99/4A OWNER/USERS GROUP
MONTHLY NEWSLETTER
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DON'T FORGET

Our next meeting is March 16, 1984; 7:00 PM; at the Woodstock High School. Try and bring a new member with you. This month computer sorting routines will be discussed. If you have any good routines which you would like to share with the membership, please bring them along.

A TI FORTH ERROR FOUND

Mike McCann, Acting President of Greater Omaha 99/4A Users Group forwards an error tip on FORTH. John Sautter, one of their officers, found a bug which hinders output to the RS-232 port:

In SCREEN #72, on LINE 5, the variable PAB_ADDRESS must be changed to PAB-ADDR to work properly.

THE BASICS OF ASSEMBLY PROGRAMMING - PART 2

In programming with the EDITOR/ASSEMBLER, values are placed into different places in memory as needed. The location of these places in memory are notated by HEXADECIMAL addresses. The HEX number system consists of numbers between 0 >0000 to 65536 >FFFF. Note that we precede a HEX number with ">". This is to simply distinguish the decimal number, for example, 1984 in base 10 numbers from >1984 in base 16 numbers. What is meant by base 10 and base 16 numbers? The base of a numbering system is the power to which a digit is raised to place it into the next place holding position. For example, in base 10, 1 raised to a power of ten is 10. Note that a zero replaced the 1 and the value 1 was placed into the next place holder.

In base 16 number systems, 16 digits must have a slightly different form in order to represent a value in just one digit. In base 10, the numbers 0,1,2,3,4,5,6,7,8 and 9 are only one digit in length - yet they are all the numbers needed. Base 16 numbers are represented as 0,1,2,3,4,5,6,7,8,9,A,B,C,D and F. The letters are needed to represent numbers greater than one digit in length. Here are the values in both DECIMAL (base 10) and HEXADECIMAL (base 16):

HEXADECIMAL	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
DECIMAL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

HEXADECIMAL is a shorthand way to represent still more complex number systems. BINARY numbers are base 2, and they contain only the numbers 0 and 1. This number system is the most basic on earth and is thought to be understood by all living beings in the universe. As far as we are concerned our binary numbers are four digits in length for the moment. Bearing this in mind, then consider the following table:

BINARY	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1 011	1100	1101	1110	1111
HEXADECIMAL	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Note that in the BINARY representations, all possible combinations of 0 and 1 have been used within the four digit framework. Let us look a little deeper into the BINARY system. As you move to the left, BINARY numbers increase by a power of two with their digits 1 and 0:

Consider the following BINARY and DECIMAL representations. By now you should be getting the idea of these numbering systems.

0001 = 1
0010 = 2
0100 = 4
1000 = 8

Within the TI-99/4A computer there are 65,536 possible memory locations. Some of these locations are for you to use while others are reserved for the system to use. Two forms of memory address are used in the EDITOR/ASSEMBLER, one is HEXADECIMAL and the other is DECIMAL. HEXADECIMAL you now understand. DECIMAL on the other hand, requires some conversion to locate the correct address. The correct DECIMAL address is equal to (N-65536), for example, the DECIMAL address 45672 is found by subtracting 65536 from it - (45672-65536)= -19864. This somewhat odd conversion is known as the two's compliment form of representing numbers.

Next month we will discuss memory and how it is organized in the TI-99/4A computer. This study is your key to gaining access to your system. Remember, you must define all things no matter how simple they are in assembled language. To accomplish this, we must know and understand the memory structure.

LETTERS TO THE NEWSLETTER

A reader asks - "I have EXTENDED BASIC and I'm wondering about controlling my own error routines. Can you explain them?"

TI Extended Basic has a powerful error handling network of routines. The first of which is ON ERROR with an optional STOP, NEXT, or a line number. Normally, your computer is operating under ON ERROR STOP when you power up. To alter this condition, which by the way stops the printing of system error messages, you simply use a line number to a sub-routine where you write the code for your own error recovery. Upon completion of your own error recovery routine, you must return to the main part of your program via the RETURN statement. Upon execution of the RETURN statement, control will be passed back to the statement which caused the error unless RETURN is followed by a line number in which case control will be passed to that line number. If RETURN is followed by the command NEXT, control will be passed to the next executable statement following the one which caused the error. Once an error is detected by the system and control passed to your error recovery routine, the ON ERROR will be reset back to normal power up status - ON ERROR STOP. To enable the ON ERROR routine again, the ON ERROR statement must be executed again.

A reader asks - "Why is it that you cannot use multiple statements on lines that begin with data statements?"

Right off I'm assuming that you are using EXTENDED BASIC with the multiple statement separator "::". If this is so, then the reason you cannot follow a DATA statement with :: and add another statement is simply that anything that follows the keyword DATA is considered to be data by BASIC. At the end of a statement line, when no more characters follow, BASIC adds an unseen CRLF (Carriage Return and Line Feed). It is this CRLF which signals the end of a DATA statement.

A reader asks - "Now that Texas Instruments is out of the home computer business, will I ever be able to add to or upgrade my computer? I have an expansion box with nothing in it. What should I do?

The main answer to your question is that although TI is no longer supporting the TI-99/4A computer you can still complete your system by purchasing "third party equipment" (TI was one party, you are the second party, and anyone else is a third party). Several third party vendors are appearing with cards which will fit the TI Peripheral Expansion Box. Currently I know of 32K Memory cards and RS-232 cards that are being produced. More is on the drawing boards and should be out soon. Finally, I strongly urge those of you out there with TI machines not to give up the ship. If you go out to your local computer dealer and look at a new Apple or Epson or IBM you'll see some pretty neat stuff running on these machines that will leave you feeling weak in the knees. Remember, however, that this is just software running on these machines. You can make your TI do those same things if you know how to program.

BACK UP YOUR IMPORTANT PROGRAMS

The very first time you lose one or more of your programs due to either a tape breakage or accidental erasure or some stray magnetic field wipes out data stored on a disk, you will be saved only if you had the foresight to backup those important disks or tapes.

This practice is not just a waste of disks or tapes. All professional programmers make it a habit to do this on every program. If you have programs that write data out to storage and get updated or added to on a regular basis, you should backup this changed data every time to keep your backup copy current. It takes more time but its worth it in the long run.

LOWERCASE CHARACTER SET

Almost every User Group Newsletter I have read has had their own version of a lowercase character set published for their members use. Most of these have been pretty good. I cannot take credit for the set which follows but it's the best I've seen yet. It requires that you completely redefine the entire character set due to the lowercase letters such as "g, p, and y" having decenders. Because of this, the uppercase characters which are not physically changed but need to be repositioned up a bit to allow the decenders to decend.

Save this character set in a MERGE format file so that you can use it with any program. Here is the set in a easy to read format:

ASCII	CHAR.	CODE
33	!	1010 1010 1000 1000
34	"	2828 2800 0000 0000
35	#	2828 7C28 7C28 2800
36	$	3854 5038 1454 3800
37	%	6064 0810 204C 0C00
38	&	2050 5020 5448 3400
39	'	0808 1000 0000 0000
40	(	0810 2020 2010 0800
41	)	2010 0808 0810 2000
42	*	0028 107C 1028 0000
43	+	0010 107C 1010 0000
44	,	0000 0000 0030 1020
45	-	0000 007C 0000 0000
46	.	0000 0000 0030 3000
47	/	0004 0810 2040 0000
48	0	3844 4444 4444 3800
49	1	1030 1010 1010 3800
50	2	3844 0408 1020 7C00
51	3	3844 0418 0444 3800
52	4	0818 2848 7C08 0800
53	5	7C40 7804 0444 3800
54	6	1820 4078 4444 3800
55	7	7C04 0810 2020 2000
56	8	3844 4438 4444 3800
57	9	3844 443C 0408 3000
58	:	0030 3000 3030 0000
59	;	0000 3030 0030 1020
60	<	0810 2040 2010 0800
61	=	0000 7C00 7C00 0000

ASCII	CHAR.	CODE	ASCII	CHAR.	CODE
62	>	2010 0804 0810 2000	95	_	1028 0038 4848 3400
63	?	3844 0408 1000 1000	96	`	0000 3840 4038 1000
64		3844 5C54 5C40 3800	97	a	0000 3848 4848 3400
65	A	3844 447C 4444 4400	98	b	6020 3824 2424 7800
66	B	7824 2438 2444 7800	99	c	0000 3844 4044 3800
67	C	3844 4040 4044 3800	100	d	0C08 3848 4848 3C00
68	D	7824 2424 2424 7800	101	e	0000 3844 7C40 3800
69	E	7C40 4078 4040 7C00	102	f	1824 2070 2020 2000
70	F	7C40 4078 4040 4000	103	g	0000 3C44 3C04 0438
71	G	3C40 405C 4444 3800	104	h	6020 2834 2424 2400
72	H	4444 447C 4444 4400	105	i	1000 7010 1010 7C00
73	I	3810 1010 1010 3800	106	j	0800 1808 0848 4830
74	J	0404 0404 0444 3800	107	k	2020 2428 3028 2400
75	K	4448 5060 5048 4400	108	l	3010 1010 1010 7C00
76	L	4040 4040 4040 7C00	109	m	0000 A854 5454 5400
77	M	446C 5454 4444 4400	110	n	0000 5824 2424 2400
78	N	4464 6454 4C4C 4400	111	o	0000 3844 4444 3800
79	O	7C44 4444 4444 7C00	112	p	0000 7824 2438 2020
80	P	7844 4478 4040 4000	113	q	0000 3048 3808 080C
81	Q	3844 4444 5448 3400	114	r	0000 5824 2020 2000
82	R	7844 4478 5048 4400	115	s	0000 3C40 3804 7800
83	S	3844 4038 0444 3800	116	t	2020 7820 2024 1800
84	T	7C10 1010 1010 1000	117	u	0000 4848 4848 3400
85	U	4444 4444 4444 3800	118	v	0000 4444 2828 1000
86	V	4444 4428 2810 1000	119	w	0000 D454 5454 2800
87	W	4444 4454 5454 2800	120	x	0000 4428 1028 4400
88	X	4444 2810 2844 4400	121	y	0000 4444 3C04 0418
89	Y	4444 2810 1010 1000	122	z	0000 7C48 1024 7C00
90	Z	7C04 0810 2040 7C00	123	{	1820 2040 2020 1800
91		0810 3844 7C40 3800	124	|	1010 1000 1010 1000
92	\	3030 3FFF FE7C 180C	125	}	3008 0804 0808 3000
93		2010 3844 7C40 3800	126	~	0000 2054 0800 0000
94		3844 4040 4438 1000			

CALLING ALL KEYS

A really handy feature of TI BASIC's is the CALL KEY subroutine. When you use this subroutine you have returned to you two variables which can make your programs run smoother and more professional. Say you have a part of your program in which you must input a response from the keyboard. There are several ways to do this but, none so clean and foolproof as CALL KEY. Here is it's syntax:

CALL KEY(key-unit,return-variable,status-variable)

When CALL KEY is executed the value returned in return-variable depends on which value was assigned in key-unit. A key-unit value of 0 (zero) tells the subroutine to scan the entire keyboard. See your TI Referance Guide for other key-unit values. The return-variable returns the ASCII code of the key pressed. The status-variable returns a 0 if no key was pressed, a 1 if a new key was pressed, and a -1 if the same key was pressed that was pressed before.

Here is a typical way to use CALL KEY. "350 CALL KEY(0,K,S) :: IF S=0 THEN 350". In this case we follow the CALL KEY statement with an immeadiate test to see if a key was pressed. If no key was pressed we go back and execute the CALL KEY statement again. Note that we must do this because the computer is far faster than any human hand and without this

test for a status of 0 we would never be able to respond in time to our prompt before the computer would be well beyond the CALL KEY statement in the program. In a case like that the computer would assign a value of -1 to the variable K. Look at the program example below to get a better idea of how this all works:

```
100 PRINT "DO YOU WISH TO CONTINUE? (Y/N)
110 CALL KEY(0,K,S)
120 IF S=0 THEN 110
130 IF K=89 OR K=78 THEN 140 ELSE 110
140 IF K=78 THEN END
150 REM Continue on with program.
```

In the above program only the uppercase Y or N will be accepted, all other keys will be rejected and nothing will appear on the screen to upset any part of your screen display.

MIDLAND DATA SYSTEMS

Here is a place which I'm sure some of you may know about but I'll bet not all know about. The place is Midland Data Systems at the Crystal Point Mall in Crystal Lake, phone 459-3274. This is a swell place to visit if your in the market for an Epson printer or a good price on diskettes. They are also the only place around I know where you can get genuine Epson printer ribbons. If you have purchased those generic printer ribbons before I know you'll be glad to find out that the genuine Epson ribbons have ink in them. Remember that origonal ribbon that was packed with your printer?

Also on display are Epson computers and CP/M software to run on them. One thing we did find of interest was their cute little display monitor for under a hundred dollars. We also found our favorite Elephant disks on sale, a box of 10 for under 25 dollars. Check this place out, the staff is always willing to talk computers.

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Your advertisments can appear in this newsletter. Your copy must be camera ready and fit the format for an 8 1/2 by 11 inch page. Fees for one insertion are as follows: Full Page $20.00; 1/2 Page $10.00; 1/4 Page $5.00. All fees must be included with your artwork. The issue in which your advertisment appears will be sent to you at no charge. If you desire more than one copy of our newsletter, state how many and add 50 cents for each additional copy.

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WHAT'S NEXT FOR HOME COMPUTER USERS?

The following article by John Koloen, Publisher of the Home Computer Compendium is both timely and authorative. His article from Volume 1 Number 2, March 1984 is reproduced here in whole for your enlightenment.

It's hard to believe, but the TI-99/4A has been around for less than three years and already it's out of production. But that's the way it is in high-tech. Here today, gone (or upgraded) tomorrow.

So what's next for TI home computer users?

I don't have a crystal ball so I won't pretend to have all the answers. But there are many indications that the TI home computer market is not quite like any other, and I think its uniqueness will play in the favor of TI owners.

Why?

For one thing, regardless of how many TI consoles are on the market - I've seen figures ranging from a low of one million to a high of four million - the perception among vendors is that the market is large enough to support many product lines.

My personal view is that the "real" TI market is much smaller than one million. No doubt, many who purchased the 99/4A during the fourth quarter of 1983 have already tucked it away in the closet. There are also those who, having purchased the computer, either do not have the income or the desire to expand the system. That leaves those users who like the system and have or are in the process of expanding it. This is the real market that vendors want.

Here are some predictions about what may happen in the home computer market:

1. Diversification: Just about everybody who has been depending on the TI market exclusively is or will be diversifying. However, few will be closing their books on the TI home computer.

2. New Companies: Now that the big cheese is out of the market, the little cheeses will be able to come in from the sidelines and call some plays. I'm not talking about companies forming to deal with the TI market exclusively. I'm talking about established companies creating TI product divisions to sell products for the TI home computer that they've been selling to users of other brands.

3. New Products: Don't look for anyone to pick up the rights to the TI-99/4A, despite what you hear. The only companies foolhardy enough to do this are in the red ink business. Do look for lots of TI compatible hardware, starting with Cor-Comp's 99/64. Also, look for increased interest in such peripheral devices as light pens and graphics pads.

4. New Software: Yes, you'll be hearing a lot about new software. Actually, much of it will be old software translated or adapted for use by the TI home computer. Despite the current trend, not all of it will be cartridge-based. There are limitations to using cartridges as the medium for software distribution. In fact, any "serious" software developments will require disk drives and memory expansions. Even TI couldn't get TI-Writer or Microsoft Multiplan to work out of a cassette recorder (These two software packages are much larger than the 12K limit placed upon cassette based programs. -ED). Look, too, for a good database program that will run using the Extended BASIC cartridge and expansion memory.

5. New Publications: There will be a greater diversity of publications for TI and compatabile computers. It's clear that no one publication can serve the needs of all TI users. However, these publications will be oriented toward a specific TI audience. They will be smaller than the general interest computer publications that you find on newsstands, but they will be packed with information that is useful to TI users. Why is this? Look at the former 99er Magazine. It never developed the kind of advertising support it needed to compete in the general market. Rather than keep its focus on a market that was not growing very rapidly, it chose to expand its market by including other computers and, hence, advertisers.

So much for now. JK

EDITORS COMMENT

The above article by John Koloen is typical of the calibre of lively and informative content of Home Computer Compendium. John asks just $12.00 for a one year subscription to his magazine. If your tired of hearing or reading volumes of printed material just to get a few words about the TI computer, then give his magazine a try. Use the form below, you'll be glad you did. While 99er Magazine loses steam, Home Computer Compendium is gaining momentum. I'm on board, how about you! Bob Eckert 815-653-9341

I'm a member of the 99/4A OWNER-USERS GROUP. Please send me the next 12 issues of **Home Computer Compendium**. I'm enclosing a check or money order for $12 for my subscription. Mail to: Home Computer Compendium, P.O.Box 1343, Round Rock, Texas 78690.

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