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# TACOMA USERS USERS GROUP NEWSLETTER

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P. O. BOX 42383  
TACOMA, WA 98442

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No. 6

## From the President

Sorry about not getting a letter into our last month newsletter. I had it ready to deliver to our editor, but found out he really does have a deadline for having items in. So get a clue from this, get your important articles in to Art before 25th of the month. By the time this is out, our Swap Meet at Midway will be over. Many thanks to all who helped with the contribution of items and for the storage and transportation of same. Ron Prewitt's wife, Pat has been calling to remind people to bring saleable goodies to the meeting. Thanks to Pat for all her help in all our swap meets and special events.

Although I missed the May 7 meeting, I heard about an area TI Faire being planned for this fall sometime, so make plans now to attend. Am sure we will be updated on that later.

Remember to fill out the survey that is in the May newsletter. This could be a good tool to be used to encourage software and hardware development. If you bring them to the meeting, we could mail them all together.

At our last meeting, we had a good demo, thanks to Wally, of one of our library programs. We are getting some really great programs in our library so check them out and support our library. Also give us some ideas on what you want to see demonstrated. WE NEED YOUR INPUT.

I was reminded of an article I saw in the newsletter from Sheboygan Area Users Group - as follows. Have you ever thought about what a Users Group really is? If not, just think about it for a moment before continuing on.

A Users Group can be several things, but most of all, a Users Group is its members. By members, I mean you and me and everyone else who holds membership in our group. So, what does that mean?

It means that our Users Group is what you make of it. Do you come to the meetings just to get whatever new software is available and not give us another thought until the next time you want some new software?

To some people, that is what a Users Group is. But it is much more than that. A Users Group is a place to share ideas and information. A Users Group is a place where TI enthusiasts can be one big happy family.

To make a group a good group, takes everyone of us. No one person can make or break our group. But in our group, the most active member is that ever faithful, "Somebody Else". What a lousy group we would be without Somebody Else. But I won't go into the achievements of Somebody Else, so it doesn't need further coverage now.

You, as a member of our group, can really only expect to get out of the group what you put in. Being at meetings is important. But do you say anything? Do you ask questions? You may have the answer to a question that another member has. Or maybe that member has some information you need. Sharing is the basis of a successful Users Group. The more you put into the Users Group, the more you will get out of it! Remember,

**THERE IS NO SER GROUP WITHOUT U!!!**

As was discussed at our last meeting, we will take care of business at the first meeting of the month and then have demos or what is of interest to the group. The second meeting, will have a business meeting if necessary and as short as possible so the majority of time can be used for demos or question and answer or group discussions, whatever interest the group. So be sure to have some ideas what you want to do or programs you want to see. Please let one of the group officers know.

This being the time of year for vacations to be planned and started, I hope you all have a good summer.

Till next month,  
Vern Schrottenboer

**TO SAVE TIME  
PLEASE GIVE  
EXCUSES BY  
THE NUMBER**

1. The Computer fouled it up.
2. I didn't think it was that important.
3. Don't blame me. I was hired for my looks.
4. That's not my department.
5. No one told me to go ahead.
6. I've been too busy.
7. We've always done it that way.
8. I forgot.
9. I was waiting for an O.K.
10. The boss didn't tell me.
11. That's someone else's job.
12. Sorry, I goofed.

**TACOMA 99ers  
USERS GROUP**

**OFFICERS**

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**VICE PRESIDENT**

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# FROM THE LIBRARY DESK. . .

I'VE GOT A COUPLE OF THINGS ON MY MIND RIGHT NOW. I'M NOT IN A PARTICULARLY GOOD HUMOR AS I FEEL THAT WE ARE GOING TO: 1. LOSE OUR MEETING PLACE. 2. LOSE SOME OF OUR MOST VALUABLE MEMBERS! 3. PROBABLY BOTH.

AT FIRST, I FELT THAT MAYBE I WAS JUST GETTING TIRED AND FELT THAT A FEW OF THE REST COULD LEND A HAND WITH CLUB ACTIVITIES ONCE IN A WHILE. I'VE BEEN WATCHING JOE TRYING TO GET VOLUNTEERS TO TAKE CARE OF THE COMPUTER ROOM, RON TRYING TO GET COMMITMENTS FOR THE SWAP MEET AND ART TRYING TO GET ARTICLES FOR OUR NEWS LETTER.

I'VE FOUND IT ISN'T JUST ME!! I'M NOT ALONE IN MY THINKING! I'VE TALKED TO SEVERAL OTHERS AND THEY FEEL PRETTY MUCH THE SAME WAY. KIND AND GENTLE PEOPLE, WE NEED TO GET OUR ACT TOGETHER!

THIS ALL CAME UP LAST YEAR AND WE VOTED TO HAVE EVERYBODY PERFORM TWO HOURS OF CLUB ACTIVITIES PER MONTH. THAT WORKED FINE FOR A COUPLE OF MONTHS. NOW WE ALL HAVE FOUND OTHER MORE IMPORTANT ACTIVITIES! SO JOE GETS STUCK COVERING THE COMPUTER ROOM, ETC.

HERE ARE MY COMMENTS, LIKE THEM OR NOT;

1. I'M GOING TO BE LOOKING FOR A VOLUNTEER TO TAKE OVER THE LIBRARY. I WANT TO SIT ON MY BUTT FOR A WHILE. (I'LL HANDLE THE COMPUTER ROOM ONCE A MONTH!). THAT WILL KEEP MY MEMBERSHIP ACTIVE AND CURRENT. I'LL KEEP ON FOR A FEW MONTHS UNTIL SOMEONE WILL TAKE IT OVER. I WILL NOT TURN IT OVER TO JUST ANYONE. NOBODY CAN SPARE TWO HOURS A MONTH! NOW YOU HAVE TO FIND THE PERSON WHO WILL PUT IN AT LEAST 20 TO 40 HOURS PER WEEK OR YOU WONT HAVE A LIBRARY.

2. ART HAS AN IDEA THAT HAS LOTS OF MERIT. EVERYONE WILL BE OBLIGATED TO PREPARE A SHORT ARTICLE FOR THE NEWS LETTER PERIODICALLY. SOUNDS PRETTY GOOD TO ME!

3. MY LAST IDEA IS TO PREPARE A "DUTY ROSTER" AND LET EACH PERSON BE FULLY RESPONSIBLE, AS THEIR NAME COMES UP, TO HANDLE THE VARIOUS CLUB CHORES, OR FIND A REPLACEMENT! THIS MAY BE THE BEST OF ALL THE IDEAS. AT LEAST EVERYBODY WILL HAVE A CHANCE TO FIND OUT IF THEY TRULY WANT TO KEEP THE CLUB ALIVE!

LET'S FACE IT, I HAVE A DUPLICATE OF THE ENTIRE LIBRARY. THE PEOPLE I HAVE TALKED TO ALL SEEM TO AGREE THAT WE CAN FORM AN INFORMAL GROUP, AND HANDLE EVERYTHING OURSELVES. NO BILLS FOR \$35.00 FOR CATALOG ADDITIONS OR \$45.00 PER MONTH TO PRINT AND MAIL OUR NEWS LETTER. THE CATALOG COULD BE ON DISKS AND UPDATED AS NEEDED. THINK ABOUT IT, EITHER WE KEEP THE CLUB VIABLE AND SUPPORT IT OR LET'S FORGET IT. I'M SORRY IF I'M A GLOOM AND DOOM TYPE, BUT FRANKLY I'M TIRED OF WATCHING THE SIGNOUT SHEETS BEING CIRCULATED AND COMING BACK EMPTY.

"NUFF SAID", I DON'T PLAN ON WRITING ANYTHING LIKE THIS AGAIN. I FIGURE THAT IF IT SHOULD BECOME NECESSARY, I WILL NOT BE INVOLVED! NEXT TIME SOMEONE ELSE, THAT CARES ABOUT OUR GROUP, CAN WRITE IT!

BOB HAUN, 584-3938

# XBASHER

A review by Scott Darling (C)copyright 1987  
Written by Mike Dodd, Distributed by Genial Computerware.  
Box 183  
Grafton, Ma. 01519

\$10.00  
All A+'s.

This program is needed by anyone and everyone!! No clarification you say?? EVERYONE has an Extended Basic program! AT LEAST one!! This program will make that one program run faster and reduce its size. GUARANTEED!! Most of us who have been around the Ti World for awhile remember what SMASH is. The BAD part about SMASH is you had to start it at night and HOPE it was done by morning!! You won't have to worry about XBASHER! Xbasher runs out of the Extended Basic environment. There are two versions available. One for TI XB and one for Myarc XB II. No mention was made of the 9640 compatibility. Probably because the 9640 will be so much faster. You can even run XBASHER on combined XB and A/L programs. Complete instructions are given on how to do this! To run XBASHER requires that you save your Program in Merge format using the following: "OLD DSKn.filename" then "SAVE DSKn.mergenname, MERGE". Then insert the XBASHER disk in drive and select XB. The disk files will determine which XB you are using and load the correct version of XBASHER. After the program has loaded, you are presented with a title screen. Next is the option screen. Which is: Shorten Variables, Crunch Lines, Remove REMS and !'s, Remove Let's, Change CALL CLEAR to DISPLAY ERASE ALL (this one alone saves you 5 Bytes!), Don't Change CALL SUB routine Digits, and Change Constants. Some of these are obvious as to what is going on. Shorten Variables will take all your String and Nonstring Variables and shorten them to one then two character variables. There is an immense saving in memory by doing this. Tho, most people like to have a 'name' for variables. If the variable name is less than 3 characters it is no saving in memory. Its when you go over this limit that memory is being eaten away. There is also an option to print the Variable list to an output device. Next is crunch lines. This was VERY impressive. XBASHER will crunch or combine lines together. So what about the lines that are GDTQ'ed you ask?? (Well somebody will ask!!) The A/L in XBASHER keeps track of the logic flow of the program! THIS part makes the program FAR superior to SMASH!! The only bad thing about this function is that the line length of a line number is so long you may not be able to edit the new line!! Considering this is the only drawback, it is a worthwhile option! I have been able to get 8 lines of code to a line number....so did XBASHER. Next is REMOVE REM's and !'s. Remarks are good for developing a program but are a hindrance when actually running the program. This option will delete them and restructure the resulting deletion of them. Remove LET's. PLEASE I hope everyone by now

realizes the LET statement is inconsequential to programming! Change CALL CLEAR to DISPLAY ERASE ALL. Nothing irks me more in XB programs than to see a "345 CALL CLEAR" then "350 DISPLAY AT(12,1):...". If you use "350 DISPLAY AT(12,1)ERASE ALL:" it does the same thing as CALL CLEAR and saves memory!! Next is Don't change Sub Digits. What this option does is change the numeric constants to the characters .\.,],and\_. This saves 2 bytes per each occurrence of the variable. But, because of the nature of CALL SUB routines this may cost you MORE memory than any savings. Also, note. CALL SUB routines are like a separate XB program within a program. Consequently you can use identical variable names in CALL SUB's as in the program without any type of error received by the Basic Interpreter. Also, CALL SUBS are slower processing than GDSUB's. The only advantage is to CALL SUB's is variable variable passing!! (Are we confused yet??) Lastly is the Change Constants option. Basically what was said in the previous paragraph applies to this option. EXCEPT in this environment, this option will save you memory. Don't ask me why there is a difference. Just believe me!! So much for the option list. Each option has a letter reference. By pressing that Letter toggles each option on and off. Hitting X says you like what you see on the Screen. Next screen asks for the input file name. The one you saved in MERGE format and checks to see if you remembered the filename correctly. Then asks for an output name. And even provides a suggested name. Next is an output device and name for the variable listing if you selected that option. FINALLY the computer starts doing the work!! The screen will show you the status of the program. A line count, the last line number referenced by a goto, gosub statement will be shown on the screen. Xbasher makes two passes thru a program. First to make lists of variables, line numbers and other info. The second pass will write the new program to disk. How long will it take?? The size of the program involved is the ONLY factor. I ran an 11 sector file thru Xbasher and it took 5 minutes to do the job. The savings were 500 bytes. Next I ran the ultimate EGO test on XBASHER. I wrote a BBS program that is 90 plus sectors long. Almost 23K in bytes. So, I ran XBASHER against it. I felt I was a decent XB programmer and there was no way XBASHER was going to save any bytes in MY program!! Well after about 30 minutes and my selecting ALL the options. The darn program found 200 bytes somewhere!! I'm still trying to see where it found them!! To sum it up, Xbasher is the perfect compliment to any XB program. You only need to run it once, and save the resulting code. XBASHER will show you what XB programming is all about! There is a lot of power in that cartridge!!

# FEST - WEST REVIEW

A Report on the LA Show  
(and some Random Thoughts)  
May 25, 1987 2:03 AM  
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This file is intended as a report on Fest West, the TI computer show held in Los Angeles on May 16 and 17. The show was held at "The Shrine" in LA as part of a larger computer show. The main floor was occupied by all sorts of computer dealers selling mostly IBM stuff and accessories. The balcony was shared with Amiga taking one side and the TI 99 taking the other. Because the show was part of a larger event TI owners had an opportunity to see how the other half lives, while all those with PC's could see what they missed out on. Attendance at the TI portion of the show was difficult to gauge because of the large numbers of people wandering in who didn't own TI's. A reasonable guess would be between 400 and 500 people. The show was run by the LA 99'ers, and coordinated by Terrie Masters, former president of the group, now vice-president. Rumor has it that the show may be in Las Vegas next year.

MG (formerly Millers Graphics) was there in full force selling their many fine 99/4A programs as well as showing their interesting Turbo XT which is being marketed by Triton. The XT uses the TI keyboard, and because of the limited number of keys on the 4A, the largest keyboard strip (I think it has 4 levels) I have ever seen comes with the XT. MG was also showing Super Extended BASIC which is an upgrade to TI's Extended BASIC which is being handled by Triton. Super Extended BASIC is based on the Danny Michael modifications that appear in GRAM Kracker Utilities I along with a number of new CALLs added by Mike Dodd. I believe the cartridge is selling for \$60, and if you don't have a GRAM Kracker (so you can use GK Utilities I) I would strongly recommend that you consider purchasing a copy - the new editing and line moving capabilities are worth the price alone. MG was also promoting their VID program which is a video tape database program for PC's. It is quite a good program, as one would expect from MG, but since it is for those computers I won't go into any more detail.

Bytemaster, represented by Richard Mitchell, was in attendance. Bytemaster used to publish Super 99 Monthly and now publishes the Smart Programmer, the premier publication for anyone who programs on the 4A. It features articles by Richard, Mike Dodd, Craig Miller, Doug Warren, Mariusz Stanczak, and many others. Topics such as GRAM Kracker and Forth which don't receive much attention elsewhere are given regular treatment here. Smart Programmer has been behind schedule as of late, but Richard is working hard to get back on track, and the

quality of every issue has been outstanding. Bytemaster has recently gotten into software as well. In addition to the 2 disk set, "Best of Super 99 Monthly," they are preparing to release a package called String Master which is a must for the Extended BASIC programmer who works regularly with string arrays. Bytemaster is now distributing Doug Warren's extraordinary Explorer program, which was formerly carried by MG. The program now comes on 4 floppies, and is unprotected. There are versions for GRAM Kracker, Extended BASIC, and Editor/Assembler. The complete manual is on disk. I might add that the program is mostly Geneve compatible as well. It is still \$25, and well worth it, to have a version of the program to put on your utility disk.

DataBioTics was there, represented by Bill Moseid. They were showing many of their programs, many of which I had never seen before. They have a version of Forth called Super Forth which was worked on by Edgar Dohmann (of Super Bug fame). It is a very fast, well documented version of Forth, that among other things supports a Winchester hard disk. It requires the use of a "super cartridge" such as DataBioTics' Super Space to work, and as such is available provides the Forth programmer with more room to work. They were also showing the shell of a program called SAM (that stands for something but I can't remember the details now). The program is a complete disk manager, including support for a hard drive. The program will be written in 100% assembly and can be used with both the old MYARC personality card (with new EPROMs) and the new MYARC hard drive controller. This program should prove to be quite popular because the utilities supplied with the MYARC hard disk are written in a combination of Extended BASIC and assembly and are extremely slow and painful to use. They were also showing Todd Kaplan's new WordWrite program which is a complete rewrite of the TI-Writer editor with many nice features including more memory. The program fits in a cartridge, which can include a built in printer port, and can use a cassette to load and save files. If you know anyone with a bare bones TI system looking for a word processing program, this is the only serious choice.

Dijit Systems was at the show, demonstrating their analog and TTL RGB display conversion kits for the 4A. These go for about \$100 and let you use a high quality display with your 4A. I suspect the analog option may become quite popular as more people buy analog monitors to use with their Geneve. Dijit was also showing a prototype of a video card they are working on. This card allows for 80 columns, and is based around the 9938 chip that is used in the Geneve. It should be available in the next couple months for around \$200. From what I've seen, it looks to be a better supported product than the 80 column card from Mechatronics.

A little known company by the name of Pesaca came down from San Francisco to show their programs. CharMat and Print Designer are their two current offerings and both are well documented, full featured, graphics type programs. Their main pitfall is that they only work with certain printers (although Tom Freeman and I didn't have much trouble in converting some of the programs to run on an Epson compatible) and they are a bit pricey. If you have one of the printers that is supported, I strongly recommend these programs. Details can be found in the last few issues of MICROpendium.

MYARC was present as represented by their west coast distributor Les Merryman. Since Lou Phillips was up at the Ottawa show, I (jph) was sent out there by MYARC to represent the company. Mostly we showed the Geneve 9640 and answered questions. The computer was very well received and all ten units that were available for sale at the show were sold. During the two days of the show many people brought over disks of programs that they wished to try out, and in over 95% of the cases the programs worked flawlessly. This made for the best demo because the people were 100% sure that nothing was rigged. They were seeing that this machine was compatible with their beloved 4A. I would dwell more on the subject of the 9640, except I think that we all know the details by now.

Since I was going to the show, I also dragged along products from Genial Computerware, Tigercub, Boston Computer Society, and the MAGNETIC user group. Tigercub had Nuts and Bots 3 available as well as Tips from the Tigercub 4 and these sold well. The Boston Computer Society was selling disks from its popular software library and copies of Joyce Corker's excellent TI Writer Tips and Tricks booklet. Magnetic was selling laminated keyboard strips. Genial Computerware was selling subscriptions to volumes one and two of Barry Traver's incredible Genial Traveler diskazine, as well as XBasher by Mike Dodd, and XB:Bug, GRAM Packer, and the Horizon RAM Disk EPROM by me. Watch for reviews of these product in MICROpendium over the next couple months. I would say more, but then this would turn into an advertisement.

I.A.P.E. was there selling the Mechatronics product line including a very affordable EPROM programmer at about \$140, the excellent Intern book by Heiner Martin, an 80 column card, a memory expansion for the their GRAM Karte (sort of a GRAM Kracker in a box), and the very popular "I <heart> My TI" baseball caps that Disk Only Software made famous at the Chicago show this past summer.

Rave 99 came in all the way from Connecticut and sold quite a number of their keyboards which allow you to

use an IBM style keyboard with your 4A. They also now offer the product in kit form and without the keyboard for those who may already have an IBM type keyboard (such as 9640 purchasers). They were also showing their card which allows the speech synthesizer to be placed inside the expansion box for convenience on the 4A and required if you want speech with the Geneve. They were also quietly discussing some rather exciting future plans. Keep an eye on Rave 99; they are turning out high quality hardware products for the 4A.

There was a fairware booth, where you could get copies of all the latest fairware programs and make a contribution to the author on the spot. They were also selling a listing of nearly 200 fairware offerings for only a dollar. The table was run by Steve Mehr who did a great job in producing the list, and Ken Billiland who has created some of the most incredible music programs ever written for the 4A. If you haven't heard (and seen) any of Ken's work send him a few bucks and some disks to the address below for some incredible material. He has done disks from Star Trek, The Wizard of Oz, South Pacific, Patsy Cline, Richard Wagner and more.

The LA group was premiering their new "Kracker Facts" book edited by Mike Dodd which contains page after page of useful information for GRAM Kracker owners. The material is by Mike, Tom Freeman, Craig Miller, Walt Howe, and others. It is available for \$5 (and I suspect \$1 for postage). They also were selling Tom Freeman's booklet and utility disk compilation of his incredible articles from the LA newsletter. The set is \$8 and well worth it.

There were a good number of local user groups with displays at the show, selling from their software libraries, but since I don't have a complete list I will refrain from listing them.

Because of space, I can't possibly write a paragraph about every person that was there, I am now going to name drop and just list the names of some of the many people who I met there. Tom Freeman, author of DISKASSEMBLER and vice-president of the LA group; George Steffan, former vice-president of the LA group, and resident guru; Doug Warren, creator of Explorer; Bill Harms, author of Fas-Trans; Rodger Merritt, author of Print-It, the fairware alternative to Font Writer (gasp); Ray Kazmer, author of several fairware programs; Joe Nuvolini, president, I believe, of the Colorado Springs user group; Maruiz Stanczak, author of the Forth column in the Smart Programmer; Fred Moore, software librarian for the LA 99'ers.

The show was a lot of fun. That is the true bottom

line. Friday and Saturday nights the LA group sponsored a hospitality room at the hotel, and a wonderful time was had by all. The best part of the show was meeting people - old and new friends. That is what this community is in a large part about. It has to be. Without a huge company looming over us to protect and provide for us, we have to stick together. This show was a success because of the spirit of the people who organized it, who came to display their products at it, and who came to see what is still available for their 4A computer.

A special thanks to Terrie Masters, Tom Freeman, and George Steffan for driving me around, giving me a place to stay, and in general making my stay in LA a wonderful time.

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Addresses (in no particular order)

Ray Kazner, 13225 Azores Ave, Sylmar, CA 91342

Ken Billiland, 543 Riverdale #15, Glendale, CA 91204

Bill Harms, 6527 Hayes Ct, Chino, CA 91710

J. Peter Hoddie, 12 Paul Revere Rd, Lexington, MA 02173

Genial Computerware, PO Box 183, Grafton, MA 01519

[except for the Genial TRAVELER diskazine, for which the address is Genial Computerware, 835 Green Valley Drive, Philadelphia, PA 19128]

MG, 1475 W. Cypress Ave, San Dimas, CA 91773

Bytemaster, 171 Mustang St, Sulphur, LA 70663-6724

Dijit, 4345 Hortensia St, San Diego, CA 92103

Boston Computer Society, One Center Plaza, Boston, MA 02108

Rave 99, 23 Florence Rd, Bloomfield, CT 06002

DataBioTics, PO Box 1194, Palos, Verdes Estates, CA 90274

MYARC, PO Box 140, Basking Ridge, NJ 07920-1014

Tigercub, 156 Collingwood Ave, Columbus, OH 43213

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And while I have your attention I would just like to make a few completely unrelated comments. In answer to the most popular question of the show "when will the Geneve be shipping," I can only say "real soon now." Actually sometime in the next week or two. So they tell me. And in answer to the second most popular question of the show "when will Font Writer II be shipping," I can only say that I plan to start clean up work on it as soon as I finish this file, so about 2 weeks, assuming I get that gate array from Mitsubishi . . . who got

Genial Traveler volume 1 number 6, and the John Calvin Traver disk that came with it, the Sort Experiment program on there by me doesn't work. It was sort of a combined foul up by Barry and myself. The corrected files are available on CompuServe and GENIE, and will be sent out with the next issue of Traveler. If you want them, or are not a Traveler subscriber and are looking for a very fast assembly language sort, that can handle any file type, up to 1000 records or 24K of data, ascending or descending sorts, on up to eight fields, send a disk and return mailer with postage to the address below, or \$3 (to cover the above, that \$3 is not the requested fairware donation) to me at the above address. Complete source file are included. Thanks for reading this file, your eyes must be pretty tired by now. I know my fingers are. -jph

[Postscript by BAT, who was at Ottawa instead: Actually, the SORT program sent with GT #6 does work. The minor bug (discovered by Tom Freeman) was that it could only handle single-digit entries for starting character entries (e.g., you could tell it to sort beginning at character 6, but not character 16, since it would ignore the first digit). The fix in the source code is a simple one. In line 721 of DSK1.SORT/EXP/S, you'll find this:

```
MPY D10,R1 multiply current value times 10
```

\_Before\_ that line, insert the following short line:

```
MOV R2,R1 Thank you, Tom Freeman!!!!
```

In other words, your source code for SORT/EXP/S should now look like this:

```
0721 MOV R2,R1 Thank you Tom Freeman!!!! 0722 MPY
D10,R1 multiply current value times 10
```

My mistake was omitting to include the program image file in SORT/ARC, but you'll have to reassemble it anyway. Here are the steps: (1) Assemble (the corrected) SORT/EXP/S to create SORT, (2) assemble SAVE/S to create SAVE, (3) Load SORT and SAVE into the Editor/Assembler option 3, linking to program name SAVE. That's all there is to it to create an all-a/I sort program to sort essentially any type of disk file (e.g., DVBO, IF20, etc.) on up to eight fields, thus providing a sort program with much greater speed and flexibility than you may be accustomed to! Try it - you'll love it!

## 32K - 16 BIT BUS PROJECT by Mike Ballmann

The following is a step-by-step description of how to add 64K of RAM memory on the 16 bit bus. The present modification uses only 32K. This corresponds to the memory space of the 32K Memory Expansion. The modification yields a speed increase of about 50%.

Mike Ballmann is currently working on a circuit to allow CRU decoding of the remaining 32K. This will open up a whole new area of software, including such possibilities as a real ODS which could be loaded into RAM from disk on power-up. The 32K modification described below can easily be modified for full decoding upon completion of Mike's work.

You will need two Hitachi HM62256LP-12 RAMs. One source of these is Microprocessors Unlimited. They cost around \$12. You'll also need a 74LS21 and a 74LS153. These can be obtained from various electronics supply houses. All wiring should be done with wire-wrap wire. You should use a low wattage soldering pencil with a fine, pencil type tip.

The modification is done on the main board of the Black and Silver console, and you'll need to refer to the Logic Board Component Location Diagram in the TI-99/4A Console Technical Data book.

1) Remove the board from the console, and identify the two ROMs. They are located between the GROM connector and the 9900 IC. One is parallel to the 9900 and the other is perpendicular to it. They are U610 and U611 on the Component Location Diagram.

2) Bend the pins on the HM62256 IC's closer so they will firmly contact the ROM pins when piggy-backed. One way of doing this is to place the RAM on it's side on a table and then move the body of the IC toward the table to bend the pins uniformly.

3) Bend out the following pins on both HM62256 RAMs: 1 2 20 22 23 26 27 28. These pins will NOT be soldered to anything on the ROMs. Holding the IC with the notch up and looking at the top, pin numbers start with pin 1 on the upper left, go down the left side, then across and up the right side. Pin 28 is opposite pin 1 on the end with the notch.

4) Place one HM62256 over the ROM that is parallel to the 9900. Make sure the notch points toward the 9900 and that the writing on the 9900 and the 62256 can be read from the same direction. Place the RAM such that pins 1 2 27 and 28 extend beyond the end of the ROM. The un-notched end of the RAM should line up with the un-notched end of the ROM. There should be a sort of "spring tension" that clamps the RAM pins onto

corresponding ROM pins below it. This will help to insure good solder joints. If the RAM doesn't fit tightly, remove it and bend the pins closer.

5) Solder all RAM pins not bent out to the ROM pins below. Use a low wattage pencil with a fine, pencil type tip. Inspect each solder joint carefully in good light, under magnification.

6) Place the second 62256 on the ROM that is perpendicular to the 9900. The notch on the RAM points away from the 9900 and toward the edge of the board. As above, solder and inspect all pins that were not bent out.

7) Bend out the 74LS21 pins 1 2 4 5 6 8 10 12 14. Note that pins 1 and 14 are across from each other on this 14 pin IC.

8) The 74LS21 will be piggy-backed on the 74LS138 U504. This IC is located adjacent to the end of the board where the edge connector is. There are two 138's next to each other. U504 is the one nearest the end of the board. You will place the 74LS21 so that the UN-NOTCHED end lines up with the un-notched end of the 138 (pointing toward the cassette connector). Pins 1 and 16 of the 138 will extend beyond the notched end of the 74LS21.

9) Before positioning the 74LS21, solder 1/2" lengths of wire-wrap wire to the 138 pins 7 and 9. Then position the 74LS21 on top of the 138 and solder all pins not bent out to the 138 pins below and inspect the connections.

10) Bend out all of the 74LS153 pins EXCEPT 8 and 16.

11) Place the 153 over U613, a 74LS194. The notch will line up with the 194 notch and point toward the edge of the board away from the 9900. Solder pins 8 and 16 of the 153 to pins 8 and 16 of the 194 below.

12) At the end of the 9900 opposite to where the RAM's have been piggy-backed, you will see a line of three ICs. They are a 74LS00, 74LS32, and 74LS04. The 74LS00 is U606 and the 74LS32 is U605. Turn the board upside down so you can see the traces. Find the trace that runs from pin 11 of the 74LS00 (U606) to pin 13 of the 74LS32 (U605). Double check to make sure you're doing the pin numbering correctly. When you've found the trace, cut it with a knife so there is no continuity between the LS00 pin 11 and the LS32 pin 13.

13) Identify the piggy-backed RAM that is



## Mike Ballmann's 32k--16 Bit Bus

(Continued from Page 8)

perpendicular to the 9900. Solder wire-wrap wires connecting every bent out pin on this RAM to the corresponding bent out pin on the RAM that is parallel to the 9900. Pin 1 to pin 1, pin 2 to pin 2, etc. There will be eight wires in all to solder.

14) Solder wire-wrap wires to make the following connections on the RAM that is parallel to the 9900. Pin 1 goes to pin 24 of the 9900 (solder the wire to the 9900 pin on top of the board). Pin 2 goes to the 9900 pin 22. Pin 20 goes to two places. Connect pin 20 of the RAM to pin 22 of the RAM and also to pin 8 (bent out) of the 74LS21. There should be three wires coming off pin 20 of the RAM. Pin 23 of the RAM goes to pin 21 of the 9900. Pin 26 of the RAM goes to 23 of the 9900. Pin 27 of the RAM goes to pin 61 of the 9900 (fourth from the top on the right side). Finally, connect pin 28 of the RAM to pin 20 of the 74LS244 adjacent to the piggy-backed 74LS21.

15) Connect the following 74LS21 pins with a bare wire: 1 2 4 and 14. Connect the short wire from the 138 pin 7 to the LS21 pin 5 (bent out). Connect LS21 pin 6 to LS21 pin 12. Connect LS21 pin 8 (bent out) to the piggy-backed 153 pin 2. Connect the short wire coming

from the 138 pin 9 to LS21 pin 10. Finally, connect the 74LS21 pin 14 to the 74LS244 pin 20 that you connected the RAM pin 28 to.

16) OK, we're almost done, so take a break and have a beer.

17) On the 153, connect pin 9 to pin 13 on the 74LS32 (U605). Pin 10 of the 153 goes to pin 14 of the 74LS74 next to it (U607). Also connect pin 10 of the 153 to pins 11 and 13 of the 153. Connect pin 12 of the 153 to pin 15 of the 153, and then connect pin 15 of the 153 to pin 7 of the 74LS00 U612 (next to the 74LS74). Connect pin 14 of the 153 to pin 1 of the 74LS00 U606; that's the one you cut the trace on.

18) That's it! Now have another beer before putting your computer back together. When you try it out, remember that this version isn't compatible with other 32K in the system.

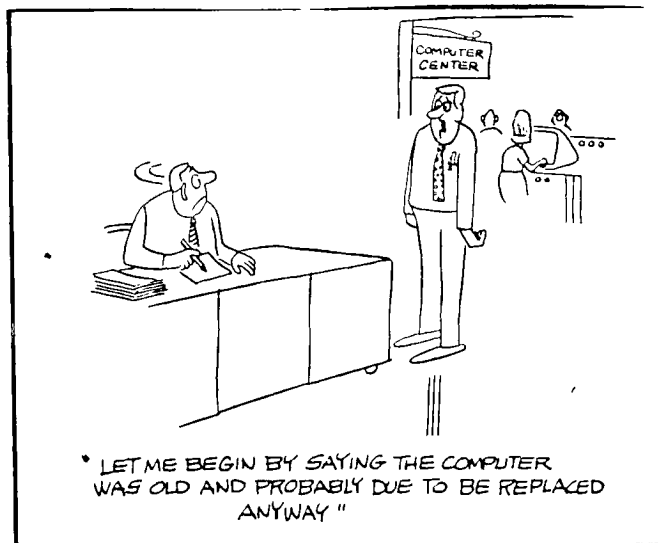
If you have problems with this I can't promise I can help but feel free to give me a call or write EMAIL (419) 874-8838. Ask for John (or Hose-Head.) and that the writing on the 9900 and the 62256 can be

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South End Pool Building -- 402 E. 56th Street -- Tacoma, WA

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