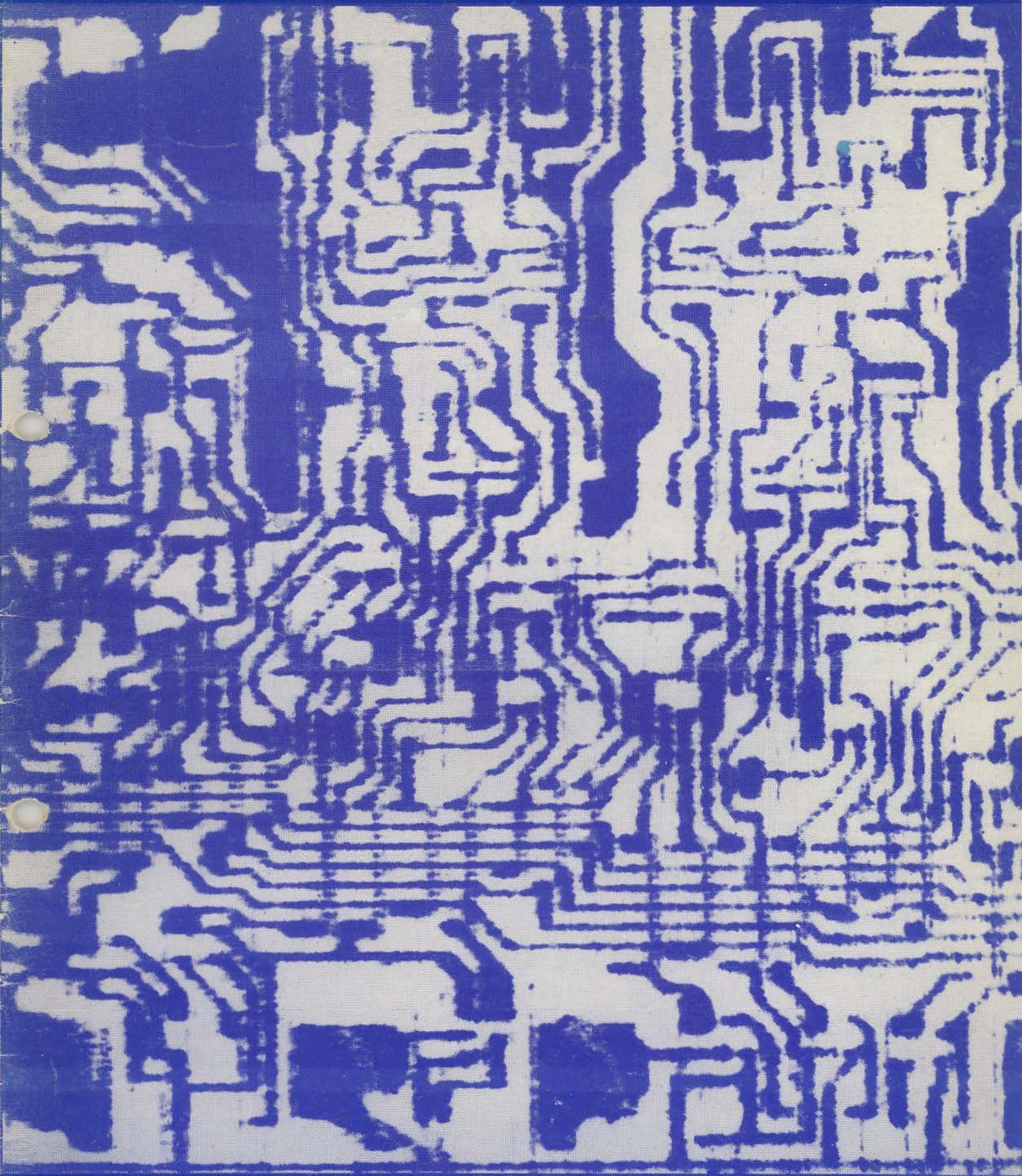


TRS-80 SYSTEM 80 VIDEO GENIE



MICRO-80

P.O. BOX 213, GOODWOOD, S.A., 5034, AUSTRALIA. TELEPHONE (08) 272 0966. PRICE: AUS. \$2.50, NZ. 3.00, U.K. £1.50

***** ABOUT MICRO-80 *****

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MICRO-80 is an international magazine devoted entirely to the Tandy TRS-80 microcomputer and the Dick Smith System 80/Video Genie. It is available at the following prices (all prices shown in Aus.\$ except for U.K. prices which are in pounds Sterling).

12 months subscription	Aus.	\$24.00
	NZ.	\$36.00 (Airmail)
	Hong Kong	\$46.00 (Airmail)
	U.K.	£16.00
Single Copy	Aus.	\$2.50
	N.Z.	\$3.50 (Airmail)
	Hong Kong	\$4.25 (Airmail)
	U.K.	£1.50
Months programs on cassette	Aus.	\$3.50
	N.Z.	\$4.00 (Airmail)
	Hong Kong	\$4.50 (Airmail)
(at present available from Australia only)	U.K.	\$4.75 (Airmail)
12 months subscription to magazine and cassette	Aus.	\$60.00
	N.Z.	\$78.00 (Airmail)
	Hong Kong	\$88.00 (Airmail)
	U.K.	£41.00 (Airmail)

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The purpose of MICRO-80 is to publish software and other information to help you get the most from your TRS-80, System 80 or Video Genie and their peripherals. MICRO-80 is in no way connected with either the Tandy or Dick Smith organisations.

**** WE WILL PAY YOU TO PUBLISH YOUR PROGRAMS ****

Most of the information we publish is provided by our readers, to whom we pay royalties. An application form containing full details of how you can use your TRS-80 or System 80 to earn some extra income is included in every issue.

**** CONTENT ****

Each month we publish at least one applications program in Level I BASIC, one in Level II BASIC and one in DISK BASIC (or disk compatible Level II). We also publish Utility programs in Level II BASIC and Machine Language. At least every second issue has an article on hardware modifications or a constructional article for a useful peripheral. In addition, we run articles on programming techniques both in Assembly Language and BASIC and we print letters to the Editor and new product reviews.

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MICRO-80 is registered for posting in Australia as a publication - CATEGORY B

AUSTRALIAN OFFICE AND EDITOR:-
MICRO-80 PO BOX 213, GOODWOOD, SA 5034

UK SUBSCRIPTION DEPT.:-
24 WOODHILL PARK, PEMBURY, TUNBRIDGE WELLS, KENT TN2 4NW.

Printed by:-
Shovel & Bull Printers, 312 A Unley Road, HYDE PARK, SA 5061.

Published in Australia by MICRO-80, 284 Goodwood Road, Clarence Park, ADELAIDE.

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EVERY NEW AUSTRALASIAN SUBSCRIBER TO MICRO-80 WILL RECEIVE A FREE CASSETTE CONTAINING THREE LEVEL I AND THREE LEVEL II PROGRAMS PLUS COMPREHENSIVE DOCUMENTATION.....THE RETAIL VALUE OF THE SOFTWARE WOULD EXCEED THE COST OF THE SUBSCRIPTION!!!

***** EDITORIAL *****

As I write this, the holiday season in Australia is in full swing. Our European readers will probably better appreciate what this means if I liken the last week in December and the first three in January to France in August. Everyone but everyone is on holiday and only the tourist industry functions. Even MICRO-80 is not immune and the Editorial staff managed to slip away for a week or so. That is behind us now but the break was welcome and it gave us a chance to quietly plan what we will be doing over the coming months. We are sure you will like what we have in store.

Two of the temporary casualties of the holiday season are GT BASIC, our popular introductory series to programming in BASIC and, ESF forum. There will be no instalments of the former in this or the next issue of MICRO-80. Look for a resumption of GT BASIC in the February 1981 edition. ESF Forum will return next month. Whilst on that subject, Charlie Bartlett, the FORUM Editor, would welcome any input from users of the EXATRON Stringy Floppy. In particular, he is going to start publishing the START, END and ENTRY points for as many commercial machine language programs as possible to facilitate their transfer from cassette to wafer. So, if you have knowledge of this sort, why not write in to Charlie so it can be shared with all our readers.

A number of our readers who own disk drive systems have accused us of not catering sufficiently to their needs. This issue should go some way towards overcoming that complaint. We have another instalment of SUPERDOS FORUM. more questions and answers on disk drives and some useful tricks to use with your disk system. Probably, we will now get complaints from cassette users that we are ignoring them!

It is heartening to find that the number and quality of articles, programs, reviews etc., written by our readers, is increasing. We do not have a Most Popular Article competition each month but from the feedback we get we know that some of those articles written by "amateurs" are amongst the most popular we publish. So, if you have something to contribute, don't be shy - send it in and let us be the judge of whether it is suitable to print or not. We would be particularly interested in receiving some articles from our UK and European readers and are still seeking a UK correspondent.

*** THE CASE OF THE EXPENSIVE TECHNICAL BULLETINS ***

In an earlier issue, we commented that the Technical Bulletins concerning the SYSTEM 80, published by Dick Smith Electronics, are available free. A number of readers have written to tell us that they have been required to pay for them; \$2.50 being the most common price. We therefore checked the situation with Jamieson Rowe, the D-S Technical Director.

It seems that, whilst the information in the bulletins is provided free, if a bulletin itself is obtained from a Dick Smith Electronics store, a charge is usually made for photocopying. That charge is entirely at the discretion of the local store manager and is designed to cover his costs (quite handsomely at \$2.50 for two or three sheets of paper).

On the other hand, if you ring the D-S Computer HOT-line with a problem, Head Office will send you, free of charge, the technical bulletins (if any) which it thinks will help you solve that problem. Of course, if you are outside the Sydney area you will have to pay a fair amount for the 'phone call anyway, so it might still be cheaper to pay the photocopying charges at your local D-S store.

*** ANNUAL INDEX ***

This issue contains an index to all the articles and programs published in MICRO 80 through the last 12 months. We are indebted to Bruce Bussenschutt, an Adelaide reader, for carrying out the hard work involved in compiling this index. I am sure that all our readers will be grateful to Bruce for his efforts.

*** MICRO-80 PRODUCTS RED FACES DEPARTMENT ***

Some time ago, MICRO-80 products revised most of the software sold on cassette to enable it to run on the SYSTEM 80. This included the program "U BOAT". The documentation was revised and the advertisements stated that the program was suitable for both the TRS-80 and the SYSTEM 80. Unfortunately the old master continued to be used so that SYSTEM 80 owners did not have all the features of this program available to them. The error has now been discovered and corrected. If you are a SYSTEM 80 owner who has bought a copy of U BOAT which requires the use of the (non-existent) Right-arrow key then you may send it back to MICRO-80 PRODUCTS and have it replaced with the revised version, free of charge.

***** DISK DRIVES - QUESTIONS AND ANSWERS (PART 2) *****

The purpose of this series is to provide answers to many of the questions that readers ask us about disk drives. Last month we answered several of the more basic questions. This month some of the issues dealt with are more complicated. We are now starting to get questions about hard disk drives, a subject with which we are not very familiar. If any of our readers has experience in this area we would welcome (and pay for!) an article explaining the various types of hard disk drives, their pros and cons and how they are used in conjunction with an '80 microcomputer.

Q. What is a DOS?

A. DOS is short for disk operating system, which is a series of machine language programs which control the operation of disk drives. It is the DOS which enables you to copy a file from one disk to another or even all the contents of one disk to another, in one operation. It is the DOS which divides the tracks on a disk into sectors and keeps a note of what data is in which segment, via the DIRectory. It is the DOS which enables you to write data onto a disk and later read it back. In short, the DOS is the most important part of a microcomputer disk system. Without a DOS the disk drives would simply be hunks of expensive, useless metal, not even able to turn themselves on or off!

Q. Is there more than one type of DOS available?

A. Yes, and more seem to be appearing each day. The first DOS for the TRS-80 was published by Tandy who called it TRSDOS 2.1. The number 2.1 suggests that there had already been several revisions to TRSDOS before it was released but even so, 2.1 had its shortcomings and bugs. 2.1 was followed some months later by 2.2 which was quickly usurped by 2.3 which has been Tandy's standard DOS for about 18 months now. The main differences between these various DOS's are that the later versions corrected bugs in 2.1. It was obviously too difficult to correct some of them and version 2.3 has quietly dropped some of the features which were claimed for 2.1 but never implemented - "DEVICE" is one such. Don't get the idea that TRSDOS is not a good DOS, it is. For example, the TRS-80 disk system is very much easier to use than that on many mini-computers. However, it does have bugs and limitations. The very size of Tandy's success and its laudable policy of customer support has probably prevented Tandy from carrying out further development and improvement on TRSDOS whilst other concerns have developed much more sophisticated DOS's. When Tandy replaced TRSDOS 2.1 with TRSDOS 2.2, it gave every owner of a Tandy disk system a new disk containing the DOS and the extra documentation required. Similarly, when TRSDOS 2.2 was replaced with TRSDOS 2.3. That is an expensive policy and would make anyone think twice before changing a program. Tandy obviously decided to wait until the release of the Model III before improving TRSDOS yet again. We will be very interested to see what this DOS is like.

Randy Cook was one of the programmers who helped develop TRSDOS. He left Tandy shortly after version 2.1 was released and has assisted in the development of several improved DOS's. The first to gain acceptance was NEWDOS from Apparat of Denver, Colorado. In its original advertisements, Apparat claimed that NEWDOS corrected more than 70 bugs in TRSDOS 2.1! But it was not just the DOS that made NEWDOS so popular. Apparat also released a version called NEWDOS + which contained a number of other useful programs, the two most notable of which were EDTASM, the standard Radio Shack (by Microsoft) cassette based Editor/Assembler converted to work on disk and, Superzap. Superzap opened up a whole new world to users of TRS-80 disk systems. With it, they could examine and change any location in memory or any byte on a disk. It wasn't long before Harvard C. Pennington, largely with the use of Superzap, unravelled the mysteries of Tandy's DOS and the protocol for storing data on disk then revealed all in his book "TRS-80 Disk and Other Mysteries!". A remarkable achievement and required reading for any programmer working with a TRS-80 disk system. Most people find it hard to believe but Superzap was written in BASIC, not machine language. From Apparat's point of view, Superzap was a marvellous marketing tool. Since every NEWDOS + owner could now modify any byte on his disk, if a bug was discovered in NEWDOS or an improvement developed, there was no need to supply new disks as Tandy did, all that was required was to mail out a sheet of paper to each registered owner containing a list of "Zaps" to be applied.

Not long after NEWDOS arrived another DOS called VTOS 3.0 appeared. This was attributed much more directly to Randy Cook than NEWDOS and gained some acceptance but suffered two major flaws. It had bugs but no Superzap to correct them but most importantly, in an effort to guard against pirating, VTOS 3.0 was very difficult to copy. It is good data processing practice to make "back-up copies" of all valuable data, particularly of a DOS which has cost \$100 or so. When VTOS's legitimate owners tried to do that they found it very difficult, so VTOS 3.0 never gained the acceptance of NEWDOS.

Percom Data Corporation, one of the earliest suppliers of Tandy compatible disk drive systems in the USA also developed their own DOS, originally called MICRO DOS but now known as OS-80. This is different from the other DOS's mentioned in that it did not include a more sophisticated BASIC interpreter (Disk BASIC on TRSDOS and the others add 6K to the BASIC interpreter). It is intended to be an easy DOS to learn for programmers experienced in BASIC. Since Dick Smith Electronics in Australia has now adopted OS-80 as the standard DOS for SYSTEM 80 disk systems this DOS is likely

to come into much more general use. We would welcome a review of OS-80 by a reader familiar with it.

The next big change in DOS systems came when NEWDOS 80 was announced. By now, Apparat had sufficient confidence to discard TRSDOS completely and start again. NEWDOS 80 was advertised as the advanced programmers DOS and offers an enormous number of options to the user. Its single biggest advance, however, is the facility to run disk drives with different track counts on the same cable. By early 1980 when NEWDOS 80 was released, disk drive manufacturers had succeeded in cramming 77 tracks onto a 5-1/4 inch diskette and 80 tracks was not far away. Tandy stuck steadfastly to its 35 track format and NEWDOS was being released in 35 track, 40 track and 77 track versions but all drives had to have the same track count. NEWDOS 80 changed all that and '80 owners were able to take advantage of the much lower cost per byte of the high track count drives. Then, lo and behold, it was discovered that the TEAC drives sold by Tandy in Australia are actually 40 track units but because TRSDOS would only support 35 tracks, Tandy was not admitting it. NEWDOS 80 enables its owner to run TEAC drives as 40 track units and so gain an unexpected bonus.

The latest offering in the DOS stakes is VTOS 4.0 which has only just been released in the USA. Significantly, the advertisements state that "no security disk is needed to make backups or to run the system" so VTOS 4.0 would appear to have avoided the mistake of VTOS 3.0. In some areas VTOS 4.0 appears to be more flexible than NEWDOS 80, supporting double-sided disk drives, double-density and even Winchester technology fixed drives. It is also claimed to be very fast. We hope to be able to review VTOS 4.0 in the near future.

Finally, we have noticed advertisements in the American magazines for DOSPLUS 3.0 from Micro Systems Software Inc. It is claimed to be faster and more efficient than TRSDOS, NEWDOS + and VTOS - more than that we do not know. Perhaps some reader has tried it and would review it for us.

Q. Which is the best DOS?

A. That depends entirely on the use you wish to make of it and the support you require. TRSDOS 2.3 is widely known and used and is "supported" by every Tandy store. The vast majority of disk software is written to operate with TRSDOS which is not to say that it will not operate with NEWDOS 80 and VTOS 4.0, both of which are compatible. If you are primarily interested in purchasing and running proprietary BASIC programs then TRSDOS is probably the most suitable DOS for you. If you need to get the most from your microcomputing dollar or pound and enjoy writing programs yourself, then NEWDOS 80 or possibly VTOS 4.0 would be a better choice. These will enable you take advantage of high track count disk drives and give more flexibility to your software.

Q. Can I operate a 35 track Tandy disk drive and a 77 or 80 track drive at the same time?

A. Yes, using NEWDOS 80 or VTOS 4.0 but not using TRSDOS. This question was really answered above.

Q. Can I operate an 8 inch disk drive fromm a TRS-80?

A. Yes, but you need special software and hardware. NEWDOS 80 or VTOS 4.0 will supply the software. The hardware required is a Mapper II printed circuit board by OMIKRON (US.\$109 including cable from OMIKRON, 1127 HEARST ST., BERKELEY, CALIFORNIA, 94702 USA). This board plugs into the disk controller socket in the expansion interface and the disk controller chip itself plugs into the board. With 80 track double-head, double density, 5-1/4 inch disk drives now available, the advantages of using 8 inch disk drives are less significant. The main reason why you might want to use an 8 inch drive would be to use the CP/M operating system.

Q. What is the CP/M operating system?

A. CP/M is one of the early operating systems for microcomputers developed by Digital Research. It finds widespread use amongst micros using the S100 bus and 8 inch drives and has virtually become an industry standard. As a result, there is a vast amount of software available to operate with CP/M, particularly for business applications. Since CP/M is only available for 8 inch disk drives, it is necessary to use the Omikron Mapper II board on the TRS-80. CP/M also requires different memory mapping from that provided in the TRS-80 and Omikron has developed a board called Mapper I (also known as the "Shuffle" board) to rearrange the TRS-80 memory mapping. Mapper I sells in the USA for US.\$199. We are not aware of anyone who has attempted to run CP/M on the SYSTEM 80/VIDEO GENIE or whether or not the Omikron boards function satisfactorily in that machine, too.

Q. My '80 will run 4 disk drives. Does that mean that I can run 4 dual-head disk drives or only 2?

***** SUPERDOS FORUM Conducted by Peter Hartley *****

WHEN IS A CHAIN NOT A CHAIN???

Some of the Advertising for NEWDOS 80 has implied that it will support the CHAINING of BASIC PROGRAMS. Bluntly, it doesn't do this in the true sense, where one program is overlaid by another while all variables remain unaltered and all files remain open. However, the RACET program BLINK (presumably for BASIC LINKER) will run with SUPERDOS provided that you make your loading BLINK module with TRSDOS!!!

What SUPERDOS does do, however, is infinitely more useful, and that is to allow you to create a file of commands and/or responses that can be read and executed just as though the entries were input directly from the keyboard. You can jump around from BASIC to DOS and BACK, running this program and that, using SUPERZAP to alter disks and files, using the chain file to rewrite programs,... the list is endless. The following program will enable you to generate a CHAIN COMMAND FILE, and allow you to add to it at any time.

```

100 CLEAR1000
110 CLS
120 PRINT"* DONT PRINT @ PRINT MESSAGE # PAUSE
130 LINEINPUT"FILESPEC";F$
140 OPEN"E",1,F$
150 LINEINPUTA$
160 IFA$="#"A$=CHR$(129)+"PRESS "+CHR$(34)+"ENTER"+CHR$(34)
170 IFLEFT$(A$,1)="#"A$=CHR$(129)+MID$(A$,2)
180 IFLEFT$(A$,7)="SECTION"A$=CHR$(128)+A$
190 IFA$="END"CLOSE:END
200 IFLEFT$(A$,1)="#"A$=CHR$(130)+MID$(A$,2)
210 IFLEFT$(A$,1)="@A$=CHR$(131)+MID$(A$,2)
220 PRINT#1,A$
230 GOTO150

```

If you don't specify any filespec extension, SUPERDOS will generate the extension "/JCL". We believe the the C and L stand for CHAIN and LIST, but the J is puzzling us still. ("JUMBUCK"? - Ed)

To use the Chain file, execute the DOS COMMAND "CHAIN,FILESPEC,SECTIONnn"

You can execute a /JCL file starting from ANY SECTION NUMBER, and it will terminate when it reaches a subsequent SECTION statement. HOWEVER, you can issue another CHAIN,FILESPEC,SECTIONnn Command from within the file, and in that way jump from one section to another. If you are in BASIC when you want to do this, you'll have to precede the jump with a CMD"S", then jump to the new section, and if you need to return to BASIC us the DOS COMMAND "BASIC *".

You don't have to specify the /JCL in the DOS CHAIN COMMAND unless there is another file of the same name on your system.

By inserting special values at the front of any single entry in the Chain File, you can have a message displayed, require the (ENTER) key to be pressed and you can keep your own messages or REMS in the file and have them ignored and not even displayed when the Chaining routines get to them.

These values are inserted by the program set out above, by using the control characters that are displayed at the top of the screen at the start of every run.

There isn't any need to keep a separate /JCL file for every chaining job, and this program will allow you to write to the END of an existing file. This means that you have only to keep track of the last used section number.

A typical application that I have been using recently, will load five programs from disk into memory in turn, dumping each to tape; it then waits for my return to turn the tape over and press (ENTER) and it repeats the process, this time rewriting one line of each of the programs prior to the dump.

The file looks like this - with an (ENTER) or ODHex after each line. (The invisible characters inserted by the above listing are not reproduced here, but appear as leading blanks.)

```

SECTION1
BASIC
CMD"T"
LOAD"TYPEX"
CSAVE"X"

```

```

LOAD"TYPEA"
CSAVE"A"
LOAD"TYPEB"
CSAVE"B"
LOAD"TYPEC"
CSAVE"C"
LOAD"TYPED"
CSAVE"D"
  TURN TAPE OVER AND PRESS ((ENTER))
  CHAINING PAUSE
LOAD"TYPEX"
50 PRINT"PRESS ((NEW LINE)) WHEN READY TO CONTINUE"
CSAVE"X"
LOAD"TYPEA"
70 PRINT"PRESS ((NEW LINE)) WHEN READY TO CONTINUE"
CSAVE"A"
LOAD"TYPEB"
55 PRINT"PRESS ((NEW LINE)) WHEN READY TO CONTINUE"
CSAVE"B"
LOAD"TYPEC"
80 PRINT"PRESS ((NEW LINE)) WHEN READY TO CONTINUE"
CSAVE"C"
LOAD"TYPED"
30 PRINT"PRESS ((NEW LINE)) WHEN READY TO CONTINUE"
120 PRINT"PRESS ((NEW LINE)) WHEN READY TO CONTINUE"
CSAVE"D"

```

Those of you keeping up-to-date with the ZAPS will have discovered the SYSTEM switch AT which alters the way that /JCL files are processed. Study the notes with ZAP 011 carefully, as setting AT the wrong way may succeed in producing the wrong result.

Further to the problems with PENCIL Directories. Zap 027 has cured all. (The Editor has the advantage of having Eddy Paay to keep his DOS up-to-the minute and had the drop on me last time!)

Applying ZAP 031 has caused problems with one obscure brand of Disk Drive. It seems that the duration of the STEP pulse to the Drive is no longer sufficient to give absolute assurance that the stepping motor has responded during FORMAT operations. If any of you has experienced this problem, please drop a line and I'll investigate this further.

The latest ZAP seen here is ZAP 044 dated October 18th, 1980, and all seem to work as intended except for those relating to PROFILE (ZAPS 032 and 042). Still haven't established the cause of the problem, which could even be my copy of PROFILE. More on that later.

Next time we'll look at some of the new forms of disk files - the real power of SUPERDOS. (Superdos forum is a continuing but irregular feature - look for the next instalment in 2 or 3 issues time - Ed.)

- 0000000000 -

DISK DRIVES - Continued from Page 4

Q. My '80 will run 4 disk drives. Does that mean that I can run 4 dual-head disk drives or only 2?

A. The short answer is that, with a standard '80, you can run only 2 dual-head disk drives, with each head having its own drive number. The reason is that the '80 does not provide a side select line although there is provision on most disk drives to include such a line. The dual-head drive has to be fooled into thinking that it is receiving a side-select signal by modifying it so that a drive select signal is applied to the side-select input, thus using up an additional drive position. The hardware modifications required to implement the side-select signal in the '80 expansion interface would not be very difficult. However, until now there has been no DOS available to make use of it. VTOS 4.0 advertisements claim this as a feature whilst NEWDOS 80 has provision for it but it is not yet implemented and no timescale for implementation has been set.

That's all for this month. The subject seems interminable so we will carry on in future issues until we have answered all the questions. If you have any questions which have not been answered yet, please send them in so we can deal with them.

- 0000000000 -

***** INPUT/OUTPUT *****

Letter from Mr. P. Chapman, Auckland, N.Z.

The statement at the top of the page in the June issue of MICRO-80 page 26, that one cannot effect the Level I + Level II modification if Level I is resident in two chips is not correct. This is done by proceeding exactly as laid down in the magazine except that both chips are placed in Z34 socket soldering one above the other in pick-a-back fashion. This works fine as I have proved in my own TRS-80.

(Thank you Mr. Chapman. Many of our readers have asked if this can be done - Ed.)

Letter from G.L. Paterson, P.O. Box 437, Atherton, Qld.

Could MICRO-80 provide an open "vetting" service to analyse and improve programs written by inexperienced readers, especially in the technical fields. If this is not in your area, can you recommend anyone who might be able to take on such tasks for we micro users.

(I am afraid that MICRO-80 is not in a position to offer such a service. Perhaps some of our readers could however. Please contact Mr. Paterson direct - Ed.)

Letter from Mr. R.D. Hall, North Geelong, Vic.

Could you tell me if there is any way of producing better graphics on the TRS-80, e.g. more realistic curves instead of square patterns? Is it software controllable e.g. with a higher level language such as Pascal or is it a hardware problem? If it is hardware, do you think it possible to modify with better or more chips?

(The graphical resolution on the TRS-80 is determined by the hardware in the machine. A number of attempts have been made to improve the graphics via hardware modifications or add-ons. Elsewhere in this issue there is a review of The Programm International "fine-line graphics" board. The fundamental requirement for improved graphics in the '80 is for extra video memory to store the additional information. As well, appropriate hardware is required to display this information. Unfortunately, neither the '80's hardware or software make such modifications either simple or cheap. - Ed)

Letter from Mr. S.J. Stewart, St. James, N.S.W.

I have a System-80. How do I load machine language programs from tape and run them? I have tried "system", "title" etc. but have had no success.

(In order to load a machine language program:

1. Type SYSTEM and press NEW LINE
2. Answer the *? with the name of the program, press NEW LINE. You should then get two asterisks in the top right hand corner as for a BASIC program but the right hand asterisk turns on for 4 seconds, off for 4 seconds on again for 4 seconds and so on. When the program has finished loading, an *? will again be displayed on the screen. Type in / and press NEW LINE when the program should commence running. If you do not get the asterisks when the tape is playing or one does not flash, then the tape is recorded at an unsatisfactory level for your machine. There are several answers to this. You may fit a volume control to your tape deck. You may fit a changeover switch to reverse the roles of the internal and external cassette recorders (machine language tapes can only be loaded via cassette no. 1) or you may use some software such as SYSCOPY, published in the November MICRO-80 to reverse the roles of Cassette #-1 and Cassette #-2. The reason for using an external cassette deck for loading machine language tapes is that the external recorder will have a volume control, which the standard System 80/Video Genie does not - Ed.)

Letter from Mr. D. Kretzschmer, Herberton, Nth. Qld.

I would like to give a tip to the machine language programmers under your Better Bytes column. This is - when you see a M/L program you would like to have running in your '80 but are put off because of the usual hazards of typing it in, e.g. repeating or leaving out lines, then relax. Find a C60 minute cassette and 'talk' in the program on it. Use phonetics for the letters and talk at a comfortable typing speed. You then play the tape as you type in the program. This method has saved me hours of 'de bugging'. Hope it will be of use.

(Thank you for this tip Mr. Kretzschmer - it could also be useful for inputting by BASIC programmers - Ed.)

From: Mr. A. Smallbridge, - Thornlie, W.A.
 Re: Mods to the System 80/Video Genie as published in Issue 10 MICRO-80

The praise MICRO-80 laid on the Dick Smith peak level indicator mod has I am afraid, been premature. I feel you should investigate these mods more fully before recommending them to your readers. After all, isn't this what MICRO-80 is all about?

My Experiences with the peak LED level mod.

I have spent 2 days solid working on this level indicator and I found the following, after setting up the indicator as outlined in the Dick Smith Technical Bulletin (and several other ways thereafter).

1. Tapes recorded on my machine as well as 3 other units belonging to friends load satisfactorily without giving any appreciable display.
2. Most Tandy pre-recorded tapes fully modulate the LED yet still load satisfactorily.
3. Other tapes including some MICRO-80 tapes appear to modulate the LED in the middle of the range yet load unsatisfactorily.

I will even go so far as to say level setting is only masking the problem. I believe the problem is two-fold:-

- a) Difference in head alignment although this is not the main problem.
- b) Tape recording distortion where the actual program material has been recorded at too high a level or non-symmetrically recorded positive and negative peaks as is the case with all eight System 80's I have seen to date, including the more recent System 80's with the DC erase Mod. To be fair, the Tandy units may have the same problem but I have only played with the System 80. Apart from this problem and a couple of other minor problems, I would readily recommend the System 80 to a hobby computer enthusiast.

(We hang our heads in shame, Andrew. You are right, of course, we have not tried the D-S level indicator to any great extent and assumed that the peak-level indicator, coupled with the volume control, would improve cassette loading. This assumption was based on our very extensive experience with the TRS-80 where control over level is very critical. You mention MICRO-80 tapes as being unsatisfactory with the SYSTEM 80. We went through a phase when we deliberately recorded our tapes at a higher level than usual to accommodate the SYSTEM 80. That was a mistake. Although it appeared to work on our SYSTEM 80 it clearly did not suit many others and caused trouble to TRS-80 owners. About 2 months ago, we remade all our masters and went back to reproducing tapes at the previous level. We now believe that our tapes load satisfactorily on both SYSTEM 80's and TRS-80's. If anyone is having difficulty, please let us know. We will replace any faulty tapes immediately - Ed)

From: Arthur Harris, - Burwood, Vic.
 The following modification to the CTR-41 is one that I have made to mine, in the interests of more reliable SAVE-ing and LOAD-ing of programs. A small calculation based on the normal 4.76 cm/sec tape speed and the 500 baud dump rate of Level II will show that each bit of the program is resident on 0.1 mm (approx.) of tape. It will be obvious that a very small break in the tape coating will result in the loss of a bit and consequently of the whole program. A friend of mine suggested that this problem could be overcome, to a large measure, by increasing the speed of tape travel past the head of the cassette recorder. He solved the problem by having a pulley turned on a lathe for him.

I was able to effect the same solution by a visit to Melbourne's Model Dockyard where I purchased a 1/2" pulley. This pulley does not have a boss on it and the hole has to be very slightly enlarged to fit over the shaft on the drive motor. Open the back of the recorder and remove the existing pulley from the drive shaft. Carefully align the holes in the two pulleys (I used a shaved match-stick as a temporary shaft) and "Araldite" them together. When the glue has set, clean the hole, using the drill which matches the shaft size and place the modified pulley on the shaft. The drive belt is placed in the groove of the larger pulley. Timing the RUN of a cassette at both speeds indicates that the fast speed is almost exactly twice normal speed.

This means that each bit of the program is now resident on 0.2 mm (approx.) of tape and, although still only a short length, significantly reduces the possibility of loss of a bit through normal defects in coating. It also means that one can use the more economical C90 audio cassettes without the hassles of a large number of programs on the tape.

It is not possible to make this modification to the CTR-80, without having a pulley turned in a lathe because of the type of pulley used in that recorder.

My only reservation about this mod. is the possibility of snapping the tape at the end of a rewind or fast-forward. It hasn't happened yet but I keep my fingers crossed.

(This is an interesting modification, Arthur. High frequency response is directly related to tape speed so, assuming the recording amplifier is not the limiting factor, you should get a cleaner signal on the tape. The disadvantage, of course, is that you would need a second, standard recorder to load in pre-recorded tapes. This could be overcome by writing a machine language program to CLOAD at 1000 baud - Ed.)

***** PRODUCT EVALUATION - by Edwin Paay *****
80 - GRAFIX from PROGRAMMA INTERNATIONAL.

As we all know, the graphics capabilities of the TRS-80/SYSTEM 80 leave much to be desired. Resolution is too coarse for anything but the simplest graphic displays. Unfortunately, the Model 3 has exactly the same screen format as the Model 1, so we will be stuck with it for some time to come. Some companies however have been advertising "high resolution" graphics boards for the TRS-80, in American computer magazines. The 80 - GRAFIX board made by Programma is one of these. We have fitted one to a TRS-80 (it is not suitable for a SYSTEM-80 without modification) and put it to the test.

The board is supplied with a 24 page manual which covers installation, theory of operation, programming techniques and contains drawings and pictures showing how to install the board. Also supplied is a tape containing several demonstration programs.

Installation proved to be straight forward as the installation procedures are outlined in detail in the manual and several good illustrations have been provided. In most machines only a couple of wires have to be soldered in place, the rest of the connections are provided as DIP plugs on ribbon cables. The idea is to push the plugs over existing IC's on the TRS-80 PC board with some double-sided tape between the IC body and plug to keep it in place. Although this is a dubious arrangement it does work and makes the board easy to install and remove. After making the necessary connections the GRAFIX board fits in the right "foot" compartment of the TRS-80. This completes installation.

The GRAFIX board replaces the normal graphics characters with programmable characters of 6 by 12 dots. A mode latch is provided to switch the programmable characters in or to put the board in the programming mode. This latch uses the same port as the cassette, namely port FFH (255). The programmable characters use 1K of static ram, the addresses used by this RAM coincide with the standard video ram. 64 programmable characters are provided this way. This results in a system similar to that used by the Sorcerer except that the latter has 128 programmable characters and they are accessible through the keyboard.

This is all very nice for creating custom characters such as a Greek alphabet but I wouldn't call it true, high resolution graphics. This board is simply a programmable character generator, nothing less nothing more. It is impossible to create an intricate pattern covering the whole screen where each character would differ from the other as only 64 characters are available - that is only one line on the display.

Now let me quote what the Programma advertisements say :

"HI-RESOLUTION GRAPHICS is available for your TRS-80 computer system. The 80 - GRAFIX board from PROGRAMMA International, Inc. gives your TRS-80 high resolution capability that is greater than the Commodore CBM/PET or even the revered APPLE II. 80 - GRAFIX gives the TRS-80 an effective screen of 384 X 192 pixels."

I wish that were true! As I said, there are only 64 characters. No way are all dots on the screen accessible at the same time, all of the time. The algorithms needed to plot a curve would be very complicated and if each character needed for this curve happens to be different then it is too bad if more than 64 characters are needed to complete it.

Now if some of you think I am being a bit critical it is simply because it is being advertised as a high resolution graphics board, which it is not. If Programma advertised it as a programmable character generator board I would have no complaint but to say that it provides high resolution graphics of 384 by 192 pixels is going too far.

Apart from the above, there are several other limitations in the board which I will mention briefly in the summary below.
To summarise then:

LIMITATIONS:-

1. You cannot use normal graphics and programmed characters at the same time.
2. Only 64 characters can be programmed, should be 128.
3. Price is too high (about Aus \$130 in the USA, probably closer to \$200 in Australia), for what it does.
4. The programmable character RAM resides at the same location as video memory, why not use the empty block from 3000H to 3700. Then, at least, the character values could be read back so that they can be worked on without having to store a duplicate in program RAM.
5. The internal regulator in the TRS-80 could get very hot trying to run the extra IC's on hot days. However, no adverse effects were noted during the test period.
6. The lowercase capability mentioned in the advertisements is provided as programmed characters and comes on a tape supplied with the board. This works only with BASIC. Word processors such as SCRIPSIT and ELECTRIC PENCIL cannot use it.

***** READERS' REQUESTS *****

This column is a regular feature of MICRO-80. In it, we list all those articles, programs, etc. requested by our readers. We invite contributions from readers to satisfy these requests and will, of course, pay a publication fee for all articles, programs, etc. printed.

** ARTICLES **

- File handling on the '80
- Description of the functions performed by the Expansion Interface
- Reviews of '80 compatible printers
- Reviews of commercially available software (including that produced by us!)
- Reviews of commercially available hardware
- How to SAVE onto Disk, programs such as Analogue clock and Touchtype
- A master index to the appropriate sections in the Tandy Manuals in Level I, Level II, DOS etc.
- Comparative review of disk drives
- How to convert a Level I program to Level II
- A simple guide to using Level I Arrays
- Review of Dunjonquest program
- An explanation of how to make full use of USR, PEEK & POKE statements.

** SOFTWARE **

- GAME OF LIFE relocated to start at 7000H
- A m.l. program to enable the break key to work like RESET when using an expansion interface
- Stock market program
- Horse racing system
- "Files" program modified for 48K system
- Morse code decoder
- Sub-routine Forum
- Program to "SET" non-graphical symbols
- A new STAR-TREK game
- Conversational programs (like ELIZA)
- 3D programs (such as a maze seen from the inside)

** HARDWARE **

- Interfacing the '80 to external hardware
- Review on the performance of line filters
- Review of high resolution graphics mods.
- Real Time clock
- Radio Teletype/Morse interfacing
- RFI (Radio Frequency Interference) suppression
- Interface for a Teletype printer

Note:-

We already have an article in hand describing how to save TOUCHTYPE to Disk. Also a master index to Tandy's manuals plus reviews on the Escon conversion to a Selectric typewriter and TASP wordprocessing program.

We have also received several letters describing how to convert "Keyboard Bleeper" and "Sound" to run on a System 80/Video Genie which we will publish next issue.

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80-GRAFIX REVIEW - Continued from Page 9.

ADVANTAGES :

1. Custom character set's and mathematical symbols can be created easily using a program called CREATE supplied with the board.
2. Line drawings can be implemented using programmed characters having lines an junctions which can be fitted together to form line drawings. .

My assessment of the 80 - GRAFIX board can be summarised by saying that it is a programmable character generator and, as such, it does make an improvement to the TRS-80/SYSTEM 80 graphics. However, its price is too high for the improvement offered. Meanwhile, the quest for true high resolution graphics on the '80 still hasn't ended.

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***** A REVIEW OF MICROSOFT'S EDITOR/ASSEMBLER-PLUS - by Ken Shillito *****

I will assume that you have read the advertisement for this program in the MICRO-80 PRODUCTS section).

First, let me say that I am extremely pleased with Editor/Assembler-plus. It is everything claimed and more. One may, for example, shift between number bases automatically, together with many other features. The two biggest advantages are the "macro" facility which Eddie Paay explained recently and the ability to assemble into memory and debug all at once without cassette operations. The cost of this is of course that the package uses a lot of memory but it allows you to "quash" parts of it selectively to make room. The QA function, incidentally, contains a bug and if you use it after a BUFFER FULL message, it will fill the memory with garbage. It also crashes if you get a BUFFER FULL message when attempting to load a source file.

The worst defect of the package is that the debugger, ZBUG, won't let you relocate the stack. The documentation says that it "doesn't recommend" moving the stack but if you do so anyway, then the contents of the AF' registers will be placed on top of the stack each time you single step. ZBUG also won't let you use RST instructions but this is not a problem. I would have preferred something corresponding to the ?MEM instruction in BASIC, rather than some of the frills that the package does contain.

The documentation is about what you would expect from a good quality microcomputer firm (i.e. fair). It is coy about the addresses occupied by the program and symbol table. Although I feel I am quite good at reading computer manuals, I found the section on displaying and modifying register contents baffling. I also spent a lot of time trying to produce a \$ sign in macros, until I realised that they wanted a real \$ and not one of their funny money \$'s, a practise which they warn against elsewhere because it causes confusion! Incidentally, SHIFT/CTRL/I duplicates all the forward arrow functions in the System-80.

The documentation makes a lot of hoopla about the "symbolic debugging" feature, whereby ZBUG can reference the address labels in the symbol table. This facility would be of great use in a multi user environment where you never know what address you'll be given but without a relocating loader it doesn't excite me as much as the authors of the manual seemed to expect.

Overall, EDTASM-Plus is superb value for money. Weep if you bought the Tandy assembler and debugger, because you wuz robbed!

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INPUT/OUTPUT - Continued from Page 8

Letter from Ted Monaghan, Warrawee, Greenwell Point Rd. Pyree, 2540.

After receiving your first edition 1979 I wrote to you and you kindly printed it in the first lot of letters to the editor, so I thought it would be appropriate to write now. We are still interested in hearing from anyone who has been using farming programs and would be pleased to answer any queries on our system so I have enclosed a photostat of an article which was in the November edition of a new magazine called "FARM" which is distributed in all States.

Shortly after this article was written the main homestead was burnt to the ground including the computer and all the office records but luckily we had backup disks of the 1979/80 ledger, stud records and general stock; we have replaced the computer system (48K 2 drives and the new line printer).

We have another farm in our area using our programs and have given demonstrations to many visitors and as I stated before, we are very keen to hear from any readers who wish to exchange information and experiences in the use of the TRS-80 for farming or grazing programs.

We have enjoyed reading your publication for the past year and wish you all the best for the future.

(We well remember receiving your letter, Ted. It was quite exciting, being one of the first letters we received. We are sorry to hear about your misfortune. Perhaps it will serve as a lesson to us all to ensure that we keep back-up copies of all valuable data in a secure place remote from our working copies. If any readers would like to avail themselves of Ted's offer to exchange information and experiences in the use of TRS-80's for farming or grazing programs, please contact Ted direct. The extracts from "FARM" which Ted enclosed make very interesting reading for anyone concerned with the use of microcomputers in farming - Ed.)

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***** MICRO BUGS *****

In which we correct those errors which sometimes seem to creep in, no matter how careful we are.

MIGHTY MORMAR

Somehow a couple of bugs crept into the Listing and cassette editions of MIGHTY MORMAR, published in the November issue. The original cassette was quite alright but the published version was not. Distraught readers have had their little robots captured by the Evil General Vagg's forces before a shot was fired (Let that be a lesson to you all - Ed.). The two guilty program lines are 127 and 203 which should have read -

```
127 IF NO()20 AND NO () 16 AND NO () 11 AND NO () 33 THEN 21
```

```
203 IF A 4 = "Y" THEN 1 ELSE END
```

Fixing it up won't do you a bit of good, of course - evil will always triumph!

SYSCOPY

A number of readers have complained that they could not enter the HEX dump of this program using BMON, despite the fact that the two programs are intended to function together. The problem arises towards the end of SYSCOPY when BMON appears to be unable to change the values in memory. The reason is that BMON uses the memory immediately below itself as a stack area and therefore stores data there whilst operating. This coincides with the last few bytes of SYSCOPY. Both the author and MICRO-80 fell into the trap because we produced the object code from an Editor/Assembler and did not attempt to enter it via BMON. We obviously did not exercise BMON enough to alter SYSCOPY's code when they were co-resident. There must be a moral in that somewhere!

Don't despair, Eddy Paay has come to our rescue by working out a modification for BMON which places the stack below SYSCOPY. This has the added advantage that you can save both programs together as one combined program, should you wish to do so. Follow the procedure below to change BMON.

- 1) Load in BMON and initialise it.
- 2) Use the (B) command to go to BASIC, then jump back to BMON using SHIFT/DOWN ARROW (or CTRL). If you have the new TRS-80 ROMs, don't forget to press Z at the same time.
- 3) Select the (E)dit memory function in BMON and make the following changes:-

ADDRESS (HEX)	OLD VALUE	NEW VALUE
7265	FF	AC
7266	71	70
7BD2	0E	BB
7BD3	72	70
7BD5	0C	B9
7BD6	72	70
7D6C	0E	BB
7D6D	72	70

- 4) After making these changes, use the (BREAK) key to return to the Menu.
- 5) Use the (C)opy command to copy the revised BMON to tape.
- 6) You should now be able to use the revised BMON to enter SYSCOPY into your machine exactly as described in the October, 1980 issue and punch out a tape of it.

If you wish to use SYSCOPY and BMON together, you must use this revised version of BMON. You may make a combined tape containing both SYSCOPY and BMON (SYSMON?) by using the following procedure.

- 7) Load in the revised version of BMON.
- 8) Load in SYSCOPY. After initialising SYSCOPY (see note 6 on page 30 of the October 1980 issue), escape back to BASIC by pressing the (BREAK) key.
- 9) Call up the BMON Menu.

***** MARKET PLACE *****

Market place is available to any reader who has hardware to dispose of. An entry costs nothing - you pay MICRO-80 \$5.00 or 5% commission, whichever is the greater - up to a maximum of \$30, after the goods are sold. The commission is calculated on your advertised price.

SYSTEM 80 L2/16K + Dick Smith monitor + Address/Mailing list and Airmail Pilot programs. This equipment is only 3 weeks old and in perfect condition. Total list price of hardware and software is \$951.50. Will sell for

\$850

P. S. Martin, 191 Stuart Street, Blakehurst NSW 2021 Phone: (02) 546 7090.

Radio Shack QUICK PRINTER: 150 LPM on 4.75" wide aluminised paper. Software selectable 80, 40 or 20 characters per line. Upper-case and lower-case with full descenders. Automatic underlining. Seldom used and in excellent working order. Catalogue price \$699. Will sell for

\$400

Mike Riley, 15a Hunter Street, Lakes Entrance Vic. 3909.

Phone: (051) 551812 Bus. (051) 552216 (A.H.)

MICROLINE 80 DOT MATRIX PRINTER: excellent condition with printer cable ready to plug into bus extender and go. Full graphics, 3 print sizes and detailed instructions and tips.

\$850 o.n.o.

Mr. J. F. Lamich, 116a Raglan Street, Mosman, NSW 2088

Phone: (02) 411 7166 Bus. hours.

** LNW RESEARCH EXPANSION INTERFACE BOARDS **

\$79.95+\$2.00 p&p

There was so much interest shown in the LNW Research expansion project described in September's MICRO-80 that we decided to import the boards to Australia. They proved so popular that the first batch sold out within 12 hours of landing! We are in stock again, so hurry, while they last. These boards are the basis for a high quality, reliable expansion interface for the TRS-80 (or the SYSTEM 80 via our SYSPAND-80 adaptor). At present we are offering the boards with their comprehensive construction manual. By next month, we will be able to offer modular kits of components and fully built up and tested units. The design of these boards is tried and tested. An expansion interface built around one costs \$100's less than an equivalent Tandy or D-S interface.

** SPECIAL OFFER - EXATRON STRINGY FLOPPY \$352.50 INCL.p&p. **

All Exatron Stringy Floppies sold by MICRO-80 will include the special chained version of HOUSEHOLD ACCOUNTS, developed by Charlie Bartlett. When used on the ESF, this program is powerful enough to perform many of the accounting functions in a small business. Remember, the ESF comes complete with a comprehensive manual, a 2 way bus-extender cable, its own power supply and 10 wafers of mixed length. One wafer contains the Data Input/Output program and another the HOUSEHOLD ACCOUNTS program.

CAN'T MAKE UP YOUR MIND ABOUT THE ESF?

Then send in \$5.00 for a copy of the manual. We will refund your \$5.00 IN FULL when you purchase an ESF.

MICRO BUGS - continued from page 12

10) Use the (C)opy command to save the combined program with the following parameters:-

START	END	#ENTRY	NAME
70BD	7EFE	7110 (SYSCOPY)	SYSMON
		7B99 (BMON)	

Note: # You may initialise either BMON or SYSCOPY on loading, depending on the ENTRY point you choose.

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***** SOFTWARE REVIEW - THE COUNT" ADVENTURE - by David Grigg *****

This is the first 'adventure' game I've bought for my computer, and I'm already hooked. Written by Scott Adams, the 'Adventure' series of games place you in various imaginary environments, with little other than your wits as aids to help you work out what you are doing there and how to solve your problems. In a sense, it would be a fair description to call them 'electronic fairy tales'. Unlike the normal story, when you are playing an adventure, you can interact with the fiction: look around, pick things up, wander around as you will.

In "The Count" (Adventure #5), you wake up in a brass bed in a castle (we presume in Transylvania), a guest, it seems, of Count Dracula. A description of the immediate environment, objects of interest, and obvious exits, is always in a frame at the top of the screen. Below that, the computer, acting as though it were a puppet entirely enslaved to your command, asks you to tell it what to do next. You proceed by giving it two-word English commands. The puppet has a surprisingly large vocabulary, though some might say that the words it doesn't understand are equally surprising. Part of the game is to find out what you can tell the computer to do.

I've lost count (no pun intended!) of how many hours I've spent so far with this adventure, trying to get Dracula before he gets me. So far, Dracula is winning hands down. But the whole game is like some enormous cryptic crossword puzzle - the more you think about it, the more you explore, the more things you find, the closer you get to the solution. When you have a genuine flash of insight which gets you over a particular block, there is a real feeling of pleasure. I went around grinning for half an hour after I figured out how to open a particular locked door in one of the rooms of the castle.

As I say, I still haven't entirely solved the puzzle, though I think I have reason to believe I'm getting close. When I finally do work it out...well, I'll go and buy another adventure! This could become obsessive, I think.

But the whole concept of adventure games is really fascinating. It's hard to imagine how any similar game could have been played before the invention of the computer. So that in a sense, adventures are the first uniquely computer games ever invented. And besides that, they are a lot of fun.

Though I must confess that my wife thinks I'm a bit strange when I sit at the computer muttering, "Now, if I just use the nail file on the vent, that's got to work! Dammit! Well, maybe if I tie the sheet to the vent and then pull, let's see..."

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***** HARDWARE REVIEW - DICK SMITH'S "SOUND-OFF" PACKAGE - by David Grigg *****

I bought this kit purely as an impulse buy. I wandered into Dick Smith's store in Lonsdale Street, Melbourne, and found that they had their System 80 hooked up to the sound generator, with a demonstration program that produced some very satisfying buzzes, pings, pongs, sirens, flying saucer noises, and other odd sounds. So I bought it.

I guess I could have put together a simple sound generator and written some simple software myself, but I'm too lazy to bother if I can buy it instead for \$19.95.

What you get in the kit is a vandalised transistor radio into which you plug the AUX plug from the computer, after pulling it out of the cassette deck. Then you load the program, either the menu program I saw displayed in the store, or a 'patch' program around which you can write your own games or other programs for which you would like sound.

The only thing I found a little odd about this was the fact that the programs supplied are in BASIC, which then spend a fair amount of time POKEing a machine language program up into high memory. Why not just supply a SYSTEM tape and be done with it? In fact, it didn't take me long to make my own SYSTEM tape out of the machine language subroutines and now I just load that if I want sound. This makes it much easier if you want to add sound to an existing program.

One thing that it is worth being aware of is that the Dick Smith sound programs are not compatible with the Exatron Stringy Floppy. This is because the programs PEEK out the Memory Size you have set, and use that data to locate the machine language program. But the ESF alters the Memory Size by four bytes. This little problem gave me a lot of worry and frustration before I worked out what was happening. Solution - don't initialise the ESF before you load the Dick Smith program.

As I said before, the kit produces some very satisfying and quite complex sounds. It wouldn't be too much trouble to write a simple program to create tunes and play them, if you were so inclined. But adding sound to games makes a big difference. What, after all, would "Space Invaders" be without that anxiety-producing sound?

All in all, I felt this was quite worth the money.

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***** '80 USERS' GROUPS *****

The following is a list of '80 Users' Groups. If you have a group that is not included here, please let us know about it so that we can publish details. Owners of System '80s are welcome at all the groups.

** AUSTRALIA **

BRISBANE: Contact: Mr. Lance Lawes,
Tel: Home (07)396 2998
Bus.(07)268 1191 Ext.15
MEETINGS 1st Sunday of the month at 2 p.m. at 21 Rodney St. Lindum, 4178.

MELBOURNE: EASTERN SUBURBS - 1
Contact: Mr. John Fletcher, 89 0677 bet. 9-4

EASTERN SUBURBS - 2
MEETINGS: 3rd Wednesday of the month at Kingswood College, 355 Station St. Box Hill.

FRANKSTON: PENINSULAR GROUP
(Vic.) MEETINGS: 2nd Tues. of the month (except Jan.)
Contact: M.G. Thompson (03)772 2674

GEELONG: *GEELONG COMPUTER CLUB
MEETINGS: 2nd Tues. of the month at TYBAR Engineering, Hampton St. Newtown.
Contact: The Geelong Computer Club,
P.O. Box 6, Geelong, 3220.

DARWIN: Contact: Tony Domigan, P.O. Box 39086,
Winnellie, N.T. 5789.

ADELAIDE: Contact: Rod Stevenson, 51 5241 bet. 9-4

CANBERRA: Contact: Bill Cushing, 10 Urambi Village, Kambah ACT 2902 (Ph. 31 6399)
MEETINGS: 3rd Thursday of each month at 7.30 pm. in:-
Urambi Village Community Centre, Crozier Circuit, Kambah.

** UNITED KINGDOM **

NEWCASTLE Contact: John Stephen Bone 0632 770036
NPCS (Newcastle Personal Computer Society) - see INPUT/OUTPUT

** NEW ZEALAND **

AUCKLAND Contact: Ron Feasy 799 366 (Bus.) 469 455 (Priv.)
MEETINGS: 1st Tuesday of each month, 7.30 pm. at:-
NZ Solenoid Co. Ltd.,
28 Kalmia Street,
Eilerslie, Auckland.

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***** SOFTWARE SECTION *****

*** MUGWUMP (L1/4K) by C. Stobert ***

The idea of this game is to find four mugwumps which are hidden on a 10 by 10 board. The board is drawn in the bottom left of the screen. To the right of that, a record of your guesses is kept as is a record of the distance that guess is away from each mugwump, unless that mugwump has already been found, in which case an empty space is left in the column for that particular mugwump.

At the top of the screen you are asked to enter your guess. Just enter the X,Y coordinates in that order, separated by a comma. Once you have entered a set of coordinates, the computer decides whether or not you have found one of the mugwumps. If you have, it prints a # in the square chosen. If not, it prints a ? at that position on the board. You continue guessing until either you find all the mugwumps or run out of guesses - you are allowed 10.

The REM statement in Line 125 means that all arrays between 1 and 12 are given the value 0 - (A(1) to A(12)). SUB 800 draws the board. Lines 800 and 810 print the numbers around the board. Take special note of Lines 830 to 860: this is the quickest way to draw the type of board required for this game. Try the following program:-

```

1  REM THIS IS THE SORT OF THING WE WOULD USUALLY SEE
5  C.
10 F. X=0 TO 40
20 IF X/6=I.(X/6) G. 70
30 F. Y=0 TO 30
40 IF Y/3=I.(Y/3) G. 60
50 S. (X,Y)
60 N. Y
70 N. X
90 REM THIS IS QUICKER AND USES LESS MEMORY
100 C.
110 F. A=0 TO 40 S. 6
120 F. X=A TO A+4
130 F. Y=0 TO 30 S. 3
150 S. (X,Y):S. (X,Y+1)
160 N. Y
170 N. X
180 N. A

```

(Note: spaces have been inserted in the program Lines for ease of reading. To minimise memory usage, enter program without spaces).

Back to Mugwump. Line 160 decides where each mugwump is to be hidden on the board. Lines 170 to 260 check for repeats. line 300 means:- IF (L>0) and (L<11) and (M>0) and (M<11) THEN GOTO 330. To break it down still further, IF L and M are both between 1 and 10 inclusive, GOTO 330. in line 340, <> means "not equal to". The SUBroutine for placing a # on the board starts at Line 900,. This subroutine also places your guess on the screen under the X and Y columns and tells you how far away you are from each mugwump.

```

1  REM C.STOBERT
2  REM 21 SHERWOOD CRS. NTH.DANDENONG VIC 3175
3  REM 03 795 6590
4  REM BASED ON L II GAME BY CREATIVE COMPUTING
5  REM REF BASIC COMPUTER GAMES
10 C.
20 P.A.283,"MUGWUMP
30 F.I=1T080:J=R.(32767):N.I
40 C.:P.
50 P."THE OBJECT OF THIS GAME IS TO FIND
60 P."FOUR MUGWUMPS HIDDEN IN POSITIONS ON A 10X10 GRID
65 P.:P."THE LENGTH OF EACH GRID PART IS 1 UNIT
70 P.:P."YOU ENTER A GRID POSITION WITH
80 P."TWO NUMBERS EACH OF 1 TO 10,
90 P."SEPARATED BY A COMMA.
100 P.:P."YOU GET 10 TRIES":P.:P."AFTER EACH TRY
110 P."I WILL TELL YOU HOW FAR YOU ARE FROM THE REMAINING MUGWUMPS
120 P.:I."PRESS <ENTER> TO START ";A$
125 C.:REM-NULL ARRAY & SELECT CO-ORDINATES
130 F.N=1T012:A(N)=0:N.N
140 T=0:F=0:E=421:O=0
145 Q=0:GOS.800
150 F.N=1T04
160 A(N)=R.(10):A(N+4)=R.(10)
165 REM-CHECK FOR REPEATS
170 F.U=1TON-1:F.U=U+1TON
180 IF(A(N)=A(U))*A(U+4)=A(U+4))G.160
260 N.U:N.U:N.N
270 T=T+1:GOS.870
280 P."TURN NUMBER":T
290 I."WHAT IS YOUR GUESS <#1>,<#2>":L,M
300 IF(L>0)*(L<11)*(M>0)*(M<11)G.330
320 GOS.870:P."NUMBERS MUST BE BETWEEN 1 & 10":G.290
325 REM-CHECK FOR MUGWUMPS
330 F.N=1T04:IFA(4+N)=1G.480
340 IF(L<>A(N))+M<>A(N+4))G.390
350 GOS.870:P."YOU HAVE FOUND MUGWUMP #":N
365 Q=1
370 F=F+1:A(N+8)=1:IFF=4G.500
375 O=1:GOS.900
390 A=A.(A(N)-L):B=A.(A(N+4)-M)
400 C=A*A+B*B

```

***** NEW FROM MICRO-80 PRODUCTS *****

We have a host of new products and software for TRS-80/SYSTEM 80 microcomputers.

MICROTEK MEMORY EXPANSION/PRINTER MODULES

A number of our readers expressed interest in the memory expansion module we developed earlier in the year. Unfortunately, there was not sufficient interest to make it worthwhile continuing with this rather expensive project, particularly as a completely assembled, tested unit would have had to sell for more than \$200.

Fortunately, MICROTEK in America had the same idea and with the larger population and greater resources, has been able to produce a similar unit which we can sell for only \$149. We are disappointed that we were unable to produce our own design economically but are happy to offer you the MICROTEK unit. It comes fully assembled and tested in a metal cabinet of similar size to the Tandy expansion interface so that you can sit your monitor atop it. The MICROTEK unit intercepts the Tandy power supply cable and has its own internal rectifiers and regulators. As well as providing sockets for 32K of memory, it also has a Centronics parallel printer port which enables you to run a line printer or the Olivetti ET-121. Full instructions for connecting to your system and adding memory chips are included.

MICROTEK MT32-A	0K	\$149
MICROTEK MT32-B	16K	\$208
MICROTEK MT32-C	32K	\$262

Incl.p&p. The memory supplied is our prime, branded 200 nanosecond kit. Fitting is included in the price if memory is ordered with the module.

***** SYSPAND-80 FOR SYSTEM 80 COMPUTERS *****
\$119 incl p&p.

The SYSPAND-80 adaptor designed by MICRO-80 PRODUCTS is now available in fully assembled and tested form. Kits and kit prices will be announced next month. The SYSPAND-80 connects to the rear of the SYSTEM-80 and provides a Centronics parallel printer port plus the Tandy bus so that you can run a Stringy Floppy, the MICROTEK memory expansion module or even a Tandy expansion interface/disk drives etc. from your SYSTEM-80. The SYSPAND-80 has its own plug-pack power supply and internal regulator so it imposes no additional load on the SYSTEM 80 power supply.

40 PIN EDGE CONNECTORS \$12.30 +50c. p&p
These difficult to obtain connectors are essential if you are working on a hardware project requiring connection to the TANDY bus. The connector attaches to a 40 way ribbon cable and plugs straight on to the back of your TRS-80.

***** GREEN SCREEN SIMULATOR *****
\$19.95 incl. p&p

The GREEN SCREEN SIMULATOR is made from a deep green perspex, cut to fit your monitor. It improves contrast and is much more restful to the eyes than the normal grey and white image. All the editorial staff of MICRO-80 (including Scrooge Mc. Hartley) are now using GREEN SCREEN SIMULATORS on their own monitors. Please make sure to specify whether you have an old (squarish) or new (rounded) style monitor when ordering. Not available for Dick Smith monitors.

OLIVETTI ET-121 DAISY WHEEL TYPEWRITER FOR '80
only \$1995

MICRO-80 PRODUCTS has developed an interface to drive the OLIVETTI ET-121 typewriter from a Centronics parallel printer port. The ET-121 is a quiet, high speed (20 cps) auto-correcting, electronic typewriter utilising a Z 80 microprocessor. We have mounted an interface inside the typewriter which does not interfere with manual operation but enables it to be driven as a printer from a Centronics port such as is available in the SYSPAND-80, MICROTEK module or TRS-80 expansion interface.

This makes an ideal combination for the home or office where you need the flexibility of a quiet, reliable, superior typewriter which can double as a correspondence quality printer when driven from your microcomputer.

This issue of MICRO-80 has been typeset using the MICRO-80 OLIVETTI.

Deliveries commence in December. Secure your order by sending a \$50 deposit or write asking for further technical details.

DATA SEPARATOR \$37.00 plus \$1.20 p&p.
When Tandy designed the TRS-80 expansion interface, they did not include a data separator in the disk-controller circuitry, despite the I.C. manufacturer's recommendations to do so. The result is that many disk drive owners suffer a lot of Disk I/O errors. The answer is a data separator. This unit fits inside your expansion interface. It is supplied with full instructions and is a must for the serious disk user.

DISK DRIVE HEAD CLEANING DISKETTES
\$29.00 plus \$1.20 p&p

Disk drives are expensive and so are diskettes. As with any magnetic recording device, a disk drive works better and lasts longer if the head is cleaned regularly. In the past, the problem has been, how do you clean the head without pulling the mechanism apart and running the risk of damaging delicate parts. 3M's have come to our rescue with SCOTCH BRAND, non-abrasive, head cleaning diskettes which thoroughly clean the head in seconds. The cleaning action is less abrasive than an ordinary diskette and no residue is left behind. Each kit contains:
- 2 head cleaning diskettes
- 1 bottle of cleaning fluid
- 1 bottle dispenser cap.

***** DISKETTE BREAKTHROUGH *****

40 TRACK NASHUA DISKETTES (in library case)
SINGLE SIDE/SINGLE DENSITY \$45.00 box of 10

40 TRACK VERBATIM DISKETTES
DOUBLE SIDE/DOUBLE DENSITY \$59.00 box of 10

77 TRACK VERBATIM DISKETTES
SINGLE SIDE/SINGLE DENSITY \$59.00 box of 10

All prices include p & p.

NEWDOS 80 IS IN STOCK. (only \$149)
 This long-awaited disk operating system has now arrived and has already been delivered to many eager customers around Australia. It is every bit as good as it was cracked-up to be and MICRO-80 has decided to standardise on it for its own systems. Here are just a few of the many things you can do with NEWDOS 80 which is upward compatible with TRSDOS and NEWDOS + (i.e. TRSDOS and NEWDOS + programs will run on NEWDOS 80 but the reverse is not necessarily so.)

- * New BASIC commands that support variable record lengths up to 4095 bytes long.
- * Mix or match disk drives. Supports any track count from 18 to 96. Use 35, 40, 77 or 80 track 5" mini disk drives, 8" disk drives, OR ANY COMBINATION!
- * An optional security boot-up for BASIC or machine code application programs. User never sees "DOSREADY" or "READY" and is unable to "BREAK", clear screen or issue any direct BASIC statements including "LIST".
- * New editing commands that allow program lines to be deleted from one location and moved to another or to allow the duplication of a program line with the deletion of the original.
- * Enhanced and improved RENUMBER that allows relocation of subroutines.
- * Powerful program chaining.
- * Device handling for routing to display and printer simultaneously.
- * DFG function; simultaneous striking of the D, F and G keys will allow user to enter a mini-DOS to perform some DOS commands without disturbing the resident program.
- * Includes Superzap 3.0 (improved, machine language version of Superzap) and all Apparat 2.1 utilities).

NEWDOS + 35 TRACK VERSION p&p	\$99.00 incl.
40 TRACK VERSION p&p	\$110.00 incl.

NEWDOS by Apparat, is the third generation disk operating system for your TRS-80. NEWDOS corrects over 70 errors and omissions in TRSDOS and Disk BASIC yet the two are completely compatible. Going from TRSDOS to NEWDOS is like going from Level I to Level II, more power, more convenience, greater speed. NEWDOS + includes the following utilities:

- * Editor-assembler for Disk
- * Disassembler (Z80 machine code)
- * LM offset - allows transfers of any system tape to a Disk file-automatically relocated.
- * BASIC 1 - Lets you convert your computer back to Level I
- * LVIDKSL - Saves and loads BASIC 1 programs to disk
- * SUPERZAP - display/print/modify any location in memory or on disk.
- * RENUMBER BASIC program.

and much more.

***** MICRO-80 PRODUCTS *****

Please use order form on page 36

******* MICROPOLIS 77 TRACK DISK DRIVES *******
 These fabulous MICROPOLIS disk drives have more than double the storage capacity of the standard 35 track drives.

** DD-7S only \$775 incl. p&p **

77 track MICROPOLIS drive complete with cable for four drives, power supply, chassis and includes NEWDOS 80.

** DD-7 only \$649 incl. p&p **

Same as above but no cable or NEWDOS 80.

** DC-4 only \$45 incl. p&p **

4 drive connector cable - suitable for any disk drives.

******* MPI DISK DRIVES *******
 MPI is the second largest manufacturer of disk drives in the world. MPI drives use the same form of head control as on 8" drives and consequently, they have the fastest track-to-track access time available: 5msec. All MPIr drives are capable of single or double-density operation. (Double-density operation requires the installation of a special PC board in the expansion interface. This board is not yet available in Australia). As well as the single head 40 track disk drive, MPI also make a dual-head 40 track disk drive. A dual-head drive is almost as versatile as two single-head drives but is much cheaper.

Our MPI drives are supplied bare, set up to operate with TRS-80. They can be used bare or a simple cabinet made up from sheet metal (single-drive cabinets will be available in early December - price \$10.00). They require the use of a separate power supply giving 5 volt at 0.7 amp and 12 volt at 1 amp. All drives are sold with a 90 day warranty and service is available through MICRO-80 PRODUCTS.

MPI SINGLE HEAD DISK DRIVE only \$339 incl. p&p.
 MPI DOUBLE HEAD DISK DRIVE only \$449 incl. p&p.

AVAILABLE SOON:-
 MPI 80 TRACK SINGLE HEAD DRIVE only \$499
 MPI 80 TRACK DOUBLE HEAD DRIVE only \$599

Ring first to check availability.

FLOPPY DOCTOR AND MEMORY DIAGNOSTIC
 (by MICRO CLINIC) \$29.95 plus 50c. p&p.
 Two machine language programs on a diskette together with manual which thoroughly test your disk drives and memory. There are 19 possible error messages in the disk drive test and their likely causes are explained in the manual. Each pass of the memory tests checks every address in RAM 520 times, including the space normally occupied by the diagnostic program itself. When an error occurs the address, expected data, and actual data are printed out together with a detailed error analysis showing the failing bit or bits, the corresponding IC's and their location. This is the most thorough test routine available for TRS-80 disk users.

**** PROGRAMS FROM CREATIVE COMPUTING ******** ADVENTURE PROGRAMS ****

ADVENTURELAND (L2/16K) \$14.95 + 50c. p&p.
Try to find and take treasures as you explore a fantasy world. The computer acts as your puppet and carries out your two word commands. Sometimes you will need special objects to do certain things, often a little magic is necessary. Absorbing and challenging.

THE COUNT ADVENTURE(L2/16K) \$14.95 + 50c. p&p.
In this adventure, you awaken in a bed in a castle in Transylvania. You don't know why you are there but you'd better solve the puzzle before it's too late. Just as enthralling as ADVENTURELAND but blood thirstier!

**** GAMES ****

AIR TRAFFIC CONTROLLER(L2/16K) \$9.95 + 50c.p&p
One of the hottest selling games in the USA, you are the Air Traffic Controller and the monitor is your radar screen. Bring down the aircraft safely and avoid mid-air collisions.

Z CHESS (L2/16K) \$19.95 + 50c. p&p.
Seven levels of ability, contains all standard moves including castling and En Passant captures. It can play either black or white and its versatile board set-up mode allows specific positions to be played as desired.

SPACE GAMES (L2/16K) \$13.50 + 50c. p&p.
4 Space Games including ULTRA-TREK, ROMULAN, STARWARS and STARLANES. Fast, real-time graphics.

STRATEGY GAMES (L2/16K) \$9.50 + 50c. p&p.
5 Strategy games including TUNNEL VISION (find your way out of a 3-D maze), EVASION - avoid the deadly snake), JIGSAW (put the puzzle together), THE MASTERS (Golf on the '80 for up to 4 players), MOTOR RACING (Compete against the computer at Indy or the Grand Prix).

GRAPHING PACKAGE (L2/16K) \$9.95 + 50c. p&p
A set of 6 utility programs which allow you to draw BAR GRAPHS, GRAPH CARTESIAN COORDINATES, carry out POLAR GRAPHING, PARAMETRIC GRAPHING, LINEAR REGRESSION and PARABOLIC REGRESSION.

**** SCOTCH BRAND COMPUTING CASSETTES ****

These super-quality cassettes are now back in stock.

C-10 pack of 10 \$26.00 incl. p&p
C-30 pack of 10 \$28.00 incl. p&p

******* 16K MEMORY EXPANSION KIT *******

REDUCED TO ONLY \$59.00 !!!!

These are prime, branded, 200 ns (yes, 200 nanosecond) chips. You will pay much more elsewhere for slow, 350 ns.chips. Ours are guaranteed for 12 months. A pair of DIP shunts is also required to upgrade the CPU memory in the TRS-80 - these cost an additional \$4.00. All kits come complete with full, step-by-step instructions which include labelled photographs. No soldering is required. You do not have to be an experienced electronic technician to instal them.

**** PROGRAMS BY MICROSOFT ******EDITOR ASSEMBLER PLUS (L2/16K)**

REDUCED TO ONLY \$37.50 + \$1.20 p&p. ####
A much improved editor-assembler and debug/monitor for L2/16K TRS-80 or SYSTEM 80. Assembles directly into memory, supports macros and conditional assembly, includes new commands-substitute, move, copy and extend.

LEVEL III BASIC \$59.95 plus \$1.20 p&p.
Loads on top of Level II BASIC and gives advanced graphics, automatic renumbering, single stroke instructions (shift-key entries) keyboard debounce, suitable for L2/16K and up (Not Disk BASIC)

ADVENTURE ON DISK \$35.95 plus \$1.20 p&p.
This is the original ADVENTURE game adapted for the TRS-80. The game fills an entire diskette. Endless variety and challenge as you seek to rise to the level of Grand Master. Until you gain skill, there are whole areas of the cave that you cannot enter. (Requires 32K One Disk)

DISK EDITOR ASSEMBLER

SAVE \$30 ONLY \$107 plus \$2.00 p&p.
Supports Macros, linking loader, editor, cross references. See Assembly language programming article in August MICRO-80 for further details. (Requires 32K One Disk)

BASIC COMPILER \$208 plus \$2.00 p&p.
Converts Disk BASIC programs to machine code, automatically. A compiled program runs, on average, 3-10 times faster than the original BASIC program and is much more difficult to pirate. Note: MICROSOFT have temporarily withdrawn this program for reworking to make it less memory-hungry. The revised version should be available about the end of NOVEMBER. All existing owners will receive updated versions at no cost to them. Don't wait though, send in your orders now and be near the front of the queue.

******* BOOKS *******

LEVEL II ROM REFERENCE MANUAL \$24.95+\$1.20 p&p
Over 70 pages packed full of useful information and sample programs. Applies to both TRS-80 and SYSTEM 80.

TRS-80 DISK AND OTHER MYSTERIES

\$24.95+\$1.20 p&p.
The hottest selling TRS-80 book in the U.S.A. Disk file structures revealed, DOS's compared and explained, how to recover lost files, how to rebuild crashed directories - this is a MUST for the serious Disk user and is a perfect companion to any of the NEWDOS's.

**** OTHER PROGRAMS ******INFINITE BASIC BY RACET (32K/1DISK)**

\$49.95 + 50C. P&P.
Full matrix functions - 30 BASIC commands; 50 more STRING functions as BASIC commands

GSF/L2/48K \$24.95 + 50c. p&p.
18 machine language routines including RACET sorts.

BUSINESS ADDRESS AND INFORMATION SYSTEM

(48K/DISK) \$24.95 + 50c. p&p.
Allows you to store addresses and information about businesses, edit them and print them out.

***** SOFTWARE BY AUSTRALIAN AUTHORS *****

All our software is suitable for either the SYSTEM 80 or the TRS-80 (with the exception of Me Think it Micro Mazin vol.2).

** UTILITIES **

S-KEY by Edwin Paay \$15.95 plus 50c. p&p
S-KEY is a complete keyboard driver routine for the TRS-80 and becomes part of the Level II basic interpreter. With S-KEY loaded the user will have many new features not available with the standard machine.

S-KEY features:

- * S-KEY provides an auto-repeat for all the keys on the keyboard. If any key is held down longer than about half a second, the key will repeat until it is released.
- * Graphic symbols can be typed direct from the keyboard, this includes all 64 graphic symbols available from the TRS-80/SYSTEM 80
- * S-KEY allows text, BASIC commands and/or graphics to be defined to shifted keys. This makes programming much easier as whole commands and statements can be recalled by typing shift and a letter key.
- * Because S-KEY allows graphics to be typed directly from the keyboard, animation and fast graphics are easily implemented by typing the appropriate graphics symbols directly into PRINT statements.
- * S-KEY allows the user to LIST a program with PRINT statements containing graphics, properly. S-KEY does this by intercepting the LIST routine when necessary.
- * S-KEY allows the user to list an updated list of the shift key entries to the video display or line printer.
- * S-KEY can be disabled and enabled when required. This allows other routines which take control of the keyboard to run with S-KEY as well.

Each cassette has TRS-80, DISK and SYSTEM 80 versions and comes with comprehensive documentation.

BMON by Edwin Paay \$19.95 plus 50c. p&p
THE ULTIMATE HIGH MEMORY BASIC MONITOR
L2/16-48K

Our own personnel refuse to write BASIC without first loading this amazing machine language utility program into high memory! BMON Renumbers; Displays BASIC programs on the screen while they are still loading; tells you the memory locations of the program just loaded; lets you stop a load part-way through; merges two programs, with automatic renumbering of the second so as to prevent any clashes of line numbers; recovers your program even though you did type NEW: makes one program invisible while you work on a second (saves hours of cassette time!); lists all the variables used in the program; makes SYSTEM tapes; lets you Edit memory directly...the list goes on and on. Cassette comes with 16K, 32K and 48K versions, ready to load. Can anyone afford NOT to have BMON?

***** LNW RESEARCH EXPANSION INTERFACE BOARDS - \$79.95 + \$2.00 p&p *****

These are the Expansion interface boards featured in the constructional article in September's MICRO-80. They are the basis for a high quality, reliable expansion interface for the TRS-80 (or the SYSTEM 80 via out SYSPAND 80 adaptor). Initially we are offering the boards with their comprehensive instruction manuals. Shortly we will offer modular kits of components and fully built up and tested units. Now in stock but hurry, the orders are pouring in.

** EDUCATIONAL **

RPN CALCULATOR (L2/16K & 32K) \$14.95+50cp&p

Give your computer the power of a \$650 reverse polish notation calculator with 45 functions and selectable accuracy of 8 or 16 digits. The main stack and registers are continuously displayed whilst the menu is always instantly accessible without disturbing any calculations or register values. The cassette comes with both the 16K and 32K versions, the latter giving you the additional power of a programmable calculator. Comes with a very comprehensive 15 page manual, which includes instructions to load and modify the 32K programmable version to run in 16K. Whether for business or pleasure, this package will prove invaluable, and turn your '80 into a very powerful instrument.

TOUCHTYPE (L2/4K) \$19.95 + 50c. p&p.

An interactive, 22 lesson typing course which uses the computer's keyboard and screen to teach you to type rapidly and accurately and, a massive cassette data dump to control your progress. The computer checks for accuracy, and sets timed exercises to check your progress. If you have to look at each key before you press it, or only use two fingers, then this program, plus a little perseverance, will do some amazing things to your typing speed.

** GAMES **

U BOAT \$7.50 plus 50c. p&p.

Real time simulation at its best! Comes with working sonar-screen and periscope, a full rack of torpedoes, plenty of targets, working fuel and battery meters, helpful Mothership for high-seas reprovisioning and even has emergency radio for that terrible moment when the depth charges put your crew at risk. Requires Level II/16K.

SPACE INVADERS \$7.50 plus 50c. p&p.

Much improved version of this arcade favourite with redesigned laser and cannon blasts, high-speed cannon, 50 roving drone targets, 10 motherships and heaps of fun for all. Level II with 4K and 16K versions on this cassette.

MMM- vol.1 and vol.2. \$7.50 ea. plus 50c. p&p.

Two, three-game cassettes from that master of TRS-80 graphics, Charlie Bartlett. Vol.1 brings you INDY 500, an exciting road race that gets faster and faster the longer you play, SUBHUNT in which your warship blows up unfortunate little submarines all over the place, and KNIEVEL (as in motorcycle, ramp and buses).

Vol.2 (not System 80 compatible) contains TANK, a two player battle of speed and skill, THIEF (steal an old man's hoard of loot then escape from the labyrinth before he gets you), and SHOOTOUT (a Mexican style high-noon for two).

```

410 IFA=0D=B:G.470
420 IFB=0D=A:G.470
425 REM-SQU(C)
430 D=C*.5:Z=0
440 W=(C/D-D)*.5
450 IF(W=0)+(W=Z)D=I.(D*10)/10:G.470
460 D=D+W:Z=W:G.440
470 A(N+12)=D
480 N.N:IFT=10G.530
485 IFO=10=0:GOS.940:T=T+1:P.A.64,:G.280
490 O=2:GOS.900:GOS.940:G.270
500 P."WELL DONE!!"
510 P."YOU GOT THEM ALL IN";T;"TURNS";
520 G.620
530 GOS.870:P."SORRY THAT'S 10 TURNS
540 P."YOU FOUND";F;"MUGWUMP";:IFF>1P."S
545 P.
550 P."HERE'S WHERE THEY ARE HIDING
560 F.N=1T02500:N.N:GOS.870
570 F.N=1T04
580 IFA(N+8)=1G.600
590 P."MUGWUMP #";N;"IS AT";A(N);", ";A(N+4)
600 N.N
620 Y=1:N=0
700 P.A.109,"WANT TO TRY AGAIN";A.173;
710 I."ENTER <Y> OR <N> ";P
720 IFP=0E.
730 C.:P.:P."FOUR MORE MUGWUMPS
740 P."ARE NOW HIDING":G.130
800 F.N=1T010
810 P.A.1023-N*64,N;A.N*3+319,N;:N.N
830 F.Z=5T0635.6:F.X=2T0Z+4
840 F.Y=18T046S.3
850 S.(X,Y):S.(X,Y+1)
860 N.Y:N.X:N.Z
863 P.A.300,"UNITS FROM MUGWUMPS";
865 P.A.356,"X";A.359,"Y";A.364,"#1";A.369,"#2";
867 P.A.374,"#3";A.379,"#4";:RET.
870 P.A.0:P.:P.:P.
880 P.A.0,:RET.
900 Y=10+3*(10-M):X=4+6*(L-1)
910 R=64*I.(Y/3)+I.(X/2)
920 IFO=1P.A.R," #";:O=0:RET.
930 IFO=2P.A.R," ?";:O=0:RET.
940 P.A.E-2,L;A.E+1,M;
950 F.N=1T04:IFA(N+8)=0P.A.E+N*S,A(12+N);
960 N.N:E=E+64:RET.

```

*** ALPHABETICAL LISTING (L1/4K) by T. Fraser ***

If you are anxious to use this program, leave out Line 1 and all Lines from 4000 on (all of the instructions), it will save your typing finger too! The instructions are very comprehensive so you should have no trouble in using this program. As far as its logic is concerned, Lines 10 and 20 give each letter of the alphabet a value (A=1, B=2 etc.), this is so your '80 can understand which letter you enter. At Line 30, C. is the same as CLS. If you have been afraid to use the ON GOTO statement before, Lines 40 to 60 show you how to use it. If you need more information on the ON GOTO statement, THEN GOTO page 79 of your User's manual!

```

1 C.:GOS.4000
10 A=1:B=2:C=3:D=4:E=5:F=6:G=7:H=8:I=9:J=10:K=11:L=12:M=13:N=14:O=15
20 P=16:Q=17:R=18:S=19:T=20:U=21:V=22:W=23:X=24:Y=25:Z=26
30 C.:I."ENTER LETTER REQUIRED";A(1):P.A.7960
40 ONA(1)G.100,200,300,400,500,600,700,800,900,1000,1100,1200,1300
50 ONA(1)-13G.1400,1500,1600,1700,1800,1900,2000,2100,2200,2300
60 ONA(1)-23G.2400,2500,2600
70 I."PRESS ENTER";A$:G.30
199 G.70
299 G.70
399 G.70
499 G.70

```

599 G.70
 600 P. *TONY FRASER
 601 P. *4 GAYHURST RD. KENWICK 6107 W.A.*:GOS.3000
 602 P. *AFTER YOU HAVE ENTERED A NAME AND ANY RELEVANT INFORMATION
 603 P. *ADD GOS.3000 THIS WILL PUT A DELAY AND A LINE
 604 P. *BETWEEN EACH NAME LIKE THE ONE BELOW*:GOS.3000
 605 P. *NOW TRY IT FOR YOUR SELF*:GOS.3000
 606 P. *JUST PRESS BREAK AND ADD THE NAMES AND ADDRESSES OF YOUR
 607 P. *FRIENDS TO THIS PROGRAMME.*:GOS.3000
 699 G.70
 799 G.70
 899 G.70
 999 G.70
 1099 G.70
 1199 G.70
 1299 G.70
 1300 P. *MICRO-80
 1301 P. *P.O. BOX 213 GOODWOOD 5034 S.AUST.
 1302 P. *TEL. (08) 272 0966*:GOS.3000
 1399 G.70
 1499 G.70
 1599 G.70
 1699 G.70
 1799 G.70
 1899 G.70
 1999 G.70
 2099 G.70
 2199 G.70
 2299 G.70
 2399 G.70
 2499 G.70
 2599 G.70
 2699 G.70
 3000 P. :F.A(0)=1T0200:N.A(0):RET.
 4000 P. *THE LETTER A STARTS AT 100, B AT 200, C AT 300 AND SO ON.
 4010 P. *THIS GIVES YOU 99 LINES FOR EACH LETTER GROUP YOU WISH TO*;
 4020 P. * INDEX.
 4030 P. *LINES SHOULD BE WRITTEN INTO THE PROGRAMME IN THIS FORM
 4040 P. *LINE NUMBER P.' NAME RELEVANT INFORMATION
 4050 P. *LINE NUMBER P.' END OF THIS NAME':GOS.3000
 4060 P. *REPLACE ' ' WITH QUOTES
 4065 P.
 4070 P. *ALWAYS START EACH LINE WITH P. AND END EACH BLOCK OF
 4080 P. *INFORMATION WITH GOS.3000
 4090 P. *GOS.3000 WILL PUT A DELAY AND A LINE BETWEEN EACH BLOCK
 4095 GOS.5000
 4100 P. *AS THE INFORMATION IS DISPLAYED ON THE SCREEN
 4110 P. *IT WILL ROLL UP THE SCREEN, WHEN THE NAME YOU REQUIRE COMES
 4120 P. *ON THE SCREEN PRESS THE BREAK KEY TO STOP THE PROGRAMME.
 4130 P. *TO RECOMMENCE TYPE CONT AND PRESS ENTER, CONT TELLS YOUR 80
 4135 P. *TO CONTINUE FROM WHERE IT WAS INTERRUPTED BY THE BREAK COMMAND.
 4136 P.
 4140 P. *TO START WITH THE PROGRAMME ASKS YOU TO ENTER THE LETTER
 4150 P. *YOU REQUIRE, IF YOU REQUIRE A NAME THAT STARTS WITH S JUST
 4160 P. *ENTER S AND ALL THE NAMES UNDER S WILL ROLL UP THE SCREEN,
 4170 P. *JUST PRESS BREAK WHEN THE CORRECT NAME APPEARS.
 4180 P. *TYPE CONT THEN PRESS ENTER AND THE LIST WILL CONTINUE TO
 4190 P. *THE END OF THAT GROUP OF LETTERS.
 4200 GOS.5000
 4210 P. *I HAVE MADE THIS EXAMPLE FOR A TELEPHONE INDEX BUT
 4220 P. *BY ALTERING THE MESSAGES ANYTHING CAN BE INDEXED.
 4230 P. *THE SPEED AT WHICH THE INFORMATION IS ROLLED UP THE SCREEN
 4240 P. *CAN BE ALTERED BY ALTERING THE FOR/NEXT LOOP IN LINE 3000
 4250 P. :P. *ONCE YOU HAVE MADE A FEW ENTRIES AND KNOW THE
 4260 P. *INSTRUCTIONS DELETE LINE 1 AND ALL LINES FROM 4000 ON.
 4265 P. *A MESSAGE HAS BEEN PUT INTO THE INDEX (600 TO 607)
 4270 P. *THESE LINES MAY BE DELETED ONCE YOU KNOW HOW TO MAKE YOUR
 4275 P. *OWN ADDITIONS TO THE PROGRAMME
 4280 P. *BY DOING THIS YOU WILL HAVE MORE MEMORY AND YOU CAN ADD MORE
 4285 P. *NAMES TO YOUR LIST
 4290 PRINT:PRINT*TO TRY IT OUT PRESS ENTER THEN TYPE IN LETTER F*
 4295 I.A\$:G.10
 5000 I. *PRESS ENTER TO CONTINUE* ;A\$:C.:RET.

*** WELL CLIMBER (L2/4K)

by J. PINAKIS ***

This is the computer version of the popular electronic game of Leds and Ladders. The object of this game is for you (represented by a flashing white graphic dot) to try to climb to the top of the well (which is represented by two parallel vertical lines). Climbing is achieved by pressing the "ENTER/NEWLINE" key but there is a number of catches.

- 1) The clear key must be pressed only when the dot is on. If it is pressed when it is off you may fall further down the well.
- 2) If you delay pressing the button you will also slip down the well.
- 3) The dot will flash a lot more rapidly after you have climbed half way.
- 4) The distance that you slip increases with the altitude that you have reached.
- 5) If you keep your finger on the "ENTER/NEWLINE" key for more than about half a second, you may also find yourself further down the well.

TIP: For the most effective climbing try to use a stroking action of the key.

```

10 'WELL CLIMBER...J.PINAKIS...PERTH W.A....1980
20 DEFINTA-Z
30 CLS
40 PRINT@B32,"TO CLIMB WELL,":PRINT"PRESS 'ENTER/NEWLINE' ";
50 PRINT@960,"ONLY WHEN LIGHT IS LIT";
60 FORY=0TO47:SET(63,Y):SET(65,Y):NEXT
70 X=64:Y=47:HY=47
80 PRINT@0,"MOVES TAKEN";M::PRINT@64,"HEIGHT =":47-Y;
90 IFY>HYTHEN120
100 RESET(62,HY):HY=Y:SET(62,HY)
110 PRINT@128,"HIGHEST REACHED";47-HY;
120 L=L+1:IFL=STHENY=Y+RND(47/Y):L=0
130 IFY>14THENR=30ELSER=Y+Y
140 IFY>47THENY=47
150 SET(X,Y):FORD=1TOR:GOTO200
160 NEXT
170 RESET(X,Y):FORD=1TOR:GOTO210
180 NEXT
190 GOTO80
200 IFPEEK(14400)<>1THEN160 ELSE220
210 IFPEEK(14400)<>1THEN180 ELSE220
220 M=M+1:L=0
230 IFPOINT(X,Y)THEN240 ELSE260
240 RESET(X,Y):Y=Y-RND(3):IFY<1THEN280
250 GOTO170
260 RESET(X,Y):Y=Y+47/Y+RND(5):IFY>47THENY=47
270 GOTO170
280 PRINT@0,"YOU CLIMBED TO THE TOP IN ";M;"MOVES"

```

*** 741 ACTIVE FILTER (L2/16K) (C) J.D. INGRAM ***

The author of this program has sent in very detailed notes and a flowchart of his program and since he obviously knows more about electronics than yours truly, the best thing to do would be to let him tell you about it himself.....

Having delved in electronics for a number of years, periodically some problems arise which in themselves are trivial. However they require some thought -- modulating speech and timing on a cassette then demodulating or filtering for example. Active filters have fascinated me and everyone has his cutoff slope - Butterworth, Bessel, Chelysher -- but these weren't what I wanted most of the time. However, if I use a gain of 2.0 I can get a much sharper cutoff and still have a simple circuit. Since the 741 operational amplifier is almost blowout proof and doesn't latch up (as does the 709) I settled on it for some of my work. Have you ever needed to separate two signals, one at 1KHz, the other at 5KHz, then another time you wanted a simple but sharp cutoff filter? Well this 741 active filter will see you well on your way.

A two pole active filter will give -6db / octave roll off using unity gain and the Corner Frequency (FC) is given by the formula:- $FC = 1/(2 \pi RC)$ where $(R1=R2, C1=C2)$ is at the 3db point. However, if the gain is doubled, the roll-off is doubled, ie. 12db/octave while FC no longer has rounded shoulders but a flat response up to FC and then a sharp transition to the roll-off slope. Depending on the accuracy of the gain-set resistors R3 & R4 there may be under or over shoot at FC.

The 741 op amp has certain limitations and so components to be used with it must also be limited :
 $F_{max} = 500 \text{ KHz}$, $F_C \text{ max} = 159 \text{ KHz}$, $10\text{K} (R_1=R_2) (1\text{M}$, $100\text{pF} (C_1=C_2) (1\text{mF}$. Staying between these limits still gives you a wide choice.

The generalised circuit of the Active Filter is shown in Figure 2 The flow chart for the program logic is shown in Figure 1

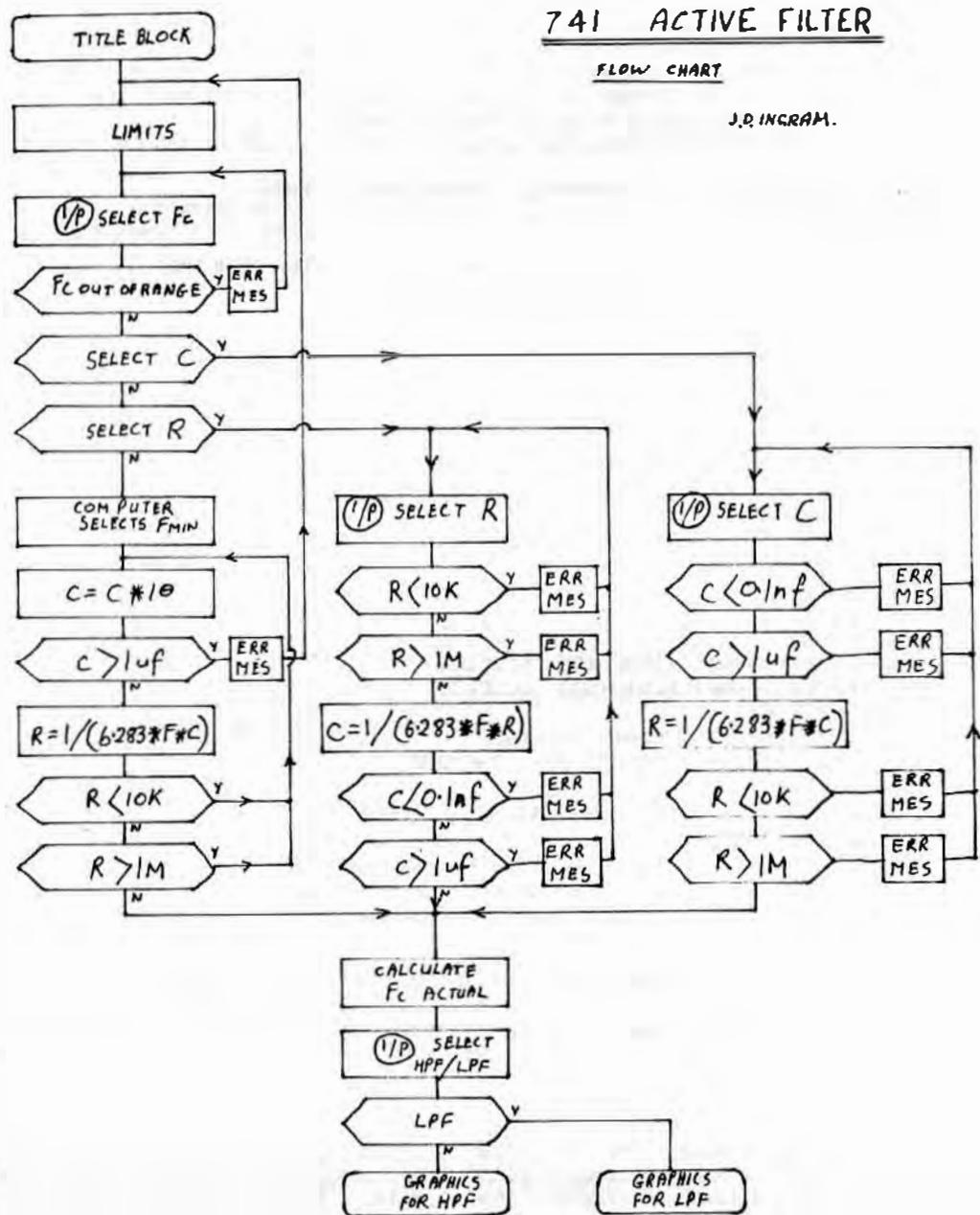


FIGURE 2 - GENERALISED CIRCUIT DIAGRAM FOR ACTIVE FILTER

Enter the program and RUN it. You will be asked for the required Corner Frequency. On inputting that, you will then be asked if you want to specify the values of capacitance and resistance or leave that up to the computer. Finally, you will be asked if you require a Low Pass Filter (LPF) or a High Pass Filter (HPF). The program then draws the circuit on the screen, complete with component values. When building the circuit, it is best to use another 741 as a voltage follower to drive the active filter. What more is there to say --- load the program, then design an active HPF filter to clean up your HUM ridden computer tapes.

741 ACTIVE FILTER

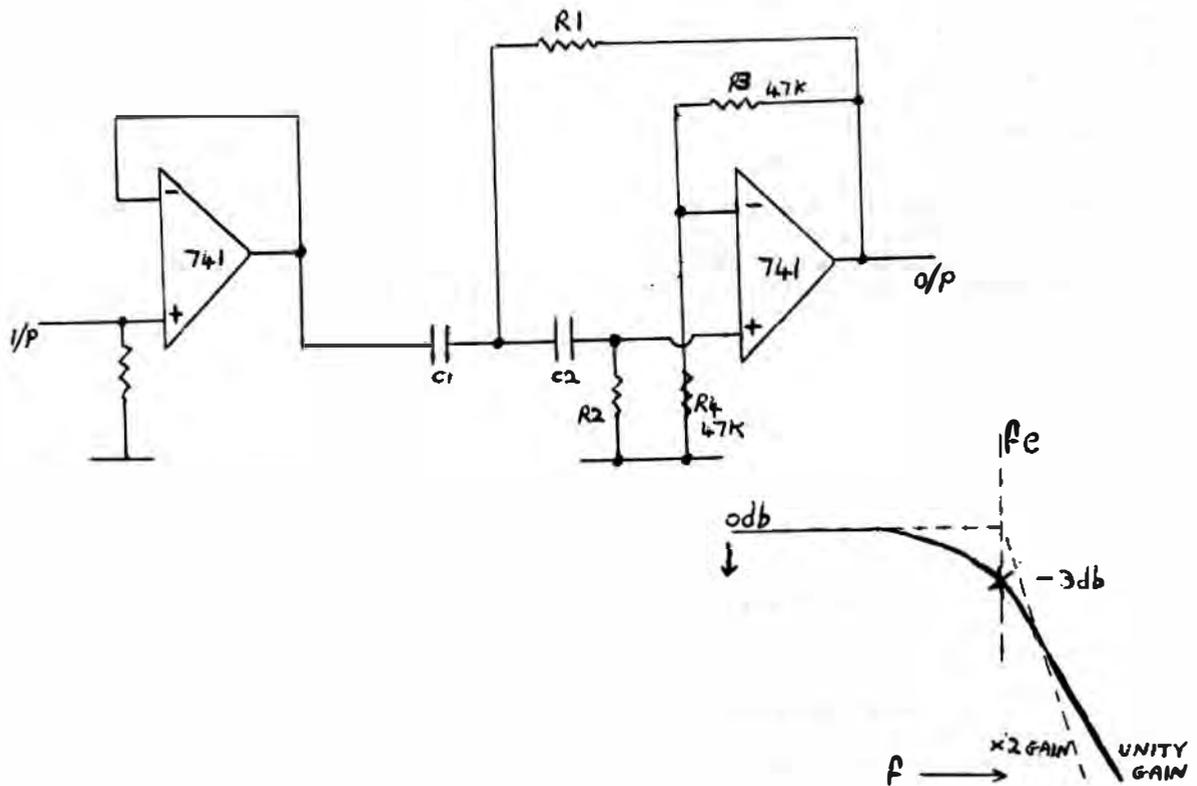


FIGURE 1 - FLOW CHART FOR ACTIVE FILTER PROGRAM LOGIC

```

5 * COPYRIGHT (C) 1979 BY J.D. INGRAM, PO BOX 244, GAWLER 5118.
10 CLS:PRINT@8,"** 741 ACTIVE FILTER **"
20 PRINT@12B,"THIS PROGRAMME WILL CALCULATE VALUES FOR A"
30 PRINT" TWO POLE ACTIVE FILTER USING THE 741 OP AMP."
40 PRINT" THE CCT HAS A GAIN OF 2, AND A ROLLOFF >12DB / OCTAVE."
50 PRINT" THE CORNER FREQUENCY IS AT 0DB INSTEAD OF -6DB AS IN A"
60 PRINT" UNITY GAIN CCT."
70 PRINT" FOR THIS ACTIVE FILTER TO PERFORM IT SHOULD BE DRIVEN"
80 PRINT" FROM A LOW IMPEDANCE SOURCE EG A UNITY GAIN 741."
90 PRINT@640,"";:INPUT"PRESS 'ENTER' TO CONTINUE";A$
100 Y=1:N=2:W=0:E=0:G=0:L=3:H=4
200 CLS:PRINT@14,"** L I M I T S **"
205 PRINT
210 PRINT" CORNER FREQUENCY < 159KHZ"
220 PRINT" OP AMP MAXIMUM FREQUENCY < 500KHZ"
230 PRINT" R > 10K < 1M      C > 0.1NF < 1000NF"
240 PRINT" ‡ FOR SIMPLICITY  R1=R2  R3=R4  C1=C2  ‡"
245 PRINT
250 INPUT" GIVE CORNER FREQUENCY IN HERTZ ";:O
260 IF O>159000GOTO267
265 GOTO270
267 PRINT" CORNER FREQUENCY TOO HIGH FOR 741"
268 GOSUB3000:GOTO250
270 INPUT" DO YOU WANT TO SELECT CAPACITANCE, TYPE Y OR N ";:E$
280 IF E$="Y" THEN W=1:GOTO410
290 INPUT" DO YOU WANT TO SELECT RESISTANCE, TYPE Y OR N ";:G$
300 IF G$="Y" THEN W=2:GOTOS10
310 W=3:GOTO610
410 CLS:PRINT@0,"";:INPUT" WHAT CAPACITANCE, IN NANOFARADS ";:A
420 IF A<.1GOTO427
425 GOTO430
427 PRINT" SELECTED CAPACITANCE TOO LOW"
428 GOSUB3000:GOTO410
    
```

```

430 IFA>1E3GOTO437
435 GOTO440
437 PRINT"SELECTED CAPACITANCE TOO HIGH"
438 GOSUB3000:GOTO410
440 B=1/(6.283*0*A*1E-9)
450 IFB<1E4GOTO457
455 GOTO460
457 PRINT"SELECT LOWER CAPACITANCE"
458 GOSUB3000:GOTO410
460 IFB>1E6GOTO467
465 GOTO470
467 PRINT"SELECT LARGER CAPACITANCE"
468 GOSUB3000:GOTO410
470 B=B/1E3:S=B:GOSUB5010:B=S:GOTO1010
510 CLS:PRINT@0,":INPUT"WHAT RESISTANCE, IN KILOHMS ";B
520 IFB<10GOTO527
525 GOTO530
527 PRINT"SELECTED RESISTANCE TOO LOW"
528 GOSUB3000:GOTO510
530 IFB>1E3GOTO537
535 GOTO540
537 PRINT"SELECTED RESISTANCE TOO HIGH"
538 GOSUB3000:GOTO510
540 A=1E6/(6.283*0*B)
550 IFA<.1GOTO557
555 GOTO560
557 PRINT"SELECT LOWER RESISTANCE"
558 GOSUB3000:GOTO510
560 IFA>1E3GOTO567
565 GOTO570
567 PRINT"SELECT LARGER RESISTANCE"
568 GOSUB3000:GOTO510
570 S=A:GOSUB5010:A=S:GOTO1010
610 A=1E-11
620 A=A*10:IFA>1E-6GOTO627
625 GOTO630
627 PRINT"CAPACITANCE NOW OUT OF RANGE"
628 GOSUB3000:GOTO200
630 B=1/(6.283*0*A)
640 IFB<1E4GOTO620
650 IFB>1E6GOTO620
660 B=B/1E3:S=B:GOSUB5010:B=S:A=A/1E-9:S=A:GOSUB5010:A=S:GOTO1010
1010 I=1/(6.283*B*A*1E-6)
1020 INPUT"TYPE L FOR LPF OR H FOR HPF ";D$
1030 CLS:IFD$="L"PRINT@20,"LOW PASS FILTER"
1040 IFD$="H"PRINT@20,"HIGH PASS FILTER"
1060 PRINT"GAIN=2          ROLLOFF >12DB / OCTAVE"
1070 PRINT"SELECTED FC=";0;"HZ          CALCULATED FC=";I;"HZ"
1080 GOSUB2000
1090 IFD$="L"GOTO1130
1100 PRINT@585,"C1";:PRINT@647,A;"N";:PRINT@594,"C2";:PRINT@655,A;"N";
1110 PRINT@274,"R1";:PRINT@337,B;"K";:PRINT@791,"R2";:PRINT@851,B;"K";
1120 PRINT@1020,":INPUTA$;:GOTO200
1130 PRINT@274,"C1";:PRINT@337,A;"N";:PRINT@791,"C2";:PRINT@851,A;"N";
1140 PRINT@585,"R1";:PRINT@647,B;"K";:PRINT@594,"R2";:PRINT@655,B;"K";
1150 PRINT@1020,":INPUTA$;:GOTO200
2000 PRINT@415,"2";:PRINT@432,"R3";:PRINT@483,"-";:PRINT@496,"47K";
2010 PRINT@551,"741";:PRINT@571,"0/P";:PRINT@576,"I/P";:PRINT@611,"+";
2020 PRINT@626,"6";:PRINT@671,"3";:PRINT@865,"R4";:PRINT@929,"47K";
2030 PRINT@977,"0U";:FORQ=18T032:SET(66,Q):NEXTO:X=66:Y=18
2040 FORN=0T07:SET(X+4*N,Y+N):NEXTN:Y=32:FORN=0T07:SET(X+4*N,Y-N):NEXTN
2050 FORF=95T0115:SET(F,25):NEXTF:FORF=28T0107:SET(F,13):NEXTF
2060 FORF=58T0107:SET(F,16):NEXTF:FORF=58T066:SET(F,22):NEXTF
2070 FORF=10T066:SET(F,28):NEXTF:FORF=42T083:SET(F,47):NEXTF
2080 FORF=80T093:SET(F,15):NEXTF:FORF=80T093:SET(F,17):NEXTF
2090 FORF=82T091:RESET(F,16):NEXTF:FORF=38T044:SET(S7,F):NEXTF
2100 FORF=38T044:SET(60,F):NEXTF:FORF=13T025:SET(106,F):NEXTF
2110 FORF=13T025:SET(107,F):NEXTF:FORF=16T047:SET(58,F):NEXTF
2120 FORF=16T047:SET(59,F):NEXTF:FORF=28T047:SET(48,F):NEXTF
2130 FORF=28T047:SET(49,F):NEXTF:FORF=13T028:SET(28,F):NEXTF
2140 FORF=13T028:SET(29,F):NEXTF:FORF=39T043:RESET(58,F):NEXTF
2150 FORF=39T043:RESET(59,F):NEXTF:RESET(58,27):RESET(59,27)
2160 RESET(58,29):RESET(59,29):RETURN
3000 FORF=0T01222:NEXTF:RETURN

```

```

5010 U=0:S=S/1E3
5020 T=INT(S):IFT>=1GOTO5040
5030 U=U+1:S=S*10:GOTO5020
5040 S=INT(S*10+.5)
5050 IFU>=5GOTO5070
5060 U=U+1:S=S*10:GOTO5050
5070 S=S/1E3:RETURN

```

*** WORLD TIME

L2/16K

(C) B.J. WHITE ***

This program will output the time in another country, selected from a list, when the local time is entered. As written the program is designed for use from Australian eastern states. The variable "J" in lines 210 to 410 will require changing for other states. "J" appears more than once in some lines.

```

CHANGES  W.A.  J=J+2  IF THE FOLLOWING GOSUB IS TO 440
           J=J-2  IF THE FOLLOWING GOSUB IS TO 420

           S.A.  J=J+.5 IF THE FOLLOWING GOSUB IS TO 440
           J=J-.5 IF THE FOLLOWING GOSUB IS TO 420

```

Listed below is a breakdown of the program lines so that those who wish to may make changes to the program, for instance reversing the operation so that given the local time in another country the program would output the time in your location.

60-100	Print instruction line and list of countries indexed by a single letter. System 80 owners may omit the CHR\$(23) instruction.
110	INKEY\$ INPUT of country index letter. Check for validity then convert to numerical variable "X" in range 1-20 for branching from line 200.
130	INPUT LOCAL TIME. B\$,C\$,D\$. Convert B\$ and C\$ to numerical and test for validity.
150	INKEY\$ INPUT reply to Daylight Saving question. E\$="Y" or "N"
160-180	IF E\$="Y" convert daylight saving time to normal and make adjustment to D\$ if required.
190	Converts local time from 12 hour to 24 hour format. ie. If D\$="PM" add 12 to hours.
200	Converts local time (hours/minutes) to decimal format. ie. 9:30 = 9.5. Branch to line for desired country using variable "X" from line 110.
210-410	Contain the variable "J" (SEE MAIN TEXT). GOSUB 420 or 440 depending if the country is ahead or behind local time. Print countries concerned. Branch to 570 for end or rerun
420	Computes time for countries behind local time. Set Y\$ to "TODAY" or "YESTERDAY" as required
440	Computes time for countries ahead of local time. Set Y\$ to "TODAY" or "YESTERDAY" as required.
470	Converts desired time "L" from decimal to hours/minutes.
480-520	480-520 Convert desired time (hours "X") from 24 HR to 12 HR format adjusting X\$ to "AM" or "PM" as required.
540	Checks if Y\$ (output day) requires changing, only if input was daylight saving time between midnight and 1 AM.
550	Converts desired time to string for printing. Tests for MIDDAY or MIDNIGHT.
551	Formats printout of desired time. Returns to line branched from (210-410) to print list of countries
570	INKEY\$ INPUT to run again or terminates program.

The variables "J" were gleaned from the Sydney telephone directory and an atlas. (Perhaps one of our U.K. readers would like to rework this program to suit local time. If so, please send it in to us and we will be happy to publish it -Ed).

```

10 REM INTERNATIONAL TIME
   B.J. WHITE
   70 ADDISON RD CULBURRA 2540
   NSW
20 REM           NOTE THAT THIS PROGRAM IS WRITTEN FOR THE
                   EASTERN STATES OF AUSTRALIA.
                   FOR OTHER LOCATIONS THE VALUE 'J' WILL
                   REQUIRE CHANGING IN THE FOLLOWING LINES

30 REM           210     220     230     240     250     260     280     290           300
   310     320     330     340     350     360     370           380     390     400     4
10
40 REM           THE VALUE FOR 'J' MAY BE FOUND IN THE
                   INTERNATIONAL TIME SECTION OF PHONE DIRECTORY
50 REM DICK SMITH SYSTEM 80 USERS
   THIS PROGRAM USES THE CHR$(23) FUNCTION
   IT MAY BE DELETED WITHOUT DETRIMENT TO THE PROGRAM
   BUT TRY IT WITH IT IN FIRST
60 CLEAR200:
   AB$=STRING$(64,CHR$(140)):
   AC$=STRING$(31,CHR$(140)):
   S$=STRING$(9,CHR$(32)):
   CLS:
   PRINT"TO FIND THE TIME IN ANOTHER COUNTRY ENTER THE LETTER UNDER WHICH THAT C
   OUNTRY IS LISTED":
   PRINT AB$:
70 PRINT"A..AUSTRIA ANGOLA ALGERIA BELGIUM C'ZECH DENMARK FRANCE GERMANY   ITAL
   Y LIBYA NIGERIA N'LANDS NORWAY POLAND SPAIN SWIZERLAND":PRINT"B..BULGARIA CRETE
   EGYPT FINLAND GREECE ISRAEL JORDAN ROMANIA           SUDAN S.AFRICA SYRIA TURKEY"
80 PRINT"C..ARABIA ETHIOPIA KENYA KUWAIT MOSCOW TANZANIA UGANDA":PRINT"D..BERMUD
   A CHILE ECUADOR VENEZUELA           E..CANADA & U.S.A":PRINT"F..ARGENTINA BRAZIL PAR
   AGUAY URUGUAY           G..MIDWAY SAMOA"
90 PRINT"H..CHINA HONG KONG MANILLA TAWAIN           I..DJAKARTA THAILAND", "J..ENGL
   AND IRELAND MOROCCO",S$;"K..AFGHANISTAN PAKISTANL..SINGAPORE MALAYSIA VIETNAM",S
   $;"M..NEW ZEALAND SUVA"
100 PRINT"N..CEYLON INDIA", " O..JAPAN KOREA           P..ALASKA           Q..BURMA":PRI
   NT"R..ICELAND", " S..HAWAII TAHITI           T..NOUMEA"
110 X$=INKEY$:
   IF X$="" THEN 110 ELSE
   IF ASC(X$)<65 OR ASC(X$)>84 THEN 110 ELSE
   X=ASC(X$)-64
120 CLS:PRINTCHR$(23)
130 INPUT"YOUR TIME ( HR, MIN, AM OR PM)";B$,C$,D$:B=VAL(B$):C=VAL(C$):IF B>0 A
   ND B<13 AND C=>0 AND C<60 AND D$="AM" OR B>0 AND B<13 AND C=>0 AND C<60 AND D$="
   PM" THEN 140ELSE PRINT:PRINT"INPUT ERROR PLEASE RE-ENTER":PRINT:GOTO 130
140 PRINT:PRINT"ARE YOU ON DAYLIGHT SAVING (Y/N) ?";
150 E$=INKEY$:
   IF E$="Y" THEN 170 ELSE
   IF E$="N" THEN 210 ELSE 150
160 REM IF ON DAYLIGHT SAVING TAKE OFF 1 HR AND CORRECT FOR AM/PM
170 B=B-1:
   IF B=11 AND D$="PM" THEN D$="AM":GOTO 210
180 IF B=11 AND D$="AM" THEN D$="PM":GOTO 210
190 IF B=0 AND D$="PM" THEN B=12
200 REM CHANGE HOURS TO 24 HR FORMAT
210 IF B<12 AND D$="PM" THEN B=B+12
220 REM CHANGE MINUTES TO DECIMAL AND ADD TO HOURS
   THEN BRANCH TO COUNTRY SELECTED
230 CLS:
   H=B+(C/60):
   PRINTCHR$(23):
   ON X GOTO 250,260,270,290,300,280,330,340,380,390,430,370,440,420,360,320,41
   0,400,350,450

```

```

240 REM ' J ' = THE TIME VARIATION
250 J=9:
  GOSUB 470:
  PRINT:PRINT"AUSTRIA", "ANGOLA", "ALGERIA", "BELGIUM", "CZECHOSLOVAKIA":PRINT"DEN
MARK", "FRANCE", "GERMANY", "ITALY", "LIBYA", "NIGERIA", "NETHERLANDS", "NORWAY", "POLAN
D", "SPAIN", "SWEDEN", "SWITZERLAND":PRINT
  :GOTO 690
260 J=8:
  GOSUB 470:
  PRINT:PRINT"BULGARIA", "CRETE", "EGYPT", "FINLAND", "GREECE", "ISRAEL", "ROMANIA",
"SUDAN", "STH.AFRICA", "SYRIA", "JORDAN", "TURKEY":PRINT:
  GOTO 690
270 J=7:
  GOSUB 470:
  PRINT:PRINT"ARABIA", "ETHIOPIA", "KENYA", "KUWAIT", "TANZANIA", "UGANDA", "MOSCOW"
:PRINT:
  GOTO 690
280 J=13:
  GOSUB 470:
  PRINT:PRINT"ARGENTINA", "BRAZIL", "PARAGUAY", "URUGUAY":PRINT:
  GOTO 690
290 J=14:
  GOSUB 470:
  PRINT:PRINT"BURMUDA", "CHILE":PRINT"ECUADOR", "VENEZUELA":PRINT"CARACAS", "LA P
AZ":PRINT:
  GOTO 690
300 J=15:
  GOSUB 470:
  PRINT"EASTERN U.S.A. & CANADA":PRINT AC$:
  J=16:
  GOSUB 470:
  PRINT"CENTRAL U.S.A. & CANADA":PRINT AC$:
  J=17:
  GOSUB 470:
  PRINT"MOUNTAIN ZONE U.S.A. & CANADA":PRINT AC$
310 J=18:
  GOSUB 470:
  PRINT"WESTERN U.S.A. & CANADA":
  PRINT AC$:PRINT"DAYLIGHT SAVING IN SOME STATES MAR TO OCT STANDARD TIME GIU
EN":
  GOTO 690
320 J=19:
  GOSUB 470:
  PRINT"EASTERN ALASKA":PRINTAC$:PRINT:
  J=20:
  GOSUB 470:
  PRINT"ANCHORAGE ALASKA":PRINTAC$:PRINT:
  J=21:
  GOSUB 470:
  PRINT"NOME ALASKA":PRINTAC$:PRINT:
  GOTO 690
330 J=21:
  GOSUB 470:
  PRINT:PRINT:PRINT"MIDWAY", "SAMOA":PRINT:PRINTI:
  GOTO 690
340 J=2:
  GOSUB 470:
  PRINT:PRINT"CHINA", "HONG KONG":PRINT"MANILLA", "TAWAIN":PRINT:PRINT"HONG KONG
IS ON DAYLIGHT SAVING MAR TO OCT STANDARD TIME GIVEN":PRINT:PRINT:
  GOTO 690
350 J=20:
  GOSUB 470:PRINT:PRINT:PRINT"HAWAII", "TAHITI":PRINT:PRINT:
  GOTO 690
360 J=1:
  GOSUB 470:
  PRINT:PRINT"JAPAN", "KOREA":PRINT:PRINT:
  GOTO 690
370 J=2.S:
  GOSUB 470:
  PRINT:PRINT"SINGAPORE":PRINT"MALAYSIA", "UIET NAM":PRINT:
  GOTO 690
380 J=3:
  GOSUB 470:
  PRINT"DJAKARTA", "THAILAND":PRINT:PRINT:
  GOTO 690

```

```

390 J=10:
    GOSUB 470:
    PRINT:PRINT TAB(10);"G M T":PRINT:PRINT"U.K.", "MOROCCO":PRINT:PRINT:
    GOTO 690
400 J=11:
    GOSUB 470:
    PRINT:PRINT"REYKJAVIC - ICELAND":PRINT:PRINT:
    GOTO 690
410 J=3.5:
    GOSUB 470:
    PRINT:PRINT:PRINT"BURMA":PRINT:PRINT:
    GOTO 690
420 J=4.5:
    GOSUB 470:
    PRINT:PRINT:PRINT"INDIA", "CEYLON":PRINT:PRINT:
    GOTO 690
430 J=5:
    GOSUB 470:
    PRINT:PRINT:PRINT"AFGHANISTAN", "PAKISTAN":PRINT:PRINT:
    GOTO 690
440 J=2:
    GOSUB 500:
    PRINT"NEW ZEALAND", "SUVA":PRINT:PRINT:
    GOTO 690
450 J=1:
    GOSUB 500:
    PRINT:PRINT:PRINT"NOUMEA":PRINT:PRINT:
    GOTO 690
460 REM CALCULATIONS FOR COUNTRIES BEHIND EST
470 L=H-J:
    GOSUB 540:
    Y$="TODAY":
    IF H<=J GOTO 480 ELSE 630
480 Y$="YESTERDAY":
    GOTO 630
490 REM CALCULATIONS FOR COUNTRIES AHEAD OF EST
500 L=H+J:
    GOSUB 540:
    IF J=1 AND H>23 OR J=2 AND H>22 THEN 520
510 Y$="TODAY":
    GOTO 630
520 Y$="TOMORROW":GOTO630
530 REM GET MINUTES AGAIN
540 X=INT(L):
    M=INT((L-INT(L))*60):
    IF J=INT(J) THEN M=C
550 REM CONVERT BACK TO 12 HR TIME AM OR PM
560 IF X->24 THEN X=X-24
570 IF X<0 THEN X=X+24
580 IF X->12 GOTO 600
590 X$="AM":
    RETURN
600 X$="PM":
    IF X>12 THEN X=X-12
610 RETURN
620 REM MAKE CORRECTION IF ON YOU WERE ON DAYLIGHT SAVING TO GET CORRECT DAY
630 IF E$="Y" AND D$="PM" AND B=23 GOTO 670
640 REM PRINT OUT TIME AND RELATIVE DAY
650 H$=STR$(X):M$=STR$(M):T$=H$+" : "+M$+" "+X$:
    IF X=0 AND M>0 THEN T$="12"+RIGHT$(T$,9) ELSE
    IF X=12 AND M=0 AND X$="PM" THEN T$="MIDDAY" ELSE
    IF X=0 AND M=0 AND X$="AM" THEN T$="MIDNIGHT"
660 PRINT USING " % % % %";T$,Y$:
    RETURN
670 Y$="YESTERDAY":
    GOTO 650
680 REM DO YOU WANT TO GO AGAIN ???
690 PRINT"PRESS 1 TO RUN AGAIN 9 TO END";
700 A$=INKEY$:
    IF A$="1" THEN GOTO 60 ELSE
    IF A$="9" THEN CLS:PRINT"PROGRAM ";CHR$(34);"INTERNATION TIME";CHR$(34);" TE
    RMINATED":PRINT"TYPE ";CHR$(34);"RUN";CHR$(34);" AND PRESS 'ENTER' TO USE AGAIN"
    :END
    ELSE 700

```

*** GRAPHIC UTILITY

(C) J. PINAKIS ***

This is a machine language program which enables you to enhance the graphic capabilities of your '80 when programming in Level II BASIC. It resides in memory from 433F HEX to 49AC HEX. As this is low memory, the program does not require the MEMORY SIZE to be set, rather, it sets the START OF BASIC pointer past itself automatically.

Enter the HEX dump using a monitor program such as BMON (TBUG will not do as this program resides in the same area). Make a SYSTEM tape using the following parameters:-

```
NAME:    UTILITY
START:   433F HEX
END:     49AF HEX
ENTRY:   4334 HEX
```

To load the program from tape:-

```
Type in SYSTEM (ENTER/NEWLINE).
Set the recorder to the PLAY position.
Answer the *? with UTILITY (ENTER/NEWLINE).
```

Two asterisks should appear in the top right hand corner of the screen with the right hand asterisk blinking on and off every four seconds. When the program has loaded, answer the *? with:- / (ENTER/NEWLINE)

You will be rewarded with a DIRECTORY showing the features available to you. This DIRECTORY may be recalled at any time by typing:-

```
CMD10 or NAME
The DIRECTORY is shown below:-
```

- 1) SAVE SCREEN IN MEMORY
- 2) RECALL SCREEN IN MEMORY
- 3) SAVE SCREEN ON TAPE
- 4) SAVE MEMORY ON TAPE
- 5) RECALL FROM TAPE TO SCREEN
- 6) RECALL FROM TAPE TO MEMORY
- 7) REVERSE SCREEN
- 8) EXCHANGE SCREEN AND MEMORY
- 9) WHITE OUT SCREEN
- 10) PRINT INDEX

As can be seen from the directory, this program provides 9 functions which can be called up by typing:-

```
CMDn
```

where n is any variable, expression or constant with a numerical value corresponding to the number of the desired command. This can be used either in a program or from the command mode.

NOTE... Before attempting to use an option which requires tape I/O, ensure that the recorder is in the correct mode and has a tape inserted, as the program will not further prompt you. The reverse screen function operates only with graphics characters. This program will not operate with Disk BASIC.

```
433F 21 69 43 22 74 41 21 AD 49 AF 77 23 77 22 A4 40
434F 23 77 23 22 F9 40 22 FB 40 22 FD 40 21 61 43 22
435F 0F 41 21 CC 06 E5 CD 5C 48 76 CD 37 23 3A AF 40
436F FE 03 CA F6 0A E5 CD 0D 0F CD 1C 2B 3D FE 0A F2
437F 13 44 CA 13 44 07 21 4B 48 4F 06 00 09 7E 4F 23
438F 7E 47 C5 E1 E9 11 48 44 21 00 3C 01 00 04 ED B0
439F E1 C9 11 00 3C 21 48 44 01 00 04 ED B0 E1 C9 21
43AF 00 3C 3E 00 CD 12 02 CD 87 02 01 00 04 7E CD 64
43BF 02 0B 78 B1 2B 03 23 18 F4 CD F8 01 E1 C9 21 4B
43CF 44 01 00 04 18 DC 21 00 3C 01 00 04 3E 00 CD 12
43DF 02 CD 96 02 CD 35 02 77 0B 78 B1 2B DC 23 18 F4
43EF 21 48 44 01 00 04 18 E4 21 00 3C 01 00 04 7E FE
43FF 20 28 13 FE 80 FA 0B 44 2F CB FF 77 23 0B 78 B1
440F 28 02 18 EA E1 C9 3E BF 77 18 F1 21 48 44 11 00
441F 3C 01 00 04 7E 32 47 44 1A 77 3A 47 44 12 23 13
442F 0B 78 B1 2B DF 18 ED 21 00 3C 01 00 04 3E BF 77
443F 23 0B 78 B1 2B CE 18 F5 00 4D 4F 4E 49 54 4F 52
444F 20 20 20 56 45 52 20 32 2E 31 00 00 3F 20 00 20
445F 45 52 52 4F 52 0D 00 49 43 35 05 44 4D 8B 05 47
446F 4F DB 05 57 50 3C 04 4C 43 8E 02 43 43 62 03 53
447F 43 A3 04 43 48 D7 04 53 42 1E 06 43 42 58 06 50
448F 52 D9 06 41 52 1C 07 00 00 00 CD 18 70 CD 0F 70
449F 57 CD 27 70 CD 24 70 21 64 00 CD 18 70 3E 0E CD
44AF 0C 70 21 7E 00 CD 18 70 CD 0F 70 57 CD 0F 70 5F
44BF FD 46 01 FD 4E 00 FD E5 DD E1 DD 09 01 04 00 DD
44CF 7E 00 FE 00 28 20 7A DD BE 00 20 06 7B DD BE 01
44DF 2B 04 DD 09 18 E9 06 01 CD 15 70 DD 6E 02 DD 66
44EF 03 FD E5 C1 09 E9 21 82 00 CD 18 70 1B AF ED 73
44FF 56 70 31 56 70 FD E5 DD E5 E5 05 C5 F5 08 09 E5
450F D5 C5 F5 ED 7B 56 70 FD 21 2A 70 FD 66 2D FD 6E
```

451F 2C 23 23 FD 75 2C FD 74 2D C9 3E 1C CD 0C 70 3E
 452F 1F CD 0C 70 C9 D5 FD E5 CD 2B 00 B7 2B FA FD E1
 453F D1 C9 D5 FD E5 CD 33 00 FD E1 D1 C9 CD 09 70 FE
 454F 0B 2B F9 CD 0C 70 C9 C5 4F CB 3F CB 3F CB 3F CB
 455F 3F CD 1E 70 CD 0C 70 79 E6 0F CD 1E 70 CD 0C 70
 456F C1 C9 FE 0A 38 02 C6 07 C6 30 C9 3E 20 CD 0C 70
 457F 10 F9 C9 C5 FD E5 C1 09 C1 7E B7 CB CD 0C 70 23
 458F 1B F7 D5 06 00 21 00 00 CD 21 70 30 10 FE 0D 28
 459F 2D FE 20 28 29 FE 2C 20 25 3E 01 18 22 55 CB 24
 45AF CB 24 CB 24 CB 24 CB 3A CB 3A CB 3A CB 3A CB 25
 45BF CB 25 CB 25 CB 25 85 6F 7C 82 67 04 18 CA AF D1
 45CF C9 CD 0F 70 FE 30 38 14 FE 3A 30 04 E6 0F 18 0D
 45DF FE 47 30 00 FE 41 38 04 D6 37 18 01 37 C9 0D 48
 45EF 45 41 44 45 52 20 43 4F 44 45 20 45 52 52 4F 52
 45FF 00 0D 44 41 54 41 20 42 4C 4F 43 4B 20 48 45 41
 460F 44 45 52 20 45 52 52 4F 52 00 0D 43 48 45 43 4B
 461F 53 55 4D 20 45 52 52 4F 52 00 0D 54 4F 20 53 41
 462F 56 45 3A 20 57 50 20 23 2C 00 0D 52 45 41 44 59
 463F 20 54 41 50 45 20 54 4F 20 52 45 41 44 00 0D 52
 464F 45 41 44 59 20 54 41 50 45 20 54 4F 20 57 52 49
 465F 54 45 00 0D 4E 41 4D 45 3A 20 00 CD 24 70 21 5D
 466F 02 CD 18 70 CD 09 70 FD 36 0F 00 FD 36 10 00 21
 467F 06 02 CD 18 70 3E 00 CD 12 02 CD 96 02 CD 35 02
 468F FE 55 20 09 21 11 02 CD 18 70 C3 06 70 06 06 CD
 469F 35 02 CD 0C 70 10 F8 CD 35 02 FE 78 28 4B FE 3C
 46AF 28 09 21 24 02 CD 18 70 C3 06 70 CD 2C 02 CD 35
 46BF 02 47 0E 00 CD 35 02 6F 81 4F CD 35 02 67 81 4F
 46CF FD 7E 0F FD 86 10 20 06 FD 75 0F FD 74 10 CD 35
 46DF 02 77 23 81 4F 10 F7 CD 35 02 B9 28 09 21 3D 02
 46EF CD 18 70 C3 06 70 C3 F4 72 FD 75 11 FD 74 12 CD
 46FF 35 02 6F CD 35 02 67 E5 21 4D 02 CD 18 70 FD 7E
 470F 10 CD 12 70 FD 7E 0F CD 12 70 3E 2C CD 0C 70 FD
 471F 7E 12 CD 12 70 FD 7E 11 CD 12 70 3E 2C CD 0C 70
 472F E1 7C CD 12 70 7D CD 12 70 CD F8 01 C3 06 70 CD
 473F 24 70 21 5D 02 CD 18 70 CD 09 70 21 86 02 CD 18
 474F 70 21 00 43 3E 00 CD 12 02 CD 96 02 CD 35 02 FE
 475F 55 28 09 21 11 02 CD 18 70 C3 06 70 77 23 06 06
 476F CD 35 02 77 23 CD 0C 70 10 F6 CD 35 02 77 23 FE
 477F 78 28 42 FE 3C 28 09 21 24 02 CD 18 70 C3 06 70
 478F CD 2C 02 CD 35 02 77 23 47 0E 00 CD 35 02 77 23
 479F 81 4F CD 35 02 77 23 81 4F CD 35 02 77 23 81 4F
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 482F 0A CD 18 70 FE 00 20 25 FD 75 0B FD 74 0C CD 1B
 483F 70 FE 00 20 18 7D FD 96 0B 94 43 A1 43 AE 43 CD
 484F 43 D5 43 EF 43 F7 43 1A 44 36 44 5C 48 21 6B 48
 485F 7E FE 99 CA 13 44 CD 3A 03 23 18 F4 54 52 53 2D
 486F 38 30 20 47 52 41 50 48 49 43 53 20 55 54 49 4C
 487F 49 54 59 20 31 20 56 45 52 53 49 4F 4E 20 33 0A
 488F 57 52 49 54 54 45 4E 20 42 59 20 4A 2E 50 49 4E
 489F 41 4B 49 53 20 20 50 45 52 54 48 20 57 2E 41 2E
 48AF 2E 2E 20 20 20 31 39 38 30 0A 0A 31 29 20 53 41
 48BF 56 45 20 53 43 52 45 45 4E 20 49 4E 20 4D 45 4D
 48CF 4F 52 59 0A 32 29 20 52 45 43 41 4C 4C 20 53 43
 48DF 52 45 45 4E 20 49 4E 20 4D 45 4D 4F 52 59 0A 33
 48EF 29 20 53 41 56 45 20 53 43 52 45 45 4E 20 4F 4E
 48FF 20 54 41 50 45 0A 34 29 20 53 41 56 45 20 4D 45
 490F 4D 4F 52 59 20 4F 4E 20 54 41 50 45 0A 35 29 20
 491F 52 45 43 41 4C 4C 20 46 52 4F 4D 20 54 41 50 45
 492F 20 54 4F 20 53 43 52 45 45 4E 0A 36 29 20 52 45
 493F 43 41 4C 4C 20 46 52 4F 4D 20 54 41 50 45 20 54
 494F 4F 20 4D 45 4D 4F 52 59 0A 37 29 20 52 45 56 45
 495F 52 53 45 20 53 43 52 45 45 4E 0A 38 29 20 45 58
 496F 43 48 41 4E 47 45 20 53 43 52 45 45 4E 20 41 4E
 497F 44 20 4D 45 4D 4F 52 59 0A 39 29 20 57 48 49 54
 498F 45 20 4F 55 54 20 53 43 52 45 45 4E 0A 31 30 29
 499F 20 50 52 49 4E 54 20 49 4E 44 45 58 0A 99 55 29
 49AF CE C0 DD 7E 0B B9 C9 1A 07 38 05 F1 3E 26 B7 C9

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***** NEXT MONTH'S ISSUE *****

Next month's issue will contain at least the following programs plus the usual features, articles, news, letters, etc.. (Two of the Level II programs advertised last month:- Pinball Machine and Bombing Raid, turned out to be Level I programs. They will appear in a future issue).

** MATURITY TEST (L1/4K) **

Find out how mature you are. Everything in life is being tested, now it's your turn.

** SHOOTING GALLERY (L1/4K) **

Shoot down the ducks as they move across your screen. That's right, now we are shooting poor little duckies!

** CWORD (L2/4K) **

Here's one for the crossword fans. You give the computer the letters you have and it comes up with the rest of the word (within reason! - Ed.). Just the thing for those difficult crossword puzzles.

** CELLAR CONTROL (L2/16K) **

Need inventory control in your Wine cellar? You'd have to be a real Wino to outgrow this one. It has the ability to keep track of over 19000 bottles!!!

** CHESS (L2/16K) **

Someone has done it at last, a chess game in BASIC for two players, complete with detailed graphics and all of it crammed into 16K of memory.

** TENNIS (L2/16K) **

Another first. Just like the arcade type pong. Now you can play it at home on your '80. The only thing missing is the slot for your money.

***** APPLICATION FOR PUBLICATION OF A PROGRAM IN MICRO-80 *****

Tick where appropriate.

To MICRO-80
Please consider the enclosed program for...

(i) Publication in MICRO-80

(ii) Publication on disk or cassette only

(iii) Both

Name.....

Address

.....

.....Post Code.....

**** CHECK LIST ****

Please ensure that the cassette or disk is clearly marked with your name and address, program name(s), Memory size, Level I, II, System 1 or 2, Edtasm, System etc. The use of REM statements with your name and address is suggested, in case the program becomes separated from the accompanying literature.

Ensure that you supply adequate instructions, notes on what the program does and how it does it...etc.

For system tapes, the start, end, and entry points, etc.

The changes or improvements that you think may improve it.

Please package securely - padabags are suggested - and enclose stamps or postage if you want your cassette or disk returned.

MICRO-80

LEVEL II ROM REFERENCE MANUAL

by Edwin Paay

Published by MICRO-80 PRODUCTS

Written by Eddy Paay, the LEVEL II ROM REFERENCE MANUAL is the most complete explanation of the Level II BASIC interpreter ever published.

Part 1 lists all the useful and usable ROM routines, describes their functions explains how to use them in your own machine language programs and notes the effect of each on the various Z 80 registers.

Part 1 also details the contents of system RAM and shows you how to intercept BASIC routines as they pass through system RAM. With this knowledge, you can add your own commands to BASIC, for instance, or position BASIC programs in high memory—the only restriction is your own imagination!

Part 2 gives detailed explanations of the processes used for arithmetical calculations, logical operations, data movements, etc. It also describes the various formats used for BASIC, SYSTEM and EDITOR/ASSEMBLER tapes. Each section is illustrated by sample programs which show you how you can use the ROM routines to speed up your machine language programs and reduce the amount of code you need to write.

The LEVEL II ROM REFERENCE MANUAL is intended to be used by machine language programmers. It assumes a basic understanding of the Z 80 instruction set and some experience of Assembly Language programming. But BASIC programmers too will benefit from reading it. They will gain a much better insight into the functioning of the interpreter which should help them to write faster, more concise BASIC programs.

MICRO-80