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in the correct place, BASIC will stop with a *file not found* error when you run IFF to Icon.

Using The Program

Run IFF to Icon. The program asks you to enter the name of the IFF file to translate and the name of the info file to modify. You must specify the disk and folder in which the programs are located. Do not include the .info extension when entering the second filename. The program does this for you. If you wish to change the trashcan's icon, for example, simply enter the filename TRASHCAN. The IFF to Icon program does not create new info files; it modifies existing ones. So, the info file must already exist on disk.

After both filenames have been entered, IFF to Icon translates the IFF image, creates a temporary image file of its own, and finally modifies the specified info file. To convert IFF image files, this program uses code from the "IFF Translator" program published in the April 1987 issue.

Even after modification, a file's original icon will stay on the Workbench screen until the file, drawer, or disk is closed and redrawn. For files and drawers, this means closing and reopening the window that the icon is located in. If you modified a disk's icon, you must close all drawers and windows from the disk, remove the disk from the drive, and reinsert the disk after the original icon has disappeared. In some cases, you may have to reboot in order to remove the original disk icon from the Workbench screen.

IFF To Icon

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

```
'  Copyright 1987 COMPUTE! Publi
cations, Inc.
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'
'  IFF to Icon
'
DECLARE FUNCTION GetDiskObject&
LIBRARY
DECLARE FUNCTION PutDiskObject&
LIBRARY
DECLARE FUNCTION FreeDiskObject&
LIBRARY
'
LIBRARY "icon.library"
'
MainLine:
GOSUB InitiaLize
OPEN FiLeIFF$ FOR INPUT AS 1
PRINT "Reading from file     : ";
FiLeIFF$
GOSUB TransLateChunks
CLOSE 1
OPEN FiLeIFF$+"_Image" FOR OUTPU
T AS 1
PRINT "Writing to file       : ";
FiLeIFF$+"_Image"
GOSUB CreateImageFiLe
CLOSE 1
OPEN FiLeIFF$+"_Image" FOR INPUT
AS 1
PRINT "Translating file      : ";
FiLeIFF$+"_Image"
GOSUB TransLateImage
CLOSE 1
KILL FiLeIFF$+"_Image"
PRINT "Modifying file        : ";
FiLeInfo$+".info"
GOSUB CreateInfoFiLe
LIBRARY CLOSE
END
'
InitiaLize:
WINDOW 1,"Brush To Icon",(0,120)
-(450,186),15
PRINT "Copyright 1987 COMPUTE! P
ublications, Inc."
PRINT "          All Rights Rese
rved.":PRINT
DEFINT a-z
DIM R1(31), G1(31), B1(31)
true = -1
faLse = 0
INPUT "IFF file to translate: ",
FiLeIFF$
INPUT ".info file to modify : ",
FiLeInfo$
RETURN
'
TransLateChunks:
ckID$=INPUT$(4,1)
SkipData$=INPUT$(4,1)
ckType$=INPUT$(4,1)
IF ckID$ <> "FORM" OR ckType$ <>
"ILBM" THEN
PRINT "File is not a FORM ILBM c
hunk."
STOP
END IF
FoundBMHD = faLse
FoundCMAP = faLse
WHILE true
ckID$=INPUT$(4,1)
ckLength&=CVL(INPUT$(4,1))
IF ckID$="BMHD" THEN
GOSUB TransLateBMHD
FoundBMHD = true
ELSEIF ckID$="CMAP" THEN
GOSUB TranslateCMAP
FoundCMAP = true
ELSEIF ckID$="BODY" THEN
IF FoundBMHD AND FoundCMAP THEN
GOSUB TransLateBODY
RETURN
ELSE
PRINT "Context chunks are missin
g."
STOP
END IF
ELSE
SkipData$=INPUT$(ckLength&,1)
SkipData$=""
END IF
IF ckLength& MOD 2 THEN
SkipData$=INPUT$(1,1)
END IF
WEND
'
TransLateBMHD:
Wide&=CVI(INPUT$(2,1))
Height&=CVI(INPUT$(2,1))
SkipData$=INPUT$(4,1)
depth&=ASC(INPUT$(1,1))
Masking=ASC(INPUT$(1,1))
Compression=ASC(INPUT$(1,1))
SkipData$=INPUT$(1,1)
TransCoLor=CVI(INPUT$(2,1))
SkipData$=INPUT$(2,1)
PageWidth=CVI(INPUT$(2,1))
PageHeight=CVI(INPUT$(2,1))
ScnMode=PageWidth/320+2*(PageHei
ght/200-1)
pLanepick=2^depth&-1
IF Masking<>2 THEN
PRINT "Unknown masking technique
used."
STOP
END IF
IF Compression = 0 THEN
FiLeCompressed = faLse
ELSEIF Compression = 1 THEN
FiLeCompressed = true
ELSE
PRINT "Unknown compression techn
ique used."
STOP
END IF
IF TransCoLor <>0 THEN
PRINT "Register zero is not the
transparent color."
STOP
END IF
Header$=MKL$(0)+MKL$(0)+MKL$(dep
th&)+MKL$(Wide&)+MKL$(Height&)
Header$=Header$+MKI$(24)+MKI$(pL
anepick)+MKI$(0)
RETURN
'
TranslateCMAP:
CoLorCount=ckLength&/3-1
FOR register=0 TO CoLorCount
R1(register)=INT(ASC(INPUT$(1,1)
)/12)/20
G1(register)=INT(ASC(INPUT$(1,1)
)/12)/20
B1(register)=INT(ASC(INPUT$(1,1)
)/12)/20
NEXT register
RETURN
'
TransLateBODY:
BytesPerRow = 2*INT((Wide&+15)/1
6)
BytesPerPLane = BytesPerRow*Heig
ht&
ReqBytes = BytesPerPLane*depth&
BitMap$=STRING$(ReqBytes,CHR$(0)
)
FOR RowNo=1 TO Height&
pointer=1+BytesPerRow*(RowNo-1)
FOR PLaneNo=1 TO depth&
Offset=BytesPerPLane*(PLaneNo-1)
'
IF FiLeCompressed THEN
Row$=""
WHILE LEN(Row$)<BytesPerRow
UByte=ASC(INPUT$(1,1))
ControLByte=UByte-2*(UByte AND 1
28)
IF ControLByte<-127 THEN
' No operation
ELSEIF ControLByte<0 THEN
Row$=Row$+STRING$(-ControLByte+1
,INPUT$(1,1))
ELSEIF ControLByte<128 THEN
Row$=Row$+INPUT$(ControLByte+1,1
)
END IF
WEND
ELSE
Row$=INPUT$(BytesPerRow,1)
END IF
MID$(BitMap$,pointer+Offset,Byte
sPerRow)=Row$
NEXT PLaneNo
NEXT RowNo
RETURN
'
CreateImageFiLe:
PRINT#1, Header$+BitMap$;
```


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```
RETURN
TransLateImage:
garbage$     = INPUT$(8,1)
' throw away colorset and datase
t
depth&       = CVL(INPUT$(4,1))
' depth of screen in bitmaps
bwidth&      = CVL(INPUT$(4,1))
' width of screen in pixels
bheight&     = CVL(INPUT$(4,1))
' height of screen in pixels
garbage$     = INPUT$(2,1)
' drop masking flags
pLanepick%   = CVI(INPUT$(2,1))
pLaneonoff%  = CVI(INPUT$(2,1))
bit$         = INPUT$(LOF(1)-26,1
)  ' bitplane data
RETURN

CreateInfoFiLe:
diskobj& = GetDiskObject&(SADD(F
iLeInfo$))
IF diskobj& = 0 THEN
PRINT "error opening ";FiLeInfo$
;".info"
GOTO ending
END IF
POKEL diskobj& + 8, 0     ' top c
orner at 0,0
POKEW diskobj& + 12, bwidth&
POKEW diskobj& + 14, bheight&
imageptr& = PEEKL(diskobj& + 22)

POKEW imageptr& + 4,  bwidth&
POKEW imageptr& + 6,  bheight&
POKEW imageptr& + 8,  depth&
POKEL imageptr& + 10, SADD(bit$)

POKE  imageptr& + 14, pLanepick%

POKE  imageptr& + 15, pLaneonoff
%
erro&=PutDiskObject&(SADD(FiLeIn
fo$), diskobj&)
IF erro& = 0 THEN
PRINT "error on file writing "
END IF
erro&=FreeDiskObject&(diskobj&)
IF erro& <> 0 THEN
PRINT "error on memory clearing
--> ";erro&
END IF
ending:
RETURN
```

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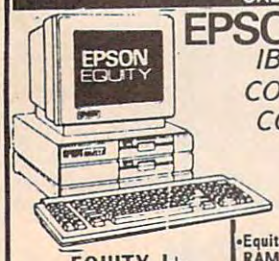

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Atari Marbles

A printing problem obliterated a character in line 1580 of the Atari version of this game from the October issue (Program 1, p. 40). The line should read as follows:

```
1580 ML=USR(ADR(MOVE$), 57344,
     CHSET, 1024)
```

Monte Carlo

All versions of this game program from the September issue (p. 30) are correct as listed, except for a minor problem in the Amiga version. The copyright message in the first line of Program 4 should begin with an apostrophe ('), which Amiga Basic accepts as a substitute for the REM statement.

Reader Joseph Meany has provided an enhancement to the Commodore version (Program 1) which allows the game to be played with a joystick in addition to the keyboard. If you are interested in this modification, add or change the following lines:

```
840 GET A$:J=PEEK(56320):IF(A$
    ="" ANDJ=127) THEN 840
842 J=-13*(J=111)-145*(J=126)-
    17*(J=125)-157*(J=123)-29*(
    J=119)
844 IF A$="" THEN A$=CHR$(J)
846 FOR DE=1 TO 100:NEXT DE
```

With these changes, you can use a joystick in port 2 to move the card cursor. Press the fire button to select a card. You must still use the keyboard to enter other commands.

BASIC Batch Files With Atari DOS

The article with this handy utility from the August issue (p. 81) suggested that batch files could be used to load and run BASIC programs. However, reader Justin E. Wilder discovered a problem with this technique. A BASIC program started from a batch file will crash with an ERROR 133 message if it contains any INPUT statements. This occurs because the the IOCB channel value in location 180 is left set to 7, the batch-file channel. The solution is to add a POKE 180,0 command to the batch file to reset the system for the default channel (the screen editor). To work properly, the POKE must appear on the same line as the LOAD or RUN command, and on the last line of the batch file (once the POKE is executed, no more lines will be read from the disk). For example, the proper batch-file line to automatically load and run a BASIC program named GAME.BAS would be

```
POKE 180,0:RUN "D:GAME.BAS"
```

IBM QuickChange

This memory-resident screen color selection program from the September issue (p. 82) will not work on the IBM PCjr. ©

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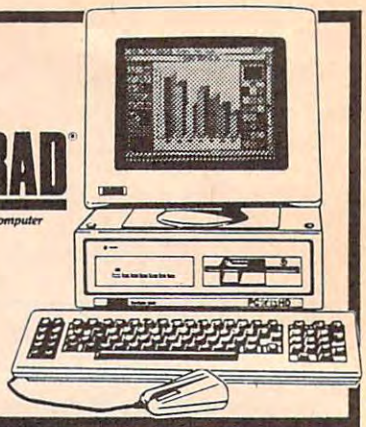

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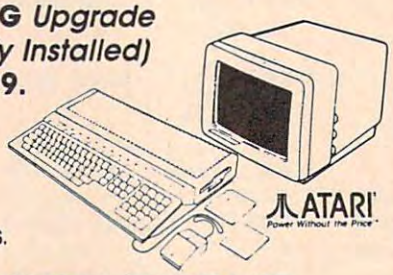

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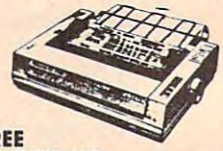

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COMPUTE!'s Guide To Typing In Programs

Computers are precise—type the program *exactly* as listed, including necessary punctuation and symbols, except for special characters noted below. We have provided a special listing convention as well as a program to check your typing—"The Automatic Proofreader."

Programs for the IBM, TI-99/4A, and Atari ST models should be typed exactly as listed; no special characters are used. Programs for Commodore, Apple, and Atari 400/800/XL/XE computers may contain some hard-to-read special characters, so we have a listing system that indicates these control characters. You will find these Commodore and Atari characters in curly braces; *do not type the braces.* For example, {CLEAR} or {CLR} instructs you to insert the symbol which clears the screen on the Atari or Commodore machines. A complete list of these symbols is shown in the tables below. For Commodore, Apple, and Atari, a single symbol by itself within curly braces is usually a control key or graphics key. If you see {A}, hold down the CONTROL key and press A. This will produce a reverse video character on the Commodore (in quote mode), a graphics character on the Atari, and an invisible control character on the Apple.

Graphics characters entered with the Commodore logo key are enclosed in a special bracket: [<A>]. In this case, you would hold down the Commodore logo key as you type A. Our Commodore listings are in uppercase, so shifted symbols are underlined. A graphics heart symbol (SHIFT-S) would be listed as S. One exception is {SHIFT-SPACE}. When you see this, hold down SHIFT and press the space bar. If a number precedes a symbol, such as {5 RIGHT}, {6 S}, or [<8 Q>], you would enter five cursor rights, six shifted S's, or eight Commodore-Q's. On the Atari, inverse characters (white on black) should be entered with the inverse video

Atari 400/800/XL/XE

When you see	Type	See	
{CLEAR}	ESC SHIFT <		Clear Screen
{UP}	ESC CTRL -	↑	Cursor Up
{DOWN}	ESC CTRL =	↓	Cursor Down
{LEFT}	ESC CTRL +	←	Cursor Left
{RIGHT}	ESC CTRL *	→	Cursor Right
{BACK S}	ESC DELETE	◀	Backspace
{DELETE}	ESC CTRL DELETE		Delete character
{INSERT}	ESC CTRL INSERT		Insert character
{DEL LINE}	ESC SHIFT DELETE		Delete line
{INS LINE}	ESC SHIFT INSERT		Insert line
{TAB}	ESC TAB	▶	TAB key
{CLR TAB}	ESC CTRL TAB		Clear tab
{SET TAB}	ESC SHIFT TAB		Set tab stop
{BELL}	ESC CTRL 2		Ring buzzer
{ESC}	ESC ESC		ESCape key

Commodore PET/CBM/VIC/64/128/16/+4

When You Read:	Press:		See:
{CLR}	SHIFT	CLR/HOME	
{HOME}		CLR/HOME	
{UP}	SHIFT	↑ CRSR ↓	
{DOWN}		↑ CRSR ↓	
{LEFT}	SHIFT	← CRSR →	
{RIGHT}		← CRSR →	
{RVS}	CTRL	9	
{OFF}	CTRL	0	
{BLK}	CTRL	1	
{WHT}	CTRL	2	
{RED}	CTRL	3	
{CYN}	CTRL	4	
{PUR}	CTRL	5	
{GRN}	CTRL	6	
{BLU}	CTRL	7	
{YEL}	CTRL	8	

When You Read:	Press:		See:
[<1>]	COMMODORE	1	
[<2>]	COMMODORE	2	
[<3>]	COMMODORE	3	
[<4>]	COMMODORE	4	
[<5>]	COMMODORE	5	
[<6>]	COMMODORE	6	
[<7>]	COMMODORE	7	
[<8>]	COMMODORE	8	
{F1}		f1	
{F2}	SHIFT	f1	
{F3}		f3	
{F4}	SHIFT	f3	
{F5}		f5	
{F6}	SHIFT	f5	
{F7}		f7	
{F8}	SHIFT	f7	
←	←		

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key (Atari logo key on 400/800 models).

Whenever more than two spaces appear in a row, they are listed in a special format. For example, {6 SPACES} means press the space bar six times. Our Commodore listings never leave a single space at the end of a line, instead moving it to the next printed line as {SPACE}.

Amiga program listings contain only one special character, the left arrow (←) symbol. This character marks the end of each program line. Wherever you see a left arrow, press RETURN or move the cursor off the line to enter that line into memory. Don't try to type in the left arrow symbol; it's there only as a marker to indicate where each program line ends.

The Automatic Proofreader

Type in the appropriate program listed below, then save it for future use. The Commodore Proofreader works on the Commodore 128, 64, Plus/4, 16, and VIC-20. Don't omit any lines, even if they contain unfamiliar commands or you think they don't apply to your computer. When you run the program, it installs a machine language program in memory and erases its BASIC portion automatically (so be sure to save several copies before running the program for the first time). If you're using a Commodore 128, Plus/4 or 16, do *not* use any GRAPHIC commands while the Proofreader is active. You should disable the Commodore Proofreader before running any other program. To do this, either turn the computer off and on or enter SYS 64738 (for the 64), SYS 65341 (128), SYS 64802 (VIC-20), or SYS 65526 (Plus/4 or 16). To reenable the Proofreader, reload the program and run it as usual. Unlike the original VIC/64 Proofreader, this version works the same with disk or tape.

On the Atari, run the Proofreader to activate it (the Proofreader remains active in memory as a machine language program); you must then enter NEW to erase the BASIC loader. Pressing SYSTEM RESET deactivates the Atari Proofreader; enter PRINT USR(1536) to reenable it.

The Apple Proofreader erases the BASIC portion of itself after you run it, leaving only the machine language portion in memory. It works with either DOS 3.3 or ProDOS. Disable the Apple Proofreader by pressing CTRL-RESET before running another BASIC program.

The IBM Proofreader is a BASIC program that simulates the IBM BASIC line editor, letting you enter, edit, list, save, and load programs that you type. Type RUN to activate. Be sure to leave Caps Lock on, except when typing lowercase characters.

Once the Proofreader is active, try typing in a line. As soon as you press RETURN, either a hexadecimal number (on the Apple) or a pair of letters (on the Commodore, Atari, or IBM) appears. The number or pair of letters is called a *checksum*.

Compare the value displayed on the screen by the Proofreader with the checksum printed in the program listing in the magazine. The checksum is given to the left of each line number. Just type in the program a line at a time (without the printed checksum), press RETURN or Enter, and compare the checksums. If they match, go on to the next line. If not, check your typing; you've made a mistake. Because of the checksum method used, do not type abbreviations, such as ? for PRINT. On the Atari and Apple Proofreaders, spaces are not counted as part of the checksum, so be sure you type the right number of spaces between quote marks. The Atari Proofreader does not check to see that you've typed the characters in the right order, so if characters are transposed, the checksum still matches the listing. The Commodore Proofreader catches transposition errors and ignores spaces unless they're enclosed in quotation marks. The IBM Proofreader detects errors in spacing and transposition.

IBM Proofreader Commands

Since the IBM Proofreader replaces the computer's normal BASIC line editor, it has to include many of the direct-mode IBM BASIC commands. The syntax is identical to IBM BASIC. Commands simulated are LIST, LLIST, NEW, FILES, SAVE, and LOAD. When listing your program, press any key (except Ctrl-Break) to stop the listing. If you enter NEW, the Proofreader prompts you to press Y to be especially sure you mean yes.

Two new commands are BASIC and CHECK. BASIC exits the Proofreader back to IBM BASIC, leaving the Proofreader in memory. CHECK works just like LIST, but shows the checksums along with the listing. After you have typed in a program, save it to disk. Then exit the Proofreader with the BASIC command, and load the program as usual (this replaces the Proofreader in memory). You can now run the program, but you may want to resave it to disk. This will shorten it on disk and make it load faster, but it can no longer be edited with the Proofreader. If you want to convert an existing BASIC program to Proofreader format, save it to disk with SAVE *"filename"*,A.

Program 1: Atari Proofreader

By Charles Brannon

```
100 GRAPHICS 0
110 FOR I=1536 TO 1700:REA
    D A:POKE I,A:CK=CK+A:N
    EXT I
120 IF CK<>19072 THEN ? "E
    rror in DATA Statement
    s.  Check Typing.":END

130 A=USR(1536)
140 ? :? "Automatic Proofr
    eader Now Activated."
150 END
160 DATA 104,160,0,185,26,
    3,201,69,240,7
170 DATA 200,200,192,34,20
    8,243,96,200,169,74
180 DATA 153,26,3,200,169,
    6,153,26,3,162
190 DATA 0,189,0,228,157,7
    4,6,232,224,16
200 DATA 208,245,169,93,14
    1,78,6,169,6,141
210 DATA 79,6,24,173,4,228
    ,105,1,141,95
220 DATA 6,173,5,228,105,0
    ,141,96,6,169
230 DATA 0,133,203,96,247,
    238,125,241,93,6
240 DATA 244,241,115,241,1
    24,241,76,205,238
250 DATA 0,0,0,0,0,32,62,2
    46,8,201
260 DATA 155,240,13,201,32
    ,240,7,72,24,101
270 DATA 203,133,203,104,4
    0,96,72,152,72,138
280 DATA 72,160,0,169,128,
    145,88,200,192,40
290 DATA 208,249,165,203,7
    4,74,74,74,24,105
300 DATA 161,160,3,145,88,
    165,203,41,15,24
310 DATA 105,161,200,145,8
    8,169,0,133,203,104
320 DATA 170,104,168,104,4
    0,96
```

Program 2: IBM Proofreader

By Charles Brannon

```
10 'Automatic Proofreader Vers
   ion 3.0 (Lines 205,206 adde
   d/190 deleted/470,490 chang
   ed from V2.0)
100 DIM L$(500),LNUM(500):COLO
    R 0,7,7:KEY OFF:CLS:MAX=0:
    LNUM(0)=65536!
110 ON ERROR GOTO 120:KEY 15,C
    HR$(4)+CHR$(70):ON KEY(15)
     GOSUB 640:KEY (15) ON:GOT
    O 130
120 RESUME 130
130 DEF SEG=&H40:W=PEEK(&H4A)
140 ON ERROR GOTO 650:PRINT:PR
    INT"Proofreader Ready."
150 LINE INPUT L$:Y=CSRLIN-INT
    (LEN(L$)/W)-1:LOCATE Y,1
160 DEF SEG=0:POKE 1050,30:POK
    E 1052,34:POKE 1054,0:POKE
     1055,79:POKE 1056,13:POKE
     1057,28:LINE INPUT L$:DEF
     SEG:IF L$="" THEN 150
170 IF LEFT$(L$,1)=" " THEN L$
    =MID$(L$,2):GOTO 170
```


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```
180 IF VAL(LEFT$(L$,2))=0 AND
    MID$(L$,3,1)=" " THEN L$=M
    ID$(L$,4)
200 IF ASC(L$)>57 THEN 260 'no
     line number, therefore co
    mmand
205 BL=INSTR(L$," "):IF BL=0 T
    HEN BL$=L$:GOTO 206 ELSE B
    L$=LEFT$(L$,BL-1)
206 LNUM=VAL(BL$):TEXT$=MID$(L
    $,LEN(STR$(LNUM))+1)
210 IF TEXT$="" THEN GOSUB 540
    :IF LNUM=LNUM(P) THEN GOSU
    B 560:GOTO 150 ELSE 150
220 CKSUM=0:FOR I=1 TO LEN(L$)
    :CKSUM=(CKSUM+ASC(MID$(L$,
    I))*I) AND 255:NEXT:LOCATE
     Y,1:PRINT CHR$(65+CKSUM/1
    6)+CHR$(65+(CKSUM AND 15))
    +" "+L$
230 GOSUB 540:IF LNUM(P)=LNUM
    THEN L$(P)=TEXT$:GOTO 150
    'replace line
240 GOSUB 580:GOTO 150 'insert
     the line
260 TEXT$="":FOR I=1 TO LEN(L$
    ):A=ASC(MID$(L$,I)):TEXT$=
    TEXT$+CHR$(A+32*(A>96 AND
    A<123)):NEXT
270 DELIMITER=INSTR(TEXT$," ")
    :COMMAND$=TEXT$:ARG$="":IF
     DELIMITER THEN COMMAND$=L
    EFT$(TEXT$,DELIMITER-1):AR
    G$=MID$(TEXT$,DELIMITER+1)
     ELSE DELIMITER=INSTR(TEXT
    $,CHR$(34)):IF DELIMITER T
    HEN COMMAND$=LEFT$(TEXT$,D
    ELIMITER-1):ARG$=MID$(TEXT
    $,DELIMITER)
280 IF COMMAND$<>"LIST" THEN 4
    10
290 OPEN "scrn:" FOR OUTPUT AS
     #1
300 IF ARG$="" THEN FIRST=0:P=
    MAX-1:GOTO 340
310 DELIMITER=INSTR(ARG$,"-"):
    IF DELIMITER=0 THEN LNUM=V
    AL(ARG$):GOSUB 540:FIRST=P
    :GOTO 340
320 FIRST=VAL(LEFT$(ARG$,DELIM
    ITER)):LAST=VAL(MID$(ARG$,
    DELIMITER+1))
330 LNUM=FIRST:GOSUB 540:FIRST
    =P:LNUM=LAST:GOSUB 540:IF
    P=0 THEN P=MAX-1
340 FOR X=FIRST TO P:N$=MID$(S
    TR$(LNUM(X)),2)+" "
350 IF CKFLAG=0 THEN A$="":GOT
    O 370
360 CKSUM=0:A$=N$+L$(X):FOR I=
    1 TO LEN(A$):CKSUM=(CKSUM+
    ASC(MID$(A$,I))*I) AND 255
    :NEXT:A$=CHR$(65+CKSUM/16)
    +CHR$(65+(CKSUM AND 15))+"
     "
370 PRINT #1,A$+N$+L$(X)
380 IF INKEY$<>"" THEN X=P
390 NEXT :CLOSE #1:CKFLAG=0
400 GOTO 130
410 IF COMMAND$="LLIST" THEN O
    PEN "lpt1:" FOR OUTPUT AS
    #1:GOTO 300
420 IF COMMAND$="CHECK" THEN C
    KFLAG=1:GOTO 290
430 IF COMMAND$<>"SAVE" THEN 4
    50
440 GOSUB 600:OPEN ARG$ FOR OU
    TPUT AS #1:ARG$="":GOTO 30
    0
450 IF COMMAND$<>"LOAD" THEN 4
    90
460 GOSUB 600:OPEN ARG$ FOR IN
    PUT AS #1:MAX=0:P=0
470 WHILE NOT EOF(1):LINE INPU
    T #1,L$:BL=INSTR(L$," "):B
    L$=LEFT$(L$,BL-1):LNUM(P)=
    VAL(BL$):L$(P)=MID$(L$,LEN
    (STR$(VAL(BL$)))+1):P=P+1:
    WEND
480 MAX=P:CLOSE #1:GOTO 130
490 IF COMMAND$="NEW" THEN INP
    UT "Erase program - Are yo
    u sure";L$:IF LEFT$(L$,1)=
    "y" OR LEFT$(L$,1)="Y" THE
    N MAX=0:LNUM(0)=65536!:GOT
    O 130:ELSE 130
500 IF COMMAND$="BASIC" THEN C
    OLOR 7,0,0:ON ERROR GOTO 0
    :CLS:END
510 IF COMMAND$<>"FILES" THEN
    520
515 IF ARG$="" THEN ARG$="A:"
    ELSE SEL=1:GOSUB 600
517 FILES ARG$:GOTO 130
520 PRINT"Syntax error":GOTO 1
    30
540 P=0:WHILE LNUM>LNUM(P) AND
     P<MAX:P=P+1:WEND:RETURN
560 MAX=MAX-1:FOR X=P TO MAX:L
    NUM(X)=LNUM(X+1):L$(X)=L$(
    X+1):NEXT:RETURN
580 MAX=MAX+1:FOR X=MAX TO P+1
     STEP -1:LNUM(X)=LNUM(X-1)
    :L$(X)=L$(X-1):NEXT:L$(P)=
    TEXT$:LNUM(P)=LNUM:RETURN
600 IF LEFT$(ARG$,1)<>CHR$(34)
     THEN 520 ELSE ARG$=MID$(A
    RG$,2)
610 IF RIGHT$(ARG$,1)=CHR$(34)
     THEN ARG$=LEFT$(ARG$,LEN(
    ARG$)-1)
620 IF SEL=0 AND INSTR(ARG$,".
    ")=0 THEN ARG$=ARG$+".BAS"
630 SEL=0:RETURN
640 CLOSE #1:CKFLAG=0:PRINT"St
    opped.":RETURN 150
650 PRINT "Error #";ERR:RESUME
     150
```

Program 3: Commodore Proofreader

By Philip Nelson, Assistant Editor

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
    ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
    F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
    *ERROR* RELOAD PROGRAM AND
    {SPACE}CHECK FINAL LINE":EN
    D
120 POKE SA+149,PEEK(772):POKE
     SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
    14,22:POKE SA+18,23:POKESA+
    29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
    PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
    EEK(LO)+256*PEEK(HI))-1,0:N
    EW
160 DATA 120,169,73,141,4,3,16
    9,3,141,5,3
170 DATA 88,96,165,20,133,167,
    165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
    1,199,157,227,3
190 DATA 202,16,248,169,19,32,
    210,255,169,18,32
200 DATA 210,255,160,0,132,180
    ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
    1,34,208,8,72
220 DATA 165,176,73,255,133,17
    6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
    08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
    3,167,165,168,105
250 DATA 0,133,168,202,208,239
    ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
    211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
    85,211,3,32,210
280 DATA 255,162,31,189,227,3,
    149,199,202,16,248
290 DATA 169,146,32,210,255,76
    ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
    77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
    116,117,151,128,129,167,136
    ,137
```

Program 4: Apple Proofreader

By Tim Victor, Editorial Programmer

```
10 C = 0: FOR I = 768 TO 768 +
   68: READ A:C = C + A: POKE I
   ,A: NEXT
20 IF C < > 7258 THEN PRINT "ER
   ROR IN PROOFREADER DATA STAT
   EMENTS": END
30 IF PEEK (190 * 256) < > 76 T
   HEN POKE 56,0: POKE 57,3: CA
   LL 1002: GOTO 50
40 PRINT CHR$ (4);"IN#A$300"
50 POKE 34,0: HOME : POKE 34,1:
    VTAB 2: PRINT "PROOFREADER
   INSTALLED"
60 NEW
100 DATA 216,32,27,253,201,141
110 DATA 208,60,138,72,169,0
120 DATA 72,189,255,1,201,160
130 DATA 240,8,104,10,125,255
140 DATA 1,105,0,72,202,208
150 DATA 238,104,170,41,15,9
160 DATA 48,201,58,144,2,233
170 DATA 57,141,1,4,138,74
180 DATA 74,74,74,41,15,9
190 DATA 48,201,58,144,2,233
200 DATA 57,141,0,4,104,170
210 DATA 169,141,96
```

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MLX Machine Language Entry Program For Commodore 64

Ottis Cowper, Technical Editor

"MLX" is a labor-saving utility that allows almost fail-safe entry of Commodore 64 machine language programs.

Type in and save some copies of MLX—you'll want to use it to enter future machine langauge (ML) programs from COMPUTE!. When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters A–F. But don't worry—even if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, pick this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you left off typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering A Listing

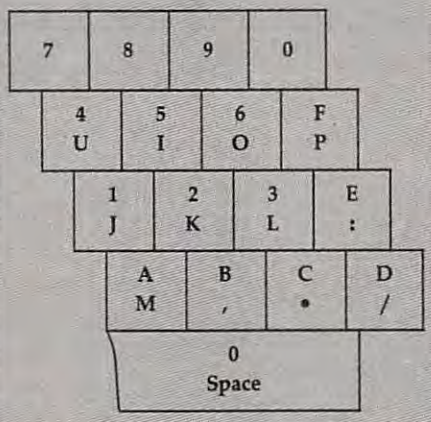
Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing.

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, a numeric keypad is now incorporated in the listing. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration:



MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line number prompt.

More editing features are available when correcting lines in which MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. The cursor left and right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu is redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to

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restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750), so this should *not* be included when entering the name. This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different name.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. (Tape users should bear in mind that Commodore computers are never able to detect errors during a save to tape.) MLX also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP–RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD *"filename"*,8 for disk or LOAD *"filename"* for tape, and then RUN. Such programs will usually have a starting address of 0801 for the 64. Other programs must be reloaded to specific addresses with a command such as LOAD *"filename"*,8,1 for disk or LOAD *"filename"*,1,1 for tape, then started with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce Of Prevention

By the time you finish typing in the data for a long ML program, you may have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to ensure that you can recall your work from disk or tape. Don't let a simple typing error in the new MLX cost you several nights of hard work.

MLX For Commodore 64

```
SS 10 REM VERSION 1.1: LINES 8
      30,950 MODIFIED, LINES 4
      85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
      I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
      4=254:Z5=255:Z6=256:Z7=
      127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
      :BS=PEEK(55)+Z6*PEEK(56
      ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
      :S$=" ":D$=CHR$(20):Z$=
      CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
      +23:POKE I,0:NEXT:POKE
      {SPACE}SD+24,15:POKE 78
      8,52
FC 150 PRINT"{CLR}"CHR$(142)CH
      R$(8):POKE 53280,15:POK
      E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
      {2 SPACES}[8 @]
      {2 SPACES}"SPC(28)"
      {2 SPACES}{OFF}{BLU} ML
      X II {RED}{RVS}
      {2 SPACES}"SPC(28)"
      {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
      {3 SPACES}COMPUTE!'S MA
      CHINE LANGUAGE EDITOR
      {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
      RESS[4]";:GOSUB300:SA=A
      D:GOSUB1040:IF F THEN18
      0
GF 190 PRINT"{BLK}{2 SPACES}EN
      DING ADDRESS[4]";:GOSUB
      300:EA=AD:GOSUB1030:IF
      {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA
      R WORKSPACE [Y/N][4]";A
      $:IF LEFT$(A$,1)<>"Y"TH
      EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
      ING...";:FORI=BS TO BS+
      EA-SA+7:POKE I,0:NEXT:P
      RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
      {BLK}{RVS} MLX COMMAND
      {SPACE}MENU {DOWN}[4]":
      PRINT T$"{RVS}E{OFF}NTE
      R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
      LAY DATA":PRINT T$"
      {RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
       FILE":PRINT T$"{RVS}Q
      {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
      MID$("EDLSQ",I,1)THEN A
      =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
      90,700,280:GOSUB1060:GO
      TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
      T"{DOWN}[4]ARE YOU SURE
       [Y/N]";A$:IF LEFT$(A$,
      1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
      LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
      =MID$(IN$,3):GOSUB320:A
      D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
      $(B$,J,1):B=ASC(A$)-C4+
      (A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
      0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
      H$,B+1,1);:B=A-B*C6:PRI
      NT MID$(H$,B+1,1);:RETU
      RN
RR 360 A=INT(AD/Z6):GOSUB350:A
      =AD-A*Z6:GOSUB350:PRINT
      ":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
      CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
      [4]";:GOSUB300:IF IN$<>
      N$ THEN GOSUB1030:IF F
      {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
      {SPACE}":GOSUB400:IF IN
      $=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
```


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```
        THEN PRINT IN$:PRINT"
        {UP}{5 RIGHT}";
GC 450  FOR I=0 TO 24 STEP 3:B$
        =S$:FOR J=1 TO 2:IF F T
        HEN B$=MID$(IN$,I+J,1)
HA 460  PRINT"{RVS}"B$L$;:IF I<
        24THEN PRINT"{OFF}";
HD 470  GET A$:IF A$=N$ THEN470
FK 480  IF(A$>"/"ANDA$<":")OR(A
        $>"@"ANDA$<"G")THEN540
GS 485  A=-(A$="M")-2*(A$=",")-
        3*(A$=".")-4*(A$="/")-5
        *(A$="J")-6*(A$="K")
FX 486  A=A-7*(A$="L")-8*(A$=":
        ")-9*(A$="U")-10*(A$="I
        ")-11*(A$="O")-12*(A$="
        P")
CM 487  A=A-13*(A$=S$):IF A THE
        N A$=MID$("ABCD123E456F
        0",A,1):GOTO 540
MP 490  IF A$=R$ AND((I=0)AND(J
        =1)OR F)THEN PRINT B$;:
        J=2:NEXT:I=24:GOTO550
KC 500  IF A$="{HOME}" THEN PRI
        NT B$:J=2:NEXT:I=24:NEX
        T:F=0:GOTO440
MX 510  IF(A$="{RIGHT}")ANDF TH
        ENPRINT B$L$;:GOTO540
GK 520  IF A$<>L$ AND A$<>D$ OR
        ((I=0)AND(J=1))THEN GOS
        UB1060:GOTO470
HG 530  A$=L$+S$+L$:PRINT B$L$;
        :J=2-J:IF J THEN PRINT
        {SPACE}L$;:I=I-3
QS 540  PRINT A$;:NEXT J:PRINT
        {SPACE}S$;
PM 550  NEXT I:PRINT:PRINT"{UP}
        {5 RIGHT}";:INPUT#3,IN$
        :IF IN$=N$ THEN CLOSE3:
        GOTO220
QC 560  FOR I=1 TO 25 STEP3:B$=
        MID$(IN$,I):GOSUB320:IF
         I<25 THEN GOSUB380:A(I
        /3)=A
PK 570  NEXT:IF A<>CK THEN GOSU
        B1060:PRINT"{BLK}{RVS}
        {SPACE}ERROR: REENTER L
        INE [4]":F=1:GOTO440
HJ 580  GOSUB1080:B=BS+AD-SA:FO
        R I=0 TO 7:POKE B+I,A(I
        ):NEXT
QQ 590  AD=AD+8:IF AD>EA THEN C
        LOSE3:PRINT"{DOWN}{BLU}
        ** END OF ENTRY **{BLK}
        {2 DOWN}":GOTO700
GQ 600  F=0:GOTO440
QA 610  PRINT"{CLR}{DOWN}{RVS}
        {SPACE}DISPLAY DATA ":G
        OSUB400:IF IN$=N$ THEN2
        20
RJ 620  PRINT"{DOWN}{BLU}PRESS:
         {RVS}SPACE{OFF} TO PAU
        SE, {RVS}RETURN{OFF} TO
         BREAK[4]{DOWN}"
KS 630  GOSUB360:B=BS+AD-SA:FOR
        I=BTO B+7:A=PEEK(I):GOS
        UB350:GOSUB380:PRINT S$
        ;
CC 640  NEXT:PRINT"{RVS}";:A=CK
        :GOSUB350:PRINT
KH 650  F=1:AD=AD+8:IF AD>EA TH
        ENPRINT"{DOWN}{BLU}** E
        ND OF DATA **":GOTO220
KC 660  GET A$:IF A$=R$ THEN GO
        SUB1080:GOTO220
EQ 670  IF A$=S$ THEN F=F+1:GOS
        UB1080
AD 680  ONFGOTO630,660,630
CM 690  PRINT"{DOWN}{RVS} LOAD
        {SPACE}DATA ":OP=1:GOTO
        710
PC 700  PRINT"{DOWN}{RVS} SAVE
        {SPACE}FILE ":OP=0
RX 710  IN$=N$:INPUT"{DOWN}FILE
        NAME[4]";IN$:IF IN$=N$
        {SPACE}THEN220
PR 720  F=0:PRINT"{DOWN}{BLK}
        {RVS}T{OFF}APE OR {RVS}
        D{OFF}ISK: [4]";
FP 730  GET A$:IF A$="T"THEN PR
        INT"T{DOWN}":GOTO880
HQ 740  IF A$<>"D"THEN730
HH 750  PRINT"D{DOWN}":OPEN15,8
        ,15,"I0:":B=EA-SA:IN$="
        0:"+IN$:IF OP THEN810
SQ 760  OPEN 1,8,8,IN$+",P,W":G
        OSUB860:IF A THEN220
FJ 770  AH=INT(SA/256):AL=SA-(A
        H*256):PRINT#1,CHR$(AL)
        ;CHR$(AH);
PE 780  FOR I=0 TO B:PRINT#1,CH
        R$(PEEK(BS+I));:IF ST T
        HEN800
FC 790  NEXT:CLOSE1:CLOSE15:GOT
        O940
GS 800  GOSUB1060:PRINT"{DOWN}
        {BLK}ERROR DURING SAVE:
        [4]":GOSUB860:GOTO220
MA 810  OPEN 1,8,8,IN$+",P,R":G
        OSUB860:IF A THEN220
GE 820  GET#1,A$,B$:AD=ASC(A$+Z
        $)+256*ASC(B$+Z$):IF AD
        <>SA THEN F=1:GOTO850
RX 830  FOR I=0 TO B:GET#1,A$:P
        OKE BS+I,ASC(A$+Z$):IF(
        I<>B)AND ST THEN F=2:AD
        =I:I=B
FA 840  NEXT:IF ST<>64 THEN F=3
FQ 850  CLOSE1:CLOSE15:ON ABS(F
        >0)+1 GOTO960,970
SA 860  INPUT#15,A,A$:IF A THEN
         CLOSE1:CLOSE15:GOSUB10
        60:PRINT"{RVS}ERROR: "A
        $
GQ 870  RETURN
EJ 880  POKE183,PEEK(FA+2):POKE
        187,PEEK(FA+3):POKE188,
        PEEK(FA+4):IFOP=0THEN92
        0
HJ 890  SYS 63466:IF(PEEK(783)A
        ND1)THEN GOSUB1060:PRIN
        T"{DOWN}{RVS} FILE NOT
        {SPACE}FOUND ":GOTO690
CS 900  AD=PEEK(829)+256*PEEK(8
        30):IF AD<>SA THEN F=1:
        GOTO970
SC 910  A=PEEK(831)+256*PEEK(83
        2)-1:F=F-2*(A<EA)-3*(A>
        EA):AD=A-AD:GOTO930
KM 920  A=SA:B=EA+1:GOSUB1010:P
        OKE780,3:SYS 63338
JF 930  A=BS:B=BS+(EA-SA)+1:GOS
        UB1010:ON OP GOTO950:SY
        S 63591
AE 940  GOSUB1080:PRINT"{BLU}**
         SAVE COMPLETED **":GOT
        O220
XP 950  POKE147,0:SYS 63562:IF
        {SPACE}ST>0 THEN970
FR 960  GOSUB1080:PRINT"{BLU}**
         LOAD COMPLETED **":GOT
        O220
DP 970  GOSUB1060:PRINT"{BLK}
        {RVS}ERROR DURING LOAD:
        {DOWN}[4]":ON F GOSUB98
        0,990,1000:GOTO220
PP 980  PRINT"INCORRECT STARTIN
        G ADDRESS (";:GOSUB360:
        PRINT")":RETURN
GR 990  PRINT"LOAD ENDED AT ";:
        AD=SA+AD:GOSUB360:PRINT
         D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
         ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
        *256):POKE193,AL:POKE1
        94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
        *256):POKE174,AL:POKE1
        75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
        1050
HA 1040 IF(AD>511 AND AD<40960
        )OR(AD>49151 AND AD<53
        248)THEN GOSUB1080:F=0
        :RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
        {SPACE}INVALID ADDRESS
         {DOWN}{BLK}":F=1:RETU
        RN
AR 1060 POKE SD+5,31:POKE SD+6
        ,208:POKE SD,240:POKE
        {SPACE}SD+1,4:POKE SD+
        4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
        TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
        240:POKE SD,0:POKE SD+
        1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
        KE SD+4,0:POKE SD,0:PO
        KE SD+1,0:RETURN
```

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MLX Machine Language Entry Program For Apple

Tim Victor, Editorial Programmer

To make it easier to enter machine language programs into your computer without typos, COMPUTE! is introducing its "MLX" entry program for the Apple II series. It's our best MLX yet. It runs on the II, II+, IIe, and IIc, and with either DOS 3.3 or ProDOS.

A machine language (ML) program is usually listed as a long series of numbers. It's hard to keep your place and even harder to avoid making mistakes as you type in the listing, since an incorrect line looks almost identical to a correct one. To make error-free entry easier, COMPUTE! generally lists ML programs for Commodore and Atari computers in a format designed to be typed in with a utility called "MLX." The MLX program uses a checksum system to catch typing errors almost as soon as they happen.

Apple MLX checks your typing on a line-by-line basis. It won't let you enter invalid characters or let you continue if there's a mistake in a line. It won't even let you enter a line or digit out of sequence. Best of all, you don't have to know anything about machine language to enter ML programs with MLX. Apple MLX makes typing ML programs almost foolproof.

Using Apple MLX

Type in and save some copies of Apple MLX on disk (you'll want to use MLX to enter future ML programs in COMPUTE!). It doesn't matter whether you type it in on a disk formatted for DOS 3.3 or ProDOS. Programs entered with Apple MLX, however, must be saved to a disk formatted with the same operating system as Apple MLX itself.

If you have an Apple IIe or IIc, make sure that the key marked CAPS LOCK is in the down position. Type RUN. You'll be asked for the starting and ending addresses of the ML program. These values vary for each program, so they're given at the beginning of the ML program listing and in the program's accompanying article. Find them and type them in.

The next thing you'll see is a menu asking you to select a function. The first is (E)NTER DATA. If you're just starting to type in a program, pick this. Press the E key, and the program asks for the address where you want to begin entering data. Type the first number in the first line of the program listing if you're just starting, or the line number where you left off if you've already typed in part of a program. Hit the RETURN key and begin entering the data.

Once you're in Enter mode, Apple MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight bytes and a checksum. When you enter a line and hit RETURN, Apple MLX recalculates the checksum from the eight bytes and the address. If you enter more or less than nine numbers, or the checksum doesn't exactly match, Apple MLX erases the line you just entered and prompts you again for the same line.

Invalid Characters Banned

Apple MLX is fairly flexible about how you type in the numbers. You can put extra spaces between numbers or leave the spaces out entirely, compressing a line into 18 keypresses. Be careful not to put a space between two digits in the middle of a number. Apple MLX will read two single-digit numbers instead of one two-digit number (F 6 means F and 6, not F6).

You can't enter an invalid character with Apple MLX. Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), nothing happens. This safeguards against entering extraneous characters. Even better, Apple MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, Apple MLX will catch your mistake.

Apple MLX also checks to make sure you're typing in the right line. The address (the number to the left of the colon) is part of the checksum recalculation. If you accidentally skip a line and try to enter incorrect values, Apple MLX won't let you continue. Just make sure you enter the correct starting address; if you don't, you won't be able to enter any of the following lines. Apple MLX will stop you.

Editing Features

Apple MLX also includes some editing features. The left- and right-arrow keys allow you to back up and go forward on the line that you are entering, so you can retype data. Pressing the CONTROL (CTRL) and D keys at the same time (*delete*) removes the character under the cursor, shortening the line by one character. Pressing CTRL-I (*insert*) puts a space under the cursor and shifts the rest of the line to the right, making the line one character longer. If the cursor is at the right end of the line, neither CTRL-D nor CTRL-I has any effect.

When you've entered the entire listing (up to the ending address that you specified earlier), Apple MLX automatically leaves Enter mode and redisplays the functions menu. If you want to leave Enter mode before then, press the RETURN key when Apple MLX prompts you with a new line address. (For instance, you may want to leave Enter mode to enter a program listing in more than one sitting; see below.)

Display Data

The second menu choice, (D)ISPLAY DATA, examines memory and shows the contents in the same format as the program listing. You can use it to check your work or to see how far you've gotten. When you press D, Apple MLX asks you for a starting address. Type in the address of the first line you want to see and hit RETURN. Apple MLX displays program lines until you press any key or until it reaches the end of the program.

Save And Load

Two more menu selections let you save programs on disk and load them back into the computer. These are (S)AVE FILE and (L)OAD FILE. When you press S or L, Apple MLX asks you for the filename. The first time you save an ML program, the name you assign will be the program's filename on the disk. If you press L and specify a filename that doesn't exist on the disk, you'll see a disk error message.

If you're not sure why a disk error has occurred, check the drive. Make sure there's a formatted disk in the drive and that it was formatted by the same operating system you're using for Apple MLX (ProDOS or DOS 3.3). If you're trying to save a file and see an error message, the disk might be full. Either save the file on another disk or quit Apple MLX (by pressing the Q key), delete an old file or two, then run Apple MLX again. Your typing should still be safe in memory.

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cursor, shortening the line by one character. Pressing CTRL-I (*insert*) puts a space under the cursor and shifts the rest of the line to the right, making the line one character longer. If the cursor is at the right end of the line, neither CTRL-D nor CTRL-I has any effect.

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Apple MLX: Machine Language Entry Program

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

```
80 100 N = 9: HOME : NORMAL : PR
       INT "APPLE MLX": POKE 34,
       2: ONERR GOTO 610
CC 110 VTAB 1: HTAB 20: PRINT "S
       TART ADDRESS";: GOSUB 530
       : IF A = 0 THEN PRINT CHR
       $ (7): GOTO 110
8C 120 S = A
E3 130 VTAB 2: HTAB 20: PRINT "E
       ND ADDRESS  ";: GOSUB 530
       : IF S > = A OR A = 0 THE
       N PRINT CHR$ (7): GOTO 13
       0
20 140 E = A
B5 150 PRINT : PRINT "CHOOSE:(E)
       NTER DATA";: HTAB 22: PRI
       NT "(D)ISPLAY DATA": HTAB
        8: PRINT "(L)OAD FILE  (
       S)AVE FILE  (Q)UIT": PRIN
       T
AE 160 GET A$: FOR I = 1 TO 5: I
       F A$ < > MID$ ("EDLSQ",I,
       1) THEN NEXT : GOTO 160
93 170 ON I GOTO 270,220,180,200
       : POKE 34,0: END
AF 180 INPUT "FILENAME: ";A$: IF
        A$ < > "" THEN PRINT CHR
       $ (4);"BLOAD";A$;",A";S
A1 190 GOTO 150
38 200 INPUT "FILENAME: ";A$: IF
        A$ < > "" THEN PRINT CHR
       $ (4);"BSAVE";A$;",A";S;"
       ,L";(E - S) + 1
92 210 GOTO 150
C2 220 GOSUB 590: IF B = 0 THEN
       150
9E 230 FOR B = B TO E STEP 8:L =
        4:A = B: GOSUB 580: PRIN
       T A$;": ";:L = 2
B5 240 FOR F = 0 TO 7:V(F + 1) =
        PEEK (B + F): NEXT : GOS
       UB 560:V(9) = C
F2 250 FOR F = 1 TO N:A = V(F):
       GOSUB 580: PRINT A$" ";:
       NEXT : PRINT : IF PEEK (4
       9152) < 128 THEN NEXT
94 260 POKE 49168,0: GOTO 150
CC 270 GOSUB 590: IF B = 0 THEN
       150
48 280 FOR B = B TO E STEP 8
A6 290 HTAB 1:A = B:L = 4: GOSUB
        580: PRINT A$;": ";: CAL
       L 64668:A$ = "":P = 0: GO
       SUB 330: IF L = 0 THEN 15
       0
F9 300 GOSUB 470: IF F < > N THE
       N PRINT CHR$ (7);: GOTO 2
       90
27 310 IF N = 9 THEN GOSUB 560:
       IF C < > V(9) THEN PRINT
       CHR$ (7);: GOTO 290
72 320 FOR F = 1 TO 8: POKE B +
       F - 1,V(F): NEXT : PRINT
       : NEXT : GOTO 150
8E 330 IF LEN (A$) = 33 THEN A$
       = O$:P = O: PRINT CHR$ (7
       );
22 340 L = LEN (A$):O$ = A$:O =
       P:L$ = "": IF P > 0 THEN
       L$ = LEFT$ (A$,P)
E0 350 R$ = "": IF P < L - 1 THE
       N R$ = RIGHT$ (A$,L - P -
        1)
55 360 HTAB 7: PRINT L$;: FLASH
       : IF P < L THEN PRINT MID
       $ (A$,P + 1,1);: NORMAL :
        PRINT R$;
7B 370 PRINT " ";: NORMAL
E6 380 K = PEEK (49152): IF K <
       128 THEN 380
C1 390 POKE 49168,0:K = K - 128
5B 400 IF K = 13 THEN HTAB 7: PR
       INT A$;" ";: RETURN
8A 410 IF K = 32 OR K > 47 AND K
        < 58 OR K > 64 AND K < 7
       1 THEN A$ = L$ + CHR$ (K)
        + R$:P = P + 1
C1 420 IF K = 4 THEN A$ = L$ + R
       $
5F 430 IF K = 9 THEN A$ = L$ + "
        " + MID$ (A$,P + 1,1) +
       R$
0A 440 IF K = 8 THEN P = P - (P
       > 0)
93 450 IF K = 21 THEN P = P + (P
       < L)
9D 460 GOTO 330
37 470 F = 1:D = 0: FOR P = 1 TO
        LEN (A$):C$ = MID$ (A$,P
       ,1): IF F > N AND C$ < >
       " " THEN RETURN
BB 480 IF C$ < > " " THEN GOSUB
       520:V(F) = J + 16 * (D =
       1) * V(F):D = D + 1
5F 490 IF D > 0 AND C$ = " " OR
       D = 2 THEN D = 0:F = F +
       1
08 500 NEXT : IF D = 0 THEN F =
       F - 1
17 510 RETURN
B5 520 J = ASC (C$):J = J - 48 -
        7 * (J > 64): RETURN
AB 530 A = 0: INPUT A$:A$ = LEFT
       $ (A$,4): IF LEN (A$) = 0
        THEN RETURN
6F 540 FOR P = 1 TO LEN (A$):C$
       = MID$ (A$,P,1): IF C$ <
       "0" OR C$ > "9" AND C$ <
       "A" OR C$ > "Z" THEN A =
       0: RETURN
2D 550 GOSUB 520:A = A * 16 + J:
        NEXT : RETURN
28 560 C = INT (B / 256):C = B -
        254 * C - 255 * (C > 127
       ):C = C - 255 * (C > 255)
20 570 FOR F = 1 TO 8:C = C * 2
       - 255 * (C > 127) + V(F):
       C = C - 255 * (C > 255):
       NEXT : RETURN
DA 580 I = FRE (0):A$ = "": FOR
       I = 1 TO L:T = INT (A / 1
       6):A$ = MID$ ("0123456789
       ABCDEF",A - 16 * T + 1,1)
        + A$:A = T: NEXT : RETUR
       N
1F 590 PRINT "FROM ADDRESS ";: G
       OSUB 530: IF S > A OR E <
        A OR A = 0 THEN B = 0: R
       ETURN
0D 600 B = S + 8 * INT ((A - S)
       / 8): RETURN
B6 610 PRINT "DISK ERROR": GOTO
       150
```

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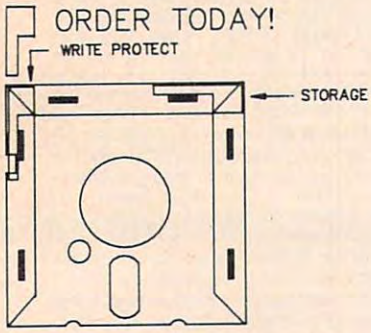

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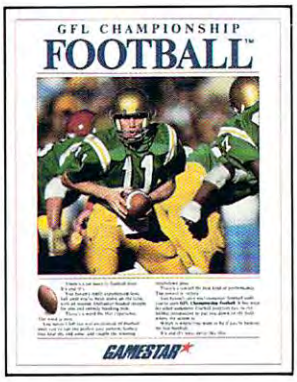

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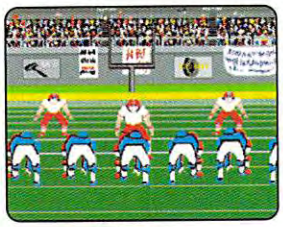

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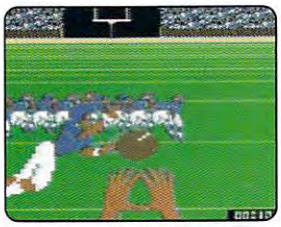

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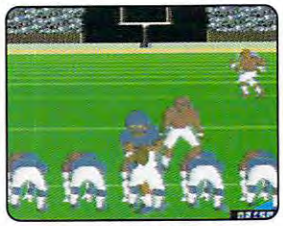

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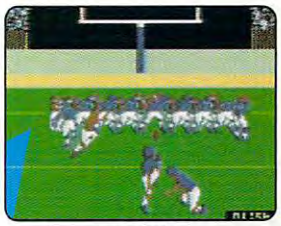

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