

# T. I. DINGS



T.I.  
ATTN: ASHLEY  
P.O. Box 10508  
LUBBOCK TX 79408

GOOD TI-DINGS FROM NEWJUG NORTH  
NEWS FOR TI 99/4A COMPUTER USERS  
Dumont, N.J. 07628

MAY 1987

Volume 5, Number 5

## OFFICERS:

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TREASURER: Frank Filice.....(384-8797)

SEC.: Jim Ott.....(790-6052)

EDITOR: Henry Mein.....(385-9057)

LIBRARIAN: Andy Westner..(967-9154)

MOITO: How can I hel ?? NEXT MEETING:

May 19, at Dumont H.S. Faculty Room  
7 P.M. TO 10 P.M.

NEWJUG/NORTH  
P.O. BOX 84  
DUMONT, N.J. 07628



Dallas TI Home Computer UG  
PO Box 29863  
Dallas, TX 75229

ATTENTION: USER GROUPS

PLEASE RECIPROCATATE



... BUT, YOU KNOW, DOC...  
I CAN'T HELP FEELING  
BUG IS A GOOD MAN  
UNDERNEATH...



PERHAPS...  
PERHAPS  
WE CAN  
FIND A  
CURE  
FOR  
HIS  
PSYCHOSES...  
HOW WAS  
HE BROUGHT  
HERE?



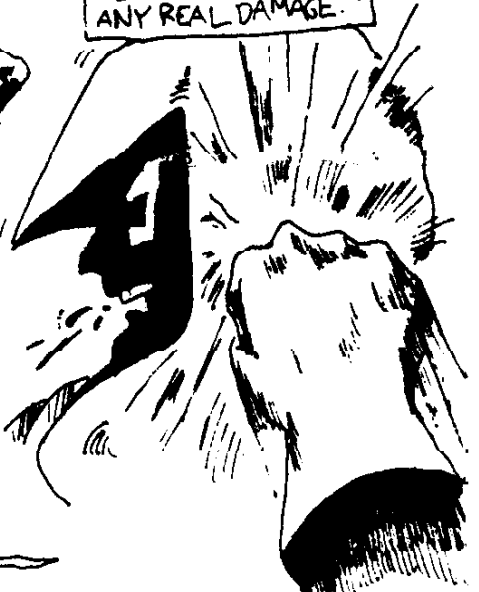
I BROUGHT HIM HERE...

"HE WAS THREATENING TO  
DESTROY THE WORLD'S  
ECONOMY THROUGH ITS  
COMPUTERS..."

"BUT I MANAGED TO EXPULSE  
HIM FROM THE SYSTEM  
BEFORE HE COULD DO  
ANY REAL DAMAGE..."



AND THE EYES...  
HOW DID HIS EYES...  
...



AH.. AND HOW DID HE  
GET THAT BURN...  
OR NOT BURN, SO MUCH  
AS A HIGH CONCENTRATION  
OF SKIN PIGMENT GIVING  
HIS FACE THE APPEARANCE  
OF BEING BURNED?



GOOD QUESTIONS, DOC...  
AND SOMETHING I  
HAVEN'T THOUGHT ABOUT  
IN A LONG TIME.



BUT IF YOU'RE  
GONNA HAVE  
ANY HOPE OF  
CURING BUG...

YOU MIGHT AS WELL  
KNOW THE WHOLE STORY  
OF...

THE ORIGIN OF TULLO MAN  
AND BUG NEXT.

HTK

MINUTES:  
by Jim Ott

Your Secretary nearly missed the meeting when just starting to read the newsletter at 7:00 PM on the night of the meeting! I will try to check the meeting date sooner in the future.

The topics discussed were the new NYARC Computer, study groups, and TIGERCUB TIPS.

Andy Westner explained and answered questions about the NYARC. He said he has been out of touch with Lou Phillips since December waiting to hear from him. He then asked members who would buy one. Two members said they would buy one. The rest of the members seemed to be content with their present systems or awaiting further developments.

The most active study group is the "c" group, at present. Ralph Kopperman continues to hold the SIG group at his home.

Henry Mein mentioned that Jim Peterson of TIGERCUB Software deserves to be patronized for the years he has given to the TI community. His volumes of 41 pages of TIGERCUB TIPS Vol. 1 and 2 are \$15 each or \$27 for both (on disk). His NUTS & BOLTS #1 & 2 are \$19.95 each or both for \$37.00. He publishes a 9-page catalog for \$1, refundable toward purchase of a host of other software, including tutorials. He says that hard copy printouts of his TIPS have been discontinued and that he does not have a full set. "Many, if not all of these items are worth sending for" said Henry. Write to TIGERCUB SOFTWARE, 156 Collingwood Ave., Columbus, OH 43213.

If anyone knows where to get a screen dump program that dumps to OKIDATA printers from cartridge screens tell Andy Westner.

Steve, Jr. will make an attempt to simplify and shorten the PR-Base manual. I hope this doesn't infringe on author's rights. I guess if he doesn't sell it it's OK. Henry reminded us that FAIRWARE is NOT FREE. If you get a FAIRWARE program, like it, and USE it, PAY the AUTHOR! Also, even the programs distributed by vendors such as ASGARD,

TEXAMENTS, QUALITY, TRITON, MCCANN, GREAT LAKES, etc. Their support of us would be diminished. Prices are extremely reasonable, besides.

The treasurer announced a balance of \$560.83.

Surprisingly no one soaked at the meeting. The discussion was lively. When the soaking topic came up Frank Filice thanked the usual soakers from abstaining. The club resolved that soaking at meetings would be discontinued.

Henry Mein made an apology to Great Lakes Software. In his NEWSBYTES column 4/87 he mentioned that a user could not make a back-up of its JOYPAINT disk. The user who bought the program had a defective disk which was quickly replaced by GLS and was able to make a backup. The user is VERY impressed with the program.

The meeting adjourned at 8:40.

NEWSBYTES:  
by Henry Mein

Steve, Jr. hopes to set up a new BBS soon. He said that the present TI BBS is temporarily out of use due to a blown PEB. It also should be up again shortly.

APOLOGIES TO GREAT LAKES SOFTWARE. In this column last month I mistakenly thought that in order to back up its JOYPAINT program a user thought he accidentally destroyed his program thinking it had some self destruct mechanism built in. It was a bad disk, and was quickly replaced. The user archived it for safe storage after making a backup for himself successfully. Sorry about that!

WANTED: a program to convert fonts from GRAPHx, ARTIST, CSGD, PRINTER'S APPRENTICE, to be used in ALL of the programs above without too much manipulation. Each program stores its fonts differently and cannot be used directly when making text for screens or pics. Only whole pics can be converted AFTER they're drawn to be used by another program. The font files for each program are terrific, and

plentiful. I just wish I could use them where I'd like.

HEY ASGARD! Is FONTWRITER 2 ready yet? We have some users ready to buy it.

THANKS to Jay Leber of TITEX we now have a library of RLE pictures. I'm sure we will treasure them.

MEETINGS: Our next scheduled meeting is to be held back at the DuPont H.S. faculty room on May 19th at 7:00 PM. From there on we have no assigned dates or places. Where shall we go after that, folks? I'll leave that to YOU!

The time is getting short and the club will need a new NEWSLETTER editor. I've already started packing for FARM, no, not the funny farm, or the farm in the sky (I hope). I'm just changing venue. Just about three more months to go. I haven't seen anyone scrambling for the job. It does take a lot of work but it pays off with many rewards in that it makes one more intimate with the workings of a computer. Besides, with the newsletter exchange program now in effect, there are many things we can learn from what other groups are doing. Tutorials, hard copy programs, tricks and hints galore.

This month's collection is the best ever. Even better is evident in the collection. I'm still inviting anyone to drop in and pick up a few. There are many articles that are worth publishing, but that wouldn't be fair to the authors since they did put their efforts into it, and they were meant for YOU and ME to read and enjoy. THEY had the GUTS to write SOMETHING, took the trouble to do it, and we all avail ourselves of their knowledge and skill. Some are nameless. Others are already well known. All were, and, I hope, will continue to contribute to the TI community.

Even though I'm leaving the club I'll still be with it in spirit. I'll try to send an article or two to the new editor each month to ease his/her task. Coaching, for now, will be FREE. Volunteers apply NOW! Once or twice a week at my home will open your eyes as to what you can learn, privately or in a group. I'd like to hear my phone ring for that!

From the Mailbag  
by Henry Wein

I just received a copy of Printer's Apprentice. One difficulty of this program is its instructions. There are many but they are not step by step. However, it is much like PRINTMASTER, written for the APPLE 2 series but holds some promise to do it one step better. That is, to combine pics with text and, possibly, to do double column print. The sample fonts included in the package (one floppy) are GREAT! More fonts can be had for \$10. The reviews I've seen in other NL's seem to confirm my view of the program. It has a LOT of promise for NL editors and for people who want special effects for personal printing and publishing. I've got a lot more to learn about the program. It IS difficult to master! Included in it is a 40-column word processor similar in some respects to the TI-Writer. The author omitted some details in the WP (Jotter) command on how to indent so I'm using a little makeshift use of dashes for future printouts to start paragraphs. It does its own fill/adjust with proper commands. It has hyphenation, proportional, and Micro-adjust capability. Check it! For only \$23.50 it is a STEAL! Designed for Epson and Gemini type printers ONLY. Lucky ME! For your copy send to McCann Software, PO Box 34160, Omaha, NE 68134.

Aaron Traiger, Member Emeritus, sent me his dues for '87. He'd like to hear from us, not just the NL. He retired to ARIZONA two years ago. As I mentioned before I expect to be a distant member, too, soon.

Steve Langguth, author of FRACTAL EXPLORER, saw my comment in last month's NL and wrote to me offering me a copy of his FAIRWARE program. He is a long time supporter of the TI writing programs, tips, etc., for his US and picked up by other US's. For those interested in learning about fractals you could send him a disk, SASE mailer, and a contribution. I think \$10 is NOT excessive. His program is said to feature the Mandelbrot Set, create multicolored images for saving to disk or dumping to a dot matrix printer. Imagine spending a night out to dinner, movie, or ball game! Isn't learning something new worth it? Enjoy!

#### More on the PRINTER'S APPRENTICE:

McCann Software is releasing another disk of fonts for this amazing program for \$11.50. Also, they are, by the time this issue is printed, a TOOLBOX disk which is supposed to do what I've long hoped for, such as, a program to convert fonts from TI-Artist, CS60, for use as P.A. fonts. I hope it includes features so that these fonts could be reconverted as well for interchangeable use by all of these programs. The TOOLBOX will be sold for \$22.50.

The NorthEastern 99ers just published their NL with a new look. Almost the whole issue was put together with the Printer's Apprentice program. I think it was cut and pasted together but it was a Be-oo-tiful Job! I don't know how else they could have put it in two or three-column modes with the P.A. unless the editor has intuitive knowledge of its 'Scheduler' routines. Pretty soon there will be a lot of writing and SIGs about this amazing set of programs.

We now have a large collection of tutorials on XBasic, FORTH, E/A, 'C' languages, many helps and hints, and good hardcopy of useful programs for above. The collection is growing by leaps and bounds, considering the latest batches in the last (at least) three months. Interesting reviews of programs, too. Make an appointment and drop in to see me, that is, before I go off to the farm. Of course, their the club's property, but I can make copies right here! For YOU! Don't be shy! Call ahead and I'll arrange an evening once or twice a week just for you (singular or plural). Copy fees are minimal, no profiteering here!

TICOFF '87 was raved about in recent NL's. Wish it could have been better attended. The BOSTON FAYUM was so closely scheduled with ours, only a week apart, many of our New England friends took their ease and opted for a more central location. They DO seem to have a greater enthusiasm, too. That wonderful BOSTON COMPUTER SOCIETY's large TI chapter hosted the event. It appears to be its most active chapter, at that! There is no doubt that some who went to TICOFF visited there, too. Their FAYUM was written well of, too.

The Knoxville group (K-Town) reprinted a Pittsburg US bulletin about

an FBI raid on a local club. CAUTION! It is ILLEGAL to copy COPYRIGHTED programs. My advice is to stick to pubdoms, some of which are better, anyway, and SAFER. "There are laws on the books that could make that copy (illegal) the most expensive program you ever gave/received."

According to Mike Dodd of K-Town, he is disappointed with the pirating of his DM99 program. He is now releasing another program called IBASHER and will be sold by Genial Computerware, try another less pirate proof route.

Another of John Bonito's columns (printed here in January) spread to Texas and Canada. A few bits of mine are reprinted here and there, too, AND I hope WE can contribute more to share with others. We reaped much from them.

From North Jersey US are mini reviews of two Quality 99 programs: QS-Solitaire; Very fast and user friendly. It has two options, a Las Vegas type of game with money to bet on, and another just to stay awake on an otherwise boring night waiting for your kid to come home. Both keep you mentally active. The second is a game called Match-Mate (both \$14.95 til May 30); match pics or alphabet characters in bit-mapped graphics for one or two players. Similar to the TV CONCENTRATION game. Ellen Kramer raves about them.

The CIN-DAY (OHIO) US is republishing month by month Jim Petersen's TIGERCUB TIPS. Maybe by December we'll have a full complement of them. Its latest NL has a revamped Index Card Disk Catalogger written by Ed York and Rick Kellogg.

J.D. Canning's program, 'Predicting Available Solar Energy' is in hardcopy in the latest Boise NL. I studied the topic in the 70's and almost forgot about it. Now I see a program written for the TI in XB that can give a screen reading, and with a screen dump a printout, of a table showing hour by hour at your latitude an indexed amount of radiation and reflection. Data inputs are date, time, degree of clearness, latitude, etc., will put the computer in motion to determine radiation retained and reflected. A nice job!

More From the Mailbag  
by Henry Hein

RYTE DATA, 210 Mountain St., Maliburton, Ontario, K0M 1S0, has Prom sets for sale for \$45 to enable your disk controller to access double or quad density drives.

TEXAS INSTRUMENTS is selling new and reconditioned parts at reasonable prices. P-Boxes for \$90, disk controllers for \$40. Their TI CARES phone # is still working. Call for info.

Mark Beck, author of CREATIVE FILING SYSTEM, is now on v. 6.0 and working on 7.0. To get a copy send \$10, disk mailer with return postage, plus two double sided or three single sided disks to above at 166 Delaware Circle, Jacksonville, AR 72076. Note: Mark says that this DB allows for math computations.

Millers Graphics EXPLORER is still available (\$24.95) with 105 page instruction booklet. An Assembly Language tutorial and utility disk yet to be outdone. It also explains much about the TI 99/4a internal structure. Mail to above at 1475 N. Cypress Ave., San Dimas CA 91773.

Jude T. Kennaly of TITEX US writes that the NYARC ramdisk CAN be fixed to hold data with power off with a 9.5 volt 1 amp transformer, and a 5 ohm resistor. He warns that extreme caution should be used in soldering the resistor.

Edmonton (Alberta, Canada) US published another 'c' tutorial of Michael Jaegerman with a working program in hard copy called CPU Memory Browser. Another program listing by JIM Beck is a game called ROBOT RAMPAGE and includes graphics galore. What's a better way to learn a language!? By reading typing programs into the computer really helps.

Quoted by Southwest 99ers (from Magnetic US, North Andover, Maine): Telecommunications with TI Writer can be done. The sending party's text should be saved with NO control characters with the commands PF <ENTER> C DSKn.filename <ENTER>. Exit and call up Formatter. Enter filename, device name RS232.LF or RS232/n.LF and go through the rest of the menu with your commands. Check to be sure receiving party is ready before toggling on the sending modem. When ready hit <ENTER>.

The receiving party should be ready with the Editor screen and prepared to load files LF <ENTER> RS232.LF or RS232/n.LF.

When sender is ready wait for squeal of his/her modem then toggle ON receiving modem and hit <ENTER>. If everything is done correctly the file will appear. After EOF appears go back to command line and S(ave)F(ile) to your own disk. Timing is important. The "Oops" command may retrieve any lost data. But now that you know it works and you didn't hit the keys in time to gather all, try again. Also, starting a file with a few blank lines would help. Nice going! I've done it before, myself, but not quite this way. Now it's almost foolproof this way, for sure!

P.S.: CALL WAITING phones can mess up a modem transfer if a caller is trying to get through to you on your active line. According to SW 99ers you can disable the CW by dialing on your Touchtone phone or 1170 on your Rotary Dial and wait for a second dial tone, then get to your modem call. It will reactivate when you hang up.

MEI/Micro Center, 1535 West Lane Ave., Columbus OH 43221 is selling 5.25" 86DD disks in lots of 100 for \$27 + \$4 shipping, including sleeves and tabs. Offer expired 4/30 but call 1-800-634-3478 for new prices and inquire about other items.

From Elmira, NY (Twin Tiers US) comes a bit of info about plastic covers for your console. They do protect it from dust but not from moisture from condensation. Let your console cool before covering it.

LA 99ers TOPICS will have new contributors writing in their newsletters in the future. Howie Rosenberg (from Long Island), Barry Traver (from Philadelphia), and Mike Dodd (from K-Town) among them. They already have regulars George Steffen, Tom Freeman, Chick DeMarti, as regulars. Who else do they need. It's getting like MICROPENDIUM/NEST, without too much advertising, thus making it more worthy of subscribing. Every month I can hardly wait for it to come. This month's had 22 pages! We can only envy in this part of the world for such a fine NL.

To detail its contents month by month is a tremendous job. The itemization by Frank Filice of MICROPENDIUM's contents is tedious enough. The LA folk are so gracious to us and other US's considering what little WE contribute. Of course they have a larger member base. Considering the size of other US's of only a handful of members in each they afford a great deal of effort

to fill each other's needs, and publish volumes of information to be shared with us. Let US kick in some more!

From Bob Daggitt and the Ninety Niner News via LA here's the way to get on GENIE. Run your TE II cartridge or other telecom disk program, opt for HALF DUPLEX, dial 1-800-638-8369 via modem. When connecting, type: "HHH" and <ENTER>. At US type "SJM11961,GENIE" and hit <ENTER> twice. The service will be explained to you with no obligation to join. Rates are \$8 per hour at non-prime time for 300 OR 1200 baud. Genie turns off the clock when uploading a program.

We have received at the time of this writing only half of the NL's we exchange. They come in bunches and one by one. BUT THEY COME, AND COME! It takes a lot of time to read all this interesting stuff! And to sort things out which would interest YOU is hard, and highly judgemental. We should have a regular committee examining them every month, or even WEEK. It's a shame to leave all decisions to one person, ME. Someone, maybe YOU, may lose out! Give a HAND! I'm anxious to please!

Thanks to John Donito's diligence he gave me some tidbits of arguments about software, fairware, and copying practices written by RUN (a magazine for Commodore users) readers. I disagree with a comment he made in that the new software coming out for the TI is higher priced and copy protected. I didn't find that true for any of the software offered at the fair though for an exceptional misconception of the JOYPAINT episode already mentioned. Our disk drives have NOT been destroyed as some Commodore users have in copying protected software for their own backups. From experience I've seen APPLE programs allowed to be backed up, and even encouraged to be. Software producers know now that they are at a loss when word gets out that their product can't be archived. I don't know much about Commodore software but I think readers who complained in RUN exaggerated except for one who expressed that protected software should be accompanied with a second copy. I agree! You can buy a disk for as little as 27 cents, even less, or less than the cost to MAIL it, wholesale. For commercial software producers to skip so much and protect their product (which may not live up to user expectations) to risk damage to user equipment if copied is not worthy to be patronized! Trust Avenue is a two way street!

The following was compiled by Frank Police for making us aware of the coverage of news for our 99/4a computers. This MICROPENDIUM publication is another example of excellent support in informing us of many things available to 99/4a users and what they can do. Noteworthy are the many hardcopy listings of programs of games, utilities, and program enhancement techniques. Isn't it about time YOU subscribed?

Gleanings from Micropendium

Vol.4 No.2, March, 1987

- Comments.....Page-6
- The Myarc 9640 is reviewed superficially due to deadline requirements.
- Feedback.....Page-8
- Multiple colons in Extended Basic: a comment on a Regena Basic/XBasic column
- Multiplying lives: refers to altering various cartridge games.
- Article subject comments: covers many subjects that have to do with software and hardware problems among them being Name/it, Corcomp Controller, M6 Advance Diagnostics, Navarone

DBM, BA-Writer, RAMdisk, etc.

- Help needed with Azim printers: a novice (aren't we all?) needs help with his printer
- Keep listings short: with all the inexpensive software who needs long listings?
- TI-Writer won't: problem with Myarc's S12 card and Funlwriter also
- Won't initialize: PEB problems
- Techie Corner.....Page-12
- Excuse me, may I please LOAD?.
- Second in a series of articles by Mack McCormick describing a Load Generator. Looks like another good project for the DIY.
- Basic by Regena.....Page-16
- Documentation and listing for Name those capitals and states
- Getting more from XBII.....Page-24
- A screen dup for use with Myarc's XBII
- LOGO-Part II of a serie.....Page-26
- LOGO tiles and sprites for more sophisticated graphics
- Various fairs in San Francisco and Denver.....Page-32
- BIJIT Systems RGB Kit.....Page-34
- Rave review for interface giving crisp, clear color video

Mycove Forth Version 3.0.....Page-35

- Review on an improvement on the original
- SPAD XIII Flight Simulator.....Page-37
- Review of latest entry in the flight simulator field and it earns high marks
- Newsbytes.....Page-39
- Programs sought for photography show
- EM Software offers utility programs
- Kazco International ceases operations
- BasicSort upgraded, distribution changed
- News from Asgard regarding new series of products for Font Writer and TI-Artist users
- M6 demonstrations scheduled for group at the April 16 meeting of the Front Ranger 99ers in Colorado Springs, Col.
- New England Faire set for April 4
- Bible Trivia released
- New Jersey TICOFF set for second year
- New phone number for FLUG TIBBS
- User Notes.....Page-42
- Simple titles for videos: add titles to videotapes
- Delete columns from T1W, E/A: an improvement on last month's routine
- Turning assembly into CALL LOADs: an Assembly Converter to Extended Basic

	50	51	52	52	54	55	56	57	48	61	SHIFT UP
	64	35	36	37	94	38	42	40	41	43	SHIFT DOWN
1	2	3	4	5	6	7	8	9	0	=	
3	4	7	2	14	12	1	6	15	188	5	FTCN
177	178	179	100	101	102	103	104	105	106	107	CTRL
113	119	101	114	116	121	117	105	111	112	47	
81	87	69	82	84	89	85	73	79	80	45	
Q	N	E	R	T	Y	U	I	O	P	/	
197	126	11	91	93	198	95	63	39	34	186	
105	151	133	146	148	153	149	137	143	144	187	
97	115	100	102	103	104	104	107	108	59	13	
65	83	68	70	71	72	74	75	76	58	13	
A	S	D	F	G	H	J	K	L	;	ENTER	
124	8	9	123	125	191	151	193	174	189	13	
129	147	132	134	135	134	133	139	140	154	13	
	122	120	99	118	98	110	109	44	45		
SHIFT	90	88	67	86	66	78	77	60	62		SHIFT
	Z	X	C	U	R	N	M	,	.		
	92	10	96	127	190	196	195	184	185		
	154	152	131	150	130	142	141	125	155		
					32						
					32						
					SPACE						
					32						
					32						
											FTCN

Your Keyboard ASCII - Thanks to LA 99ers - Tom Freeman

EXTENDED BASIC TOKENS, ALPHABETICAL (BY SIZE) AND IN NUMERICAL ORDER

NOTE1: In addition to the list of tokens below  
 199 (C7) indicates a quoted string follows  
 200 (C8) indicates an unquoted string follows  
 201 (C9) indicates 2 bytes for a line number follows

NOTE2: This is Danny Michaels XB for GK. There are a few tokens not in TI XB

:	131	03	VAL	210	DA	NEW	0	00	:	181	B5
#	253	FD	XOR	188	BC	CON	1	01	)	182	B6
&	184	B8	BASE	241	F1	CONTINUE	1	01	(	183	B7
(	183	B7	BEEP	238	EE	LIST	2	02	&	184	B8
)	182	B6	CALL	157	9D	BYE	3	03	OR	186	BA
*	195	C3	CHR\$	214	D6	NUMBER	4	04	AND	187	BB
+	193	C1	COPY	10	0A	NUM	4	04	XOR	188	BC
,	179	B3	DATA	147	93	OLD	5	05	NOT	189	BD
-	194	C2	ELSE	129	81	RES	6	06	=	190	BE
/	196	C4	GOTO	134	86	SAVE	7	07	<	191	BF
:	181	B5	LIST	2	02	MERGE	8	08	>	192	C0
;	180	B4	MOVE	11	0B	DEL	9	09	+	193	C1
<	191	BF	NEXT	150	96	COPY	10	0A	-	194	C2
=	190	BE	OPEN	159	9F	MOVE	11	0B	*	195	C3
>	192	C0	READ	151	97	ELSE	129	81	/	196	C4
^	197	C5	RPT\$	225	E1	::	130	82	~	197	C5
::	130	82	SAVE	7	07	!	131	83	EOF	202	CA
AT	240	F0	SEG\$	216	D8	IF	132	84	ABS	203	CB
GO	193	05	SIZE	235	EB	GO	133	85	ATN	204	CC
IF	132	84	STEP	170	B2	GOTO	134	86	COS	205	CD
ON	155	9B	STOP	152	98	GOSUB	135	87	EXP	206	CE
OR	186	BA	STR\$	219	DB	RETURN	136	88	INT	207	CF
PI	221	DD	THEN	176	80	DEF	137	89	LOG	208	D0
TO	177	B1	BREAK	142	8E	DIM	138	8A	SGN	209	D1
ABS	203	CB	CLOSE	160	A0	END	139	8B	SIN	210	D2
ALL	236	EC	DIGIT	233	E9	FOR	140	8C	SQR	211	D3
AND	187	BB	ERASE	230	EF	LET	141	8D	TAN	212	D4
ASC	220	DC	ERROR	165	A5	BREAK	142	8E	LEN	213	D5
ATN	204	CC	FIXED	250	FA	UNBREAK	143	8F	CHR\$	214	D6
BYE	3	03	GOSUB	135	87	TRACE	144	90	RND	215	D7
CON	1	01	IMAGE	163	A3	UNTRACE	145	91	SEG\$	216	D8
COS	205	CD	INPUT	146	92	INPUT	146	92	POS	217	D9
DEF	137	89	MERGE	8	08	DATA	147	93	VAL	218	DA
DEL	9	09	PRINT	156	9C	RESTORE	148	94	STR\$	219	DB
DIM	138	8A	TRACE	144	90	RANDOMIZE	149	95	ASC	220	DC
END	139	8B	USING	237	ED	NEXT	150	96	PI	221	DD
EOF	202	CA	ACCEPT	164	A4	READ	151	97	REC	222	DE
EXP	206	CE	APPEND	249	F9	STOP	152	98	MAX	223	DF
FOR	140	8C	DELETE	153	99	DELETE	153	99	MIN	224	E0
INT	207	CF	LINPUT	170	AA	REM	154	9A	RPT\$	225	E1
LEN	213	D5	NUMBER	4	04	ON	155	9B	NUMERIC	232	E8
LET	141	8D	OPTION	150	9E	PRINT	156	9C	DIGIT	233	E9
LOG	208	D0	OUTPUT	247	F7	CALL	157	9D	UALPHA	234	EA
MAX	223	DF	RETURN	136	88	OPTION	158	9E	SIZE	235	EB
MIN	224	E0	SUBEND	168	A8	OPEN	159	9F	ALL	236	EC
NEW	0	00	UALPHA	234	EA	CLOSE	160	A0	USING	237	ED
NOT	189	BD	UPDATE	248	F8	SUB	161	A1	BEEP	238	EE
NUM	4	04	DISPLAY	162	A2	DISPLAY	162	A2	ERASE	239	EF
OLD	5	05	NUMERIC	232	E8	IMAGE	163	A3	AT	240	F0
POS	217	D9	RESTORE	148	94	ACCEPT	164	A4	BASE	241	F1
REC	222	DE	SUBEXIT	167	A7	ERROR	165	A5	VARIABLE	243	F3
REM	154	9A	UNBREAK	143	8F	WARNING	166	A6	RELATIVE	244	F4
RES	6	06	UNTRACE	145	91	SUBEXIT	167	A7	INTERNAL	245	F5
RND	215	D7	WARNING	166	A6	SUBEND	168	A8	SEQUENTIAL	246	F6
RUN	169	A9	CONTINUE	1	01	RUN	169	A9	OUTPUT	247	F7
SGN	209	D1	INTERNAL	245	F5	LINPUT	170	AA	UPDATE	248	F8
SIN	210	D2	RELATIVE	244	F4	THEN	176	B0	APPEND	249	F9
SQR	211	D3	VALIDATE	254	FE	TO	177	B1	FIXED	250	FA
SUB	161	A1	VARIABLE	243	F3	STEP	178	B2	TAB	252	FC
TAB	252	FC	RANDOMIZE	149	95	,	179	B3	#	253	FD
TAN	212	D4	SEQUENTIAL	246	F6	;	180	B4	VALIDATE	254	FE

Thanks to Tom Freeman.

Sorting  
by Thomas Coppens

An important programming problem is the sorting of numbers or strings. This means ordering the numbers (strings) in ascending or descending order (ascending or descending alphabetical order). In this article series we will try to give you a number of methods for sorting which can be programmed in BASIC. We will also try to see how efficient (this means quick) each method is. Therefore, we will always sort the same array of numbers and give the time needed. By the way, you can check the time for yourself!!

1. BUBBLE SORT

In this rather simple method, one goes through the rows of numbers, for example, from left to right. When two adjacent numbers are in the wrong order (first bigger than second when ordering in ascending order), they are swapped. This procedure is repeated until no more swapping has to be done.

The advantages are: simple, short program.  
The disadvantages: much swapping, much 'loop'-work and slow.

Here follows the program:

```

10 REM BUBBLE SORT
20 DIM A(100)
30 RANDOMIZE (2)
100 REM SET UP RANDOM ARRAY
Y
110 FOR I=1 TO 100
120 A(I)=INT(RND*(9999))
130 NEXT I
135 PRINT "START"
140 REM START OF SORT
150 FOR I=2 TO 100
160 IF A(I)>A(I-1) THEN 200
165 REM SWAP THEM
170 X=A(I)
180 A(I)=A(I-1)
190 A(I-1)=X
195 F=1
200 NEXT I
205 REM WAS THERE A SWAP?
210 IF F=0 THEN 260
220 F=0
230 GOTO 150
250 REM END OF SORT
260 PRINT "END"
265 REM PRINT SORTED ARRAY
270 FOR I=1 TO 100
280 PRINT A(I)
290 NEXT I
300 END
    
```

```

10 REM INTEGER FLAG SORT
20 DIM A(100)
30 RANDOMIZE (2)
100 REM SET UP RANDOM ARRAY
Y
110 FOR I=1 TO 100
120 A(I)=INT(RND*(9999))
130 NEXT I
135 PRINT "START"
140 REM START OF SORT
150 N=100
160 R=N
170 F=0
180 FOR I=1 TO R-1
    
```

```

190 IF A(I)<A(I+1) THEN 215
195 X=A(I)
200 A(I)=A(I+1)
210 A(I+1)=X
214 F=1
215 NEXT I
220 IF F=0 THEN 260
225 R=R
230 GOTO 170
250 REM END OF SORT
260 PRINT "END"
265 REM PRINT SORTED ARRAY
270 FOR I=1 TO 100
280 PRINT A(I)
290 NEXT I
300 END
    
```

The approximate times for sorting 100 elements are:  
Bubble Sort : 3'20"  
Integer Flag Sort : 2'31"

2. SHAKER SORT

When doing a bubble sort by hand on paper to see what happens, one remarks that the biggest element is fast bubbling up (after one loop it is in its place). This is not the case, however, for the smallest element. This problem is taken care of in the so-called shaker sort. In fact, this is a bubble sort that goes both ways. One time the loop goes from left to right, the next time from right to left. This makes the name obvious. It may be clear that this can be combined with all the special features for the amelioration of the bubble sort.

```

100 REM SHAKER SORT
110 DIM A(100)
120 RANDOMIZE (2)
130 REM SET UP RANDOM ARRAY
Y
140 FOR I=1 TO 100
150 A(I)=INT(RND*(9999))
160 NEXT I
170 PRINT "START"
180 REM START OF SORT
190 N=100
200 L=1
210 R=N
220 F=0
230 FOR I=L TO R-1
240 IF A(I)<A(I+1) THEN 290
250 X=A(I)
260 A(I)=A(I+1)
270 A(I+1)=X
280 F=1
290 NEXT I
300 IF F=0 THEN 460
310 R=R-1
320 IF R=L THEN 460
330 F=0
340 FOR I=R TO L-1 STEP -1
350 IF A(I)>A(I-1) THEN 400
360 X=A(I)
370 A(I)=A(I-1)
380 A(I-1)=X
390 F=1
400 NEXT I
410 IF F=0 THEN 460
420 L=L+1
430 IF L=R THEN 460
440 GOTO 230
450 REM END OF SORT
    
```



```

460 PRINT "END"
470 REM PRINT SORTED ARRAY
480 FOR I=1 TO 100
490 PRINT A(I)
500 NEXT I
510 END
    
```

The time needed to sort the same 100 elements is 2'20".

3. SWAP SORT

This is a different kind of sort. We begin looking for the smallest element of the list. This element then comes in the place of the first element. Then we look for the second smallest element, which replaces the second element, and so on. The program listing is:

```

10 REM SWAP SORT
20 DIM A(100)
30 RANDOMIZE (2)
100 REM SET UP RANDOM ARRAY
Y
110 FOR I=1 TO 100
120 A(I)=INT(RND*(99999))
130 NEXT I
135 PRINT "START"
140 REM START OF SORT
145 N=100
150 FOR I=1 TO N-1
155 R=I
160 FOR J=I+1 TO N
170 IF A(R)<A(J) THEN 180
180 R=J
185 IF R=I THEN 230
200 X=A(I)
210 A(I)=A(R)
220 A(R)=X
230 NEXT J
235 REM END OF SORT
240 PRINT "END"
245 REM PRINT SORTED ARRAY
270 FOR I=1 TO 100
280 PRINT A(I)
290 NEXT I
300 END
    
```

The time for sorting the 100 numbers is 1'05".

4. SHELL SORT

The shell sort is in fact an enhancement of the bubble sort. The idea behind this sort is to switch numbers over a larger distance first and then refine. Let's take an example:

1 12 3 13 5 6 16 2 11 10 4 8 7 9 14 15

Suppose we want to sort this list of 16 numbers. In this case, the sort begins with 8 groups of 2 numbers. These groups are sorted by one of the already mentioned methods. Then the list is divided in 4 groups of 4 numbers and each set is ordered. In this manner, the algorithm continues until we have one list of 16 numbers. After this list is sorted, the work is finished. Let's take a look at what happens in the

different passes of the sort:

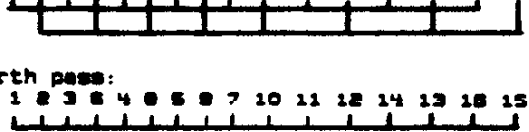
First pass:  
1 12 3 13 5 6 16 2 11 10 4 8 7 9 14 15



Second pass:  
1 10 3 8 5 6 14 2 11 12 7 13 7 9 16 15



Third pass:  
1 6 3 2 5 9 4 8 7 10 14 13 11 12 16 15



Fourth pass:  
1 2 3 4 5 6 7 10 11 12 14 13 16 15

Now the last sort takes place. This sort is a very good type of sort to use in programs. It is not too difficult to program in BASIC. Here is a program of the shell sort:

```

10 REM SHELL SORT
20 DIM A(100)
30 RANDOMIZE (2)
100 REM SET UP RANDOM ARRAY
Y
110 FOR I=1 TO 100
120 A(I)=INT(RND*(99999))
130 NEXT I
135 PRINT "START"
140 REM START OF SORT
145 N=100
170 M=N
175 M=INT(M/2)
180 IF M=0 THEN 270
185 FOR ST=1 TO M
190 I=ST
195 J=ST+M
200 F=0
205 IF A(I)<A(J) THEN 235
210 F=1
215 X=A(I)
220 A(I)=A(J)
225 A(J)=X
235 I=J
240 J=J+M
245 IF J<=N THEN 205
250 IF F=1 THEN 190
255 NEXT ST
260 GOTO 175
270 REM END OF SORT
275 PRINT "END"
276 REM PRINT SORTED ARRAY
280 FOR I=1 TO 100
285 PRINT A(I)
290 NEXT I
300 END
    
```

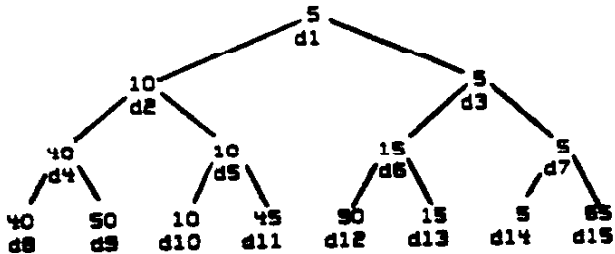
5. HEAP SORT

This is an entirely different kind of sort. Here the sorting is done by building binary

trees. A tree is an arrangement of elements as shown beneath. Take for example the numbers:

40 50 10 45 90 15 5 65

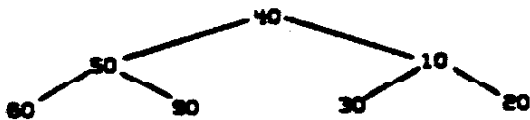
When ordering these numbers in a tree so that the smallest number is used as root, one needs N-1 comparisons.



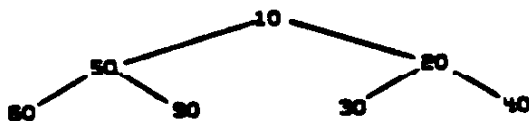
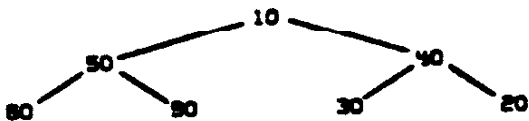
When such a binary tree has to be stored we have the following condition:

$$d(i) < -d(2i) \text{ AND } d(i) < -d(2i+1)$$

An ordering in that way is called a HEAP. Suppose now that the heap of the following figure has to take one more element (d1=40).



The new element is placed at the head of the heap. Then the element walks down the smaller elements and at the same time the small elements go upwards.



So the method of the heap sort is as follows:

- building of the heap
- working out the heap

A listing of the heap sort follows:

```

10 REM HEAP SORT
20 DIM A(100)
30 RANDOMIZE (2)
40 REM SET UP RANDOM ARRAY
50 FOR I=1 TO 100
60 A(I)=INT(RND*(99999))
70 NEXT I
80 PRINT "START"
90 REM START OF SORT
100 N=100
110 L=INT(N/2)+1
120 M=N
130 IF L=1 THEN 170
140 L=L-1
150 X=A(L)
160 GOTO 210
170 X=A(M)
    
```

```

180 A(M)=A(L)
190 M=M-1
200 IF M=1 THEN 330
210 J=L
220 I=J
230 J=J*2
240 IF J=M THEN 280
250 IF J>M THEN 310
260 IF A(J)>A(J+1) THEN 280
270 J=J+1
280 IF X>A(J) THEN 310
290 A(I)=A(J)
300 GOTO 220
310 A(I)=X
320 GOTO 130
330 A(1)=X
331 PRINT "END"
340 FOR I=1 TO N
350 PRINT A(I)
360 NEXT I
370 END
    
```

### 6. QUICK SORT

This is probably the fastest sort.

The procedure is as follows:

- choose an arbitrary element from the array to be sorted. For example: the element in the middle.
- search the array from the left and from the right to the middle. Do this until you find coming from the left an element larger than the chosen element and coming from the right an element smaller than the chosen element. Swap these elements and continue the procedure until the pointers meet each other. At that moment the array is split in two, where the elements in the left part are smaller than the elements in the right part.
- now sort each part of the array as mentioned above until the parts are forced by one element.

The algorithm is straightforward but the BASIC program is not that easy. For each partition the left and right ends have to be put in memory. This is done by building up a LIFO stack (this means a last in first out stack).

A program listing of the quick sort is given below:

```

10 REM QUICK SORT
20 DIM A(100),ST(100,2)
30 RANDOMIZE (2)
40 REM SET UP RANDOM ARRAY
50 FOR I=1 TO 100
60 A(I)=INT(RND*(99999))
70 NEXT I
80 PRINT "START"
90 REM START OF SORT
100 N=100
110 L=1
120 R=N
130 I=0
140 X=A(INT((L+R)/2))
150 I=L
160 J=R
170 IF A(I)>X THEN 200
180 I=I+1
190 GOTO 170
200 IF A(J)<X THEN 230
210 J=J-1
220 GOTO 200
    
```

We should give our neighboring Delaware Valley User Group a BIG hand for this GEM of a tutorial on SORTS. This is about the simplest explanation that can be found on the subject. Thomas Coppens did everyone a favor with his diagrams and descriptions of several ways a person may program a sort routine. We of NewJug North are grateful for this delightful bit of information and reprint it for the benefit of other user groups who exchange with us.

Attention NJUG MEMBERS:

This is only one of the many rewards of a newsletter exchange. There are many things which YOU can share with others. What you use your computers for, for one. If you own a VCR you can create titles of some movies or docutapes. Ernie Buser, for one, with a video-camera puts titles on old Bmm silent movies. Maybe we can hear how he does it in the next issue of T.I.-Dings? Or Steve, Sr.? How about that, fellas? Maybe Steve, Jr. finished work on simplifying PRBASE instructions? Or someone Else, remember him (?) will come up with a discovery to share with the rest of the group, and other groups?

Well, whatever, there is some talent in the club and it should be tapped. C'mon guys, let's share it! Don't overwork Someone Else to give ourselves more free time! HE NEEDS YOUR HELP ALL THE TIME!

```

230 IF A(I)<>A(J) THEN 270
240 IF I>=J THEN 270
250 I=I+1
260 GOTO 230
270 IF I>=J THEN 320
280 M=A(I)
290 A(I)=A(J)
300 A(J)=M
310 GOTO 170
320 I=I+1
330 J=J-1
340 IF I>=R THEN 380
350 I=I+1
360 ST(I,0)=I
370 ST(I,1)=R
380 R=J
390 IF L<R THEN 140
400 IF I=0 THEN 450
410 L=ST(I,0)
420 R=ST(I,1)
430 I=I-1
440 GOTO 140
450 PRINT "END"
460 FOR I=1 TO 100
470 PRINT A(I)
480 NEXT I
490 END
    
```

7. SORT DEMO

Now follows a program where all the sort methods we spoke about are included. It lets you choose the number of elements to be sorted and the type of sort you want to do. The word "START" appears on the screen, the sort begins and, when the sort is finished, the word "END" appears. So it is possible to time the sorting. We did this with the help of this program. The results are mentioned after the program listing.

```

5 CALL CLEAR
10 REM SORT DEMO
20 REM TISOFT (Belgian 99e
r club)
30 DIM A(400),B(400),ST(25,2)
31 DATA "1. BUBBLESORT 1","2
","4. SHAKERSORT","5. SWAPSO
RT"
32 DATA "6. SHELLSORT","7. M
EAPSORT","8. QUICKSORT","9.
STOP PROGRAM"
33 RANDOMIZE (2)
34 FOR I=1 TO 3
35 READ M(I)
36 NEXT I
37 CALL CLEAR
38 M="SORTDEMO"
39 R=12
40 C=11
41 GOSUB 10000
42 M="*****"
43 R=11
44 GOSUB 10000
45 R=13
46 GOSUB 10000
47 FOR DEL=1 TO 1000
48 NEXT DEL
49 CALL CLEAR
50 INPUT "HOW MANY NUMBERS?"
G
51 IF INT(G)<>G THEN 150
52 IF G<10 THEN 150
53 IF G>500 THEN 150
    
```

```

210 CALL CLEAR
220 PRINT "JUST A MOMENT..."
230 PRINT "MAKING THE RANDOM
  ARRAY."
240 FOR I=1 TO G
250 B(I)=INT(RND*(99998))+1
260 NEXT I
270 CALL CLEAR
300 REM *CHOICE OF SORT*
305 C=3
310 FOR J=1 TO 9
320 M=-W*(J)
330 R=2*J+1
335 GOSUB 10000
340 NEXT J
540 M=-"MAKE YOUR CHOICE (1-
  9)"
550 C=5
560 R=22
570 GOSUB 10000
580 CALL KEY(O,K,STAT)
590 IF STAT=0 THEN 580
600 IF K<49 THEN 580
610 IF K>57 THEN 580
620 ON K-48 GOSUB 1000,2000,
  3000,4000,5000,6000,7000,800
  0,9000
630 PRINT "END"
631 FOR I=1 TO G
632 CALL KEY(O,M,S)
633 IF S<>0 THEN 660
634 PRINT A(I)
636 NEXT I
640 FOR DEL=1 TO 500
650 NEXT DEL
660 CALL CLEAR
670 PRINT "PRESS ANY KEY FOR
  MENU"
680 CALL KEY(O,K,STAT)
690 IF STAT=0 THEN 680
700 CALL CLEAR
710 GOTO 300
1000 REM **BUBBLESORT 1**
1005 GOSUB 15000
1010 FOR I=2 TO N
1020 IF A(I)>A(I-1) THEN 10
  60
1040 X=A(I)
1050 A(I)=A(I-1)
1060 A(I-1)=X
1070 F=1
1080 NEXT I
1100 IF F=0 THEN 1130
1110 F=0
1120 GOTO 1010
1130 RETURN
2000 REM **BUBBLESORT 2**
2005 GOSUB 15000
2020 FOR I=2 TO N
2030 IF A(I)>A(I-1) THEN 20
  90
2050 X=A(I)
2060 A(I)=A(I-1)
2070 A(I-1)=X
2080 F=1
2090 NEXT I
2110 IF F=0 THEN 2150
2120 F=0
2130 N=N-1
2140 GOTO 2020
2150 RETURN
3000 REM **FLAGSORT**
3005 GOSUB 15000
3010 R=N
3020 F=0
3030 FOR I=1 TO R-1
3040 IF A(I)<A(I+1) THEN 30
  90
3050 X=A(I)
3060 A(I)=A(I+1)
3070 A(I+1)=X
3080 F=1
3090 NEXT I
3100 IF F=0 THEN 3130
3110 R=R-1
3120 GOTO 3020
3130 RETURN
4000 REM **SHAKERSORT**
4005 GOSUB 15000
4010 L=1
4020 R=N
4030 F=0
4040 FOR I=L TO R-1
4050 IF A(I)<A(I+1) THEN 41
  00
4060 X=A(I)
4070 A(I)=A(I+1)
4080 A(I+1)=X
4090 F=1
4100 NEXT I
4110 IF F=0 THEN 4260
4120 R=R-1
4130 IF R=L THEN 4260
4140 F=0
4150 FOR I=R TO L+1 STEP -1
4160 IF A(I)>A(I-1) THEN 42
  10
4170 X=A(I)
4180 A(I)=A(I-1)
4190 A(I-1)=X
4200 F=1
4210 NEXT I
4220 IF F=0 THEN 4260
4230 L=L-1
4240 IF L=R THEN 4260
4250 GOTO 4030
4260 RETURN
5000 REM **SWAPSORT**
5005 GOSUB 15000
5010 FOR I=1 TO N-1
5020 R=I
5030 FOR J=I+1 TO N
5040 IF A(R)<A(J) THEN 5060
5050 R=J
5060 NEXT J
5070 IF R=I THEN 5110
5080 X=A(I)
5090 A(I)=A(R)
5100 A(R)=X
5110 NEXT I
5120 RETURN
6000 REM **SHELLSORT**
6005 GOSUB 15000
6010 M=N
6020 N=INT(N/2)
6030 IF M=0 THEN 6190
6040 FOR S=1 TO M
6050 I=S
6060 J=S+M
6070 F=0
6080 IF A(I)<A(J) THEN 6130
6090 F=1
6100 X=A(I)
6110 A(I)=A(J)
6120 A(J)=X
6130 I=J
6140 J=J+M
6150 IF J<N THEN 6080
6160 IF F=1 THEN 6050
6170 NEXT S
6180 GOTO 6020
6190 RETURN
7000 REM **HEAPSORT**
7005 GOSUB 15000
7010 L=INT(N/2)+1
7020 M=N
7030 IF L=1 THEN 7070
7040 L=L-1
7050 X=A(L)
7060 GOTO 7110
7070 X=A(M)
7080 A(M)=A(L)
7090 M=M-1
7100 IF M=1 THEN 7230
7110 J=L
7120 I=J
7130 J=J*2
7140 IF J=M THEN 7180
7150 IF J>M THEN 7210
7160 IF A(J)>A(J+1) THEN 71
  80
7170 J=J+1
7180 IF X>A(J) THEN 7210
7190 A(I)=A(J)
7200 GOTO 7120
7210 A(I)=X
7220 GOTO 7030
7230 A(I)=X
7240 RETURN
8000 REM **QUICKSORT**
8005 GOSUB 15000
8010 L=1
8020 R=N
8030 T=0
8040 X=A(INT((L+R)/2))
8050 I=L
8060 J=R
8070 IF A(I)>X THEN 8100
8080 I=I+1
8090 GOTO 8070
8100 IF A(J)<X THEN 8130
8110 J=J-1
8120 GOTO 8100
8130 IF A(I)<X THEN 8170
8140 IF I>=J THEN 8170
8150 I=I+1
8160 GOTO 8130
8170 IF I>=J THEN 8220
8180 N=A(I)
8190 A(I)=A(J)
8200 A(J)=N
8210 GOTO 8070
8220 I=I+1
8230 J=J-1
8240 IF I>=R THEN 8280
8250 T=T+1
8260 ST(T,0)=I
8270 ST(T,1)=R
8280 R=J
8290 IF L<R THEN 8040
8300 IF T=0 THEN 8350
8310 L=ST(T,0)
8320 R=ST(T,1)
8330 T=T-1
8340 GOTO 8040
8350 RETURN
9000 REM *END*
9010 CALL CLEAR
9020 END
10000 REM *SCREEN DISPLAY*
10010 FOR I=1 TO LEN(MS)
10020 CALL MCHAR(R,C-I-1,ASC
  (SEGS(MS,I,1)))
10030 NEXT I
10040 RETURN
15000 REM *RENEW ARRAY*
15010 FOR I=1 TO G
15020 A(I)=B(I)
15030 NEXT I
15040 N=G
15050 CALL CLEAR

```