other programs all in ROM. It had pop-up menus and had been expanded to 1.5 megs of RAM! The keyboard made no noise when I typed, and the 8-line screen was 102 characters across! What a machine, and God, was it fast!

As I sat spellbound by this incredible machine, the door behind me opened. An alien walked in.

As if reading my mind, it spoke. "You want to know why you are here."

I nodded.

He continued in a perfect imitation of Saturday Night Live's Don Pardo, "We have come to Earth to market this small but powerful computer, and we need your help. I am authorized to offer you a planet-wide dealership for the Z88."

"Great!" I said. "Where do I sign?"

Another blinding flash and he was gone. I was back in my car driving along that deserted road, with the Z88, a ONE YEAR warranty, a dealership agreement, and an 800 number for some star in the Horse Head Nebula ...

I've got to talk to someone about this. If you've ever been abducted by alien computer entrepreneurs or want to learn more about an out-of-this-world portable computer, call me, Jonathan Pazer, at (914)496-5199.

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If you want any of these, just photocopy this page, circle the ones you want, add them up, and mail your check with the photocopy to: Portable Computing Int'l Corp, PICO Back Issues, P.O. Box 428, Peterborough, NH 03458. For faster service call 603-924-9455 and have your Visa, Mastercard, or Amex cards handy. Order **TODAY**, they might be **GONE** tomorrow! ***Note: The italicized entries in each month below are Tandy 100/102 related articles.***

1985

January: DG has the One to Go, *Model 100 Proves Itself in the Jungles of Nicaragua*, Meet the Dulmont Magnum, *Telecommuter: Software that's Ingenious, Kyocera's Three Aces. End Telephone Tag with M100's.*

February: NEC Wishing upon Its Starlet, In-Depth Reviews of HP 110, Sharp PC-5000, *Chattanooga Systems AutoPen, AutoPad, Trip.*

March: Reviews of Epson Geneva and Osborne 3, Comparisons of Two Thermal Printers (Brother HR-5 and Printex TH-160); *The Pluses and Minuses of Batteries, M100 Data Acquisition.*

April: Reviews of Sord IS-11, Sharp PC-1350, *DISK+, T-BASE*, and Roadrunner; *Free Software: Textpro*, Technology Transfer Damming the PICO Pipeline to Russia.

May: Review of DG1, Which Spreadsheet Should you Buy? Servicing Picos, LCD Screens in Color, Federal Express.

June: Reviews of *Tandy 200, 2.2 Companion*, and *T-Backup, M100 File Transfer*; Wrangler Improves the Odds with Sharp PC-5000s, Dow Jones News/Retrieval On-line Database, *Courtroom M100's.*

August: Reviews of Datavue 25 and *Touchbase Modem*; QuickTrip Convenience Stores More Efficient, Tracing Tribal Roots and Translating the Bible in Jungles of Papua New Guinea.

September: Reviews of HP Portable Plus, *WriteROM, ThinWrite 80 Portable Printer*; A Flat Mac, *M100 Meets Challenges at Woods Hole Oceanographic Institute.*

October: Reviews of Kaypro 2000, *T-View 80*; Computerized Fire Department, Stretching the limits of Telephone and Computer, *BASIC translation Tactics.*

November: Reviews of Bondwell 2, NEC 8027A Printer, CQ Haste; *PICO Formatter*, Search and Rescue Via Computers, Industry Views from an HP Exec.

December: Close Look at Ericsson Portable and *TMPC (time management software)*, Travel Tips, Tricks for Traveling, *Dialer Program, Project management with the M100.*

1986

January: Reviews of Gridcase 2, Access, WordFinder, and Prospecting, CP/M and MS-DOS, *Security Program*, Can Universities Cope with Picos? News from Comdex, *Jazz up your LCD.*

February: Reviews of ZP-150, and LeScript Word Processing; *Stevie Wonder Inspires Stardom in M100*, Can Universities Meet Expectations of Computer-literate Students? *Cold-Start recovery, Personalized Form Letters.*

March: Reviews of Panasonic Exec.Partner, Lync 5.0, and *Hardwire*; University Rethinks its Tasks, Picos in Medicine, *Auxiliary Battery Packs Spell Independence, More Muscle for the M100.*

May: Reviews of Toshiba T1100. IBM PC Convertible, Casion FX-7000G Calculator, SG-10 Printer; *MIKEY, Appointment Manager*, and *FAST*, IRS Crowns Zenith';s Z-171, Handhelds in Restaurants.

June: Reviews of Zenith Z-171, *LapCoder, SuperROM, LAPDOS, and BlackJack*; Go Shopping at PC in Rochester, NY, OM10 RAM Map (pt 1), A Tale of Two City Councils.

July: Reviews of Bondwell, ROM2, Letterjet HS-80, and Sidestar,; Electronic Cottage, Taking Stock of Investment databases II, NEC 8201A's LCD, OM10 RAM Map (pt 2)..

August: NH's Governor discusses Laptops, PC-7000 from Sharp, Choosing your test-oriented Database manager, *Model 100/200's Lend a hand to Job Seekers*, NEC-8201A's Communication Connection.

October: Reviews of Toshiba 1100+, New Word, *Diconix Printers*, Fortune 500 Picos, Interview with DG Exec's, Desktop publishing with Picos.

November: Picos in Libraries, *Clever M100 Combinations, Exploring TPDD Part I*, Reviews of Datacomputer 2.0, *TPDD, TS-DOS.*

December: Pcios on Wall Street, Connecting to On-line Databases, Telephone Problems, *TPDD Part II*, Reviews of *Cleuseau, French/German Tutor 3, Pocketsize Modems*; 1986 Article Index.

1987

January: Book Publishing With a Pico, *Framework in a Pico*, Review of Right-Writer, JK Lasser's Money Manager, HP+Enhanced, Electric Webster, *Disk Power*, Pico's Computer Buyer Guide.

February: *Poor Man's Idea Processor*, Macintosh-Pico Connection, *M100 Cursor key alteration*, Handhelds: HP-18C, Langenscheidt 8000, TI-74, Reviews of Sord IS11-C, *Lets Play Monopoly, $100 letter quality printer.*

April: Browsing the Boards, Writers & Portables, KTI products, Badminton & NEC, Reviews of *Inside the M100, TTXPress Printer, PCSG Business Analyst*, Datapad 84 Zoomracks & ECFS.

May: Doctors with Portables, *Text to printer*, Hitting the Boards, Reviews of PC Convertible Add-ons, Holiday Best, Twist & Shout, *M100 memory Expansion.*

June: Lawyers & Laptops, *Personal Management System, M100./Mainframe Terminal Prog.*, Reviews of Wang Portable, *Search, Sprint and Supercalculator, Best of Compuserve book*, Chess-to-go.

July: Programming in the Portable Environment, Sysop intervierw, Talking portables (pt1), Portable Computer Buyer Guide, Reviews of *TS-Random*, Software Carosel, Popcorn & the Hyperion.

August: NEC 8201 tokens, Laptops in Movie filming, Talking Portables (pt2), Reviews of Casio FX-8000G, Tandy 1400 LT, and *System 100.*

September: *English Teachers use Laptops, Picos in Class, Document templates, Picos in the Oil Patch*, Reviews of HP ColorPro, and the *Sportster 1200 modem.*

November: *Control That Printer, Academia & Laptops*, Laptops on Capital Hill, Starlet Secrets, Reviews of Psion II, *DVORAK keyboard*, & Spark.

December: Global Laptopping, Starlet Software, Toronto Blue Jays & GRiD, *NiCd Notes*, Review of IMC LCD-286, 1987 Article Index.

1988

January: Portable Computer Cellular Communication, Laptop Roundtable, Pico Portable Guide. Reviews Telemagic, Direc-Tree Plus, SchwabLine, Quotrek.

February: TenniStat, Flexibility of Form, T200 and T16. Reviews Eclipse, T1100 Hard Drive.

May: Handhelds Fight Crime, A Pico in China, Compaq Port. III, Datavue Snap, Fax hits the Road, HP Portable Vectra, T1400LT, Three Pocket Modems, Close-Up's Customer & Support.

June: Multispeed in the Tropics, *Monitoring Alkaline Batteries*, PSION and Mass Storage, Datavue Spark, Smith Corona Portable Word Processor.

July: Toshiba on the Road, *Diskette Ratings, Metered NiCd Manager*, Procomm on the NEC, WordPerfect 4.2 on the T1000, Sales Ally.

September: Laptops & the Learning Disabled, WordPerfect 5.0, Dynamac EL, HP-71B, WordPerfect Executive, Webster's New World Writer II.

October: Portables at Sea, Macintosh Navigating, Piloting and Celestial Progs, NEC-8300, Compaq Port. 386, File Transfer, Golden Parachute.

November: European EMAIL, New Tricks for your Casette Recorder, Pico Pillows, Amstrad PPC-640, Selecting the President, Sales Power, Sales Strategy, Office Writer goes Light.

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Write ROM — the definitive word processor for the Model 100. Function key formatting or dot commands. Search and replace. Library feature — inserts words, phrases or whole documents into text from just a code. MAP lets you see a picture of your document. In all there are 60 features and functions. No one can claim faster operation. FORM lets you create interactive forms with on-screen prompts that you can answer from the keyboard. Nothing else for the Model 100 compares with the features of Write ROM. Exactly the same as the Write ROM sold as a single program. Infoworld says it "makes the Model 100 a viable writing unit ... surpassed our highest expectations for quality and clarity."

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