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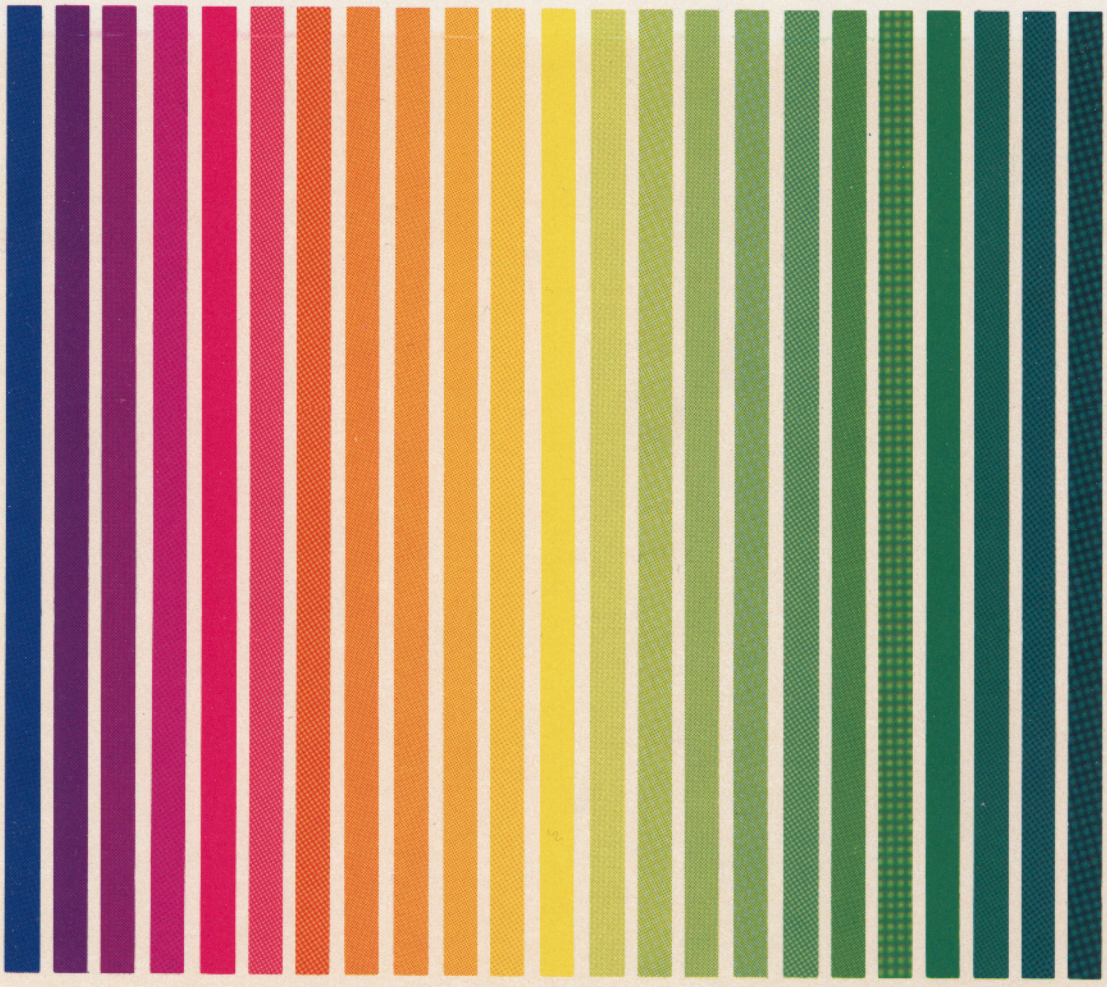

Fred Thorlin

MICROSOFT BASIC CROSS-REFERENCE UTILITY

A variable tracer for ATARI Microsoft BASIC programs

Diskette: 40K (APX-20125)

User-Written Software for ATARI Home Computers

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by

Fred Thorlin

Distributed By

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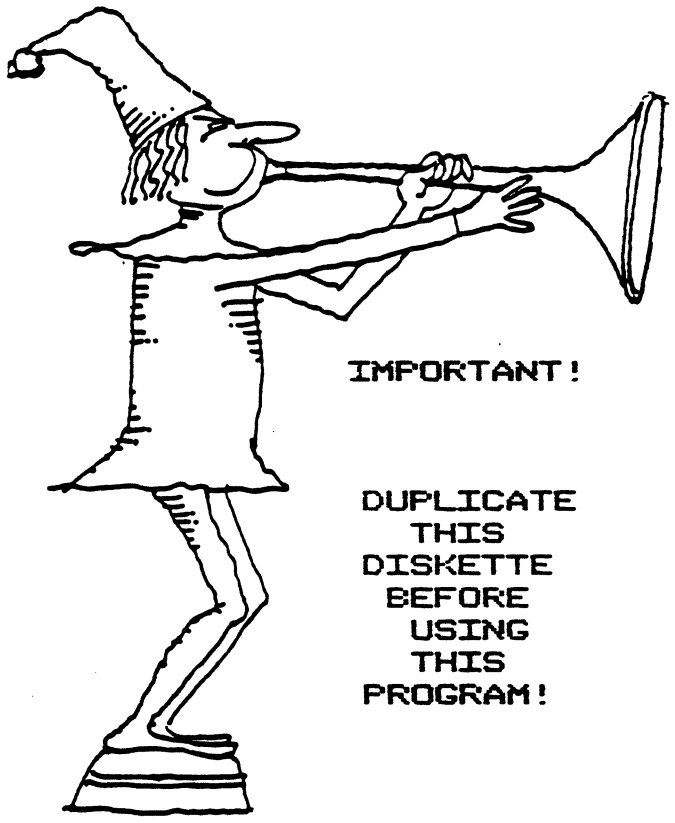

This APX diskette is unnotched to protect the software against accidental erasure. However, this protection also prevents a program from storing information on the diskette. The program you've purchased involves storing information. Therefore, before you can use the program, you must duplicate the contents of the diskette onto a notched diskette that doesn't have a write-protect tab covering the notch.

To duplicate the diskette, call the Disk Operating System (DOS) menu and select option J, Duplicate Disk. You can use this option with a single disk drive by manually swapping source (the APX diskette) and destination (a notched diskette) until the duplication process is complete. You can also use this option with multiple disk drive systems by inserting source and destination diskettes in two separate drives and letting the duplication process proceed automatically. (Note. This option copies sector by sector. Therefore, when the duplication is complete, any files previously stored on the destination diskette will have been destroyed.)

Microsoft BASIC

Cross-Reference Utility

1 - Introduction

Overview - The ATARI Microsoft BASIC Cross-Reference Utility (MXREF) is a program development tool. XREF produces directories of variable usage and line number references within ATARI Microsoft BASIC programs; it will not correctly process programs written in other BASIC dialects.

MXREF can help you write programs in ATARI Microsoft BASIC by pointing out each reference to each variable and line number. The location of these references is frequently difficult to determine in large programs under development for longer than the author can remember every change. MXREF reports help answer the following common questions:

1. Have I used this variable name somewhere else?
2. Does another statement branch to this one?
3. How did my program arrive at that statement?
4. What caused the value of that variable to change?
5. If I change this subroutine, what other code is affected?

REQUIRED ACCESSORIES

ATARI Microsoft BASIC (CX8126)
40KB RAM
ATARI 810 Disk Drive

Special Terms - The term "LIST formatted program" refers to a program which has been saved to disk by the LIST command instead of by the SAVE command. By using the LIST command, ATARI Microsoft BASIC produces a file of the program in a format that can be printed or easily read by a BASIC program. To prepare a program for analysis by MXREF, transfer it to disk using the LIST command.

2 - Getting Started

1. Remove any program cartridge from the cartridge slot of your computer.

2. If you want printed reports, turn on your printer. If you are using an ATARI 825 80-column Printer, turn on your ATARI 850 Interface Module.

3. Turn on your disk drive.

4. When the busy light goes out, open the disk drive door and insert the ATARI Microsoft BASIC Diskette with the label in the lower right-hand corner.

5. Turn on your computer and TV set.

6. ATARI Microsoft BASIC will load into your computer automatically.

7. When the prompt displays, open the disk drive door, remove the ATARI Microsoft BASIC disk.

Note MXREF requires that you store your file on diskette in LIST format rather than in SAVE format. If you have stored it with a SAVE command, convert it at this time as follows (ABC is the example file name):

i. Load your file into computer memory using the command

LOAD "D:ABC"

ii. Then copy it back to the disk using the command

LIST "D:LABC"

3 - Running MXREF

Insert the MXREF disk into the DISK DRIVE. Type the command RUN "D:MXREF" to load MXREF into computer memory and begin its execution.

After a title screen displays, the following message appears:

ENTER NAME OF

LIST FILE TO

BE INDEXED:

Enter the name of the file containing the program to be analyzed which was saved in LIST format. With the above example, you would enter D:LABC.

The following message then displays on the lower half of the screen:

ENTER NAME OF

REPORT OUTPUT

FILE:

At this point enter the name of the device or file you want the report to be copied to. A common response would be P: for directing the report to the printer. Do not enter S: since the report will display on the screen in any event. You can't proceed

until you specify an output destination. If you want only the screen output, direct the output to a disk file which you can later delete, e.g., D:JUNK.

The system will now stir a bit and attempt to locate the specified LIST-formatted file. If it can't locate your input file, the following message displays asking you to insert the disk containing the input file in your disk drive:

```
PLEASE INSTALL

D:LABC

THEN PRESS RETURN
```

After MXREF locates the file, the following message displays indicating the line number of your program that MXREF is now analyzing:

```
NOW SCANNING

STATEMENT

NUMBER 130
```

After MXREF analyzes the last statement in your program, the report displays on the screen as it is transmitted to the output file or device you designated.

4 — Report

MXREF produces a report with three sections: the title section, the variable reference section, and the line number reference section. A sample printed report is at the end of this manual.

Report Title - The first two lines of the report identify the file analyzed to produce the report and the value of TIME$ when the report was generated. The TIME$ value is useful when you make several reports on the same program during a single sitting. The title section for our example might look like this:

```
Cross-Reference of D:LABC

08:30:11
```

Variable References - This section lists the variables located by MXREF. They are listed in alphabetical order on the left hand side of the page/screen. To the right of each variable name are, in line number order, all the line numbers of statements referencing the variable. If the variable is referenced more than once within a statement, the statement's line number appears on the right-hand side as many times as the variable is referenced within.

Line Number Reference - This section lists all of the line numbers referenced within a statement in the program along the left-hand side of the report. Three periods

follow each line number to highlight it. If a line number does not appear within the program as the object of a transfer statement (e.g., GOSUB) or a RESTORE statement, it will not appear in the report on the left-hand side. To the right of each entry are all the line numbers containing references to the indicated line number. There is one entry for each reference to the line number and they are in line number order.

5 — Error Messages

The error messages produced by MXREF and the action normally required to correct the associated problem are as follows:

PRINTER NOT OPERABLE - This message is produced when an attempt to access the report output device results in an error 139; this is most commonly caused by the printer being turned off. After a delay, the program will reattempt to access the output device in the hope that it will have been made available, i.e., turned on and in ONLINE mode.

D:ABC NOT SAVED IN LIST FORMAT - The input file was not in the format required by MXREF. MXREF will terminate since it will be neccessary to convert the file to LIST format as described in section 2. This is the interpretation of an error 137 by MXREF.

PLEASE INSTALL D:LABC THEN PRESS RETURN - The error 170 is interpreted as the file to be analyzed not yet being positioned on the disk drive. MXREF will wait until you press a key and then it will look for the file again.

ABNORMAL TERMINATION - An error number was encountered other than those mentioned above. The error number can be displayed by entering ?ERR. The program will have terminated. MXREF will have to be reloaded to proceed.

6 — Technical Discussion

The following notes describe the internal structure of MXREF and do not need to be read to use the system fully. They are only for the curious.

MXREF consists of two files, MXREF and X2. MXREF performs some initialization and obtains the input and output parameters. This information is then passed to X2 for performance of the analysis and production of the report. MXREF has been broken into two parts to reduce the amount of memory required for its execution. A third program file for report generation would have been broken out except for the concomitant handling problems.

MXREF contains in DATA statements all of the key words recognized by BASIC. These words are read into string arrays from the DATA statements. The string arrays are passed on to X2 via Microsoft BASIC COMMON statement so that the space occupied by the DATA statements can be recovered. We also end up recovering all of the space associated with the title screen and parameter collection.

X2 is delicate. Emphasis has been placed on always producing a correct and complete report at the expense of speed. The following steps are followed to collect the relevant data from each statement:

1. A program line is read into WORK$.

2. Quoted strings are masked out of the statement.

3. Remarks are masked out.

4. DATA, DEFSNG, DEFDBL and DEFSTR statements are masked out.

5. Operators and delimiters are removed. At this point all that should remain are variables, line numbers, numeric constants and keywords.

6. On the basis of what keywords are encountered, MXREF determines the difference between a numeric constant and a line number. A key word is separated from a variable name by its appearance in the keyword strings. Which of the keyword strings it appears in indicates its significance for locating line numbers.

7. As references to line numbers and variables are encountered, two integers are placed in the REF array. The second is the line number of the statement containing the reference and the first, if positive, is the line number referenced. If the first is negative, then it is an index into the list of known variable names, VAR$.

That this program can be written entirely in ATARI Microsoft BASIC is an indication of the power of the language for developers. I invite the contribution to APX of a faster FORTH or assembly language version of MXREF if credit is given for the algorithm.

6 - Sample Report

Cross Reference of D:TEST
00:14:12

Variable References

A$	480	490	530	540
	580	590	630	640
	650	720	720	730
	740	750	760	830
	830	840	850	860
	870			
D	350	380	390	400
F02	130	210	220	240
	240			
F1	130	150	160	170
	180	190	200	230
	230			
FNAME$	20	710	730	730
	730	730	760	760
	770			
I	140	470	520	570
	620	650		
KW$	30	650		
LNAME$	20	820	840	840
	840	840	870	870
	880	900		
NREF	30	450		
NTE	380	390	400	
NVAR	30	450		
RW$	20	460	490	490
	510	540	540	560
	590	590	610	640
	640			
V	120	150	160	170
	180	190	200	210
	220			
Z1	370	380	410	410
Z2	370	390	420	420
Z3	370	400	430	430
	440			
ZCR	360	410	420	430

Line Number References

380... 440

720... 720 780

770... 730 740

790... 750

820... 900

830... 830 890

880... 840 850

900... 860

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1. Name and APX number of program.

2. If you have problems using the program, please describe them here.

3. What do you especially like about this program?

4. What do you think the program's weaknesses are?

5. How can the catalog description be more accurate or comprehensive?

6. On a scale of 1 to 10, 1 being "poor" and 10 being "excellent", please rate the following aspects of this program:

   _____ Easy to use
   _____ User-oriented (e.g., menus, prompts, clear language)
   _____ Enjoyable
   _____ Self-instructive
   _____ Useful (non-game programs)
   _____ Imaginative graphics and sound

7. Describe any technical errors you found in the user instructions (please give page numbers).

8. What did you especially like about the user instructions?

9. What revisions or additions would improve these instructions?

10. On a scale of 1 to 10, 1 representing "poor" and 10 representing "excellent", how would you rate the user instructions and why?

11. Other comments about the program or user instructions:

From

STAMP

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[seal here]