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APRIL 1987

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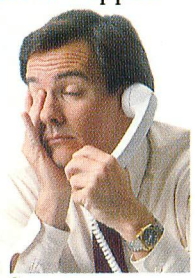

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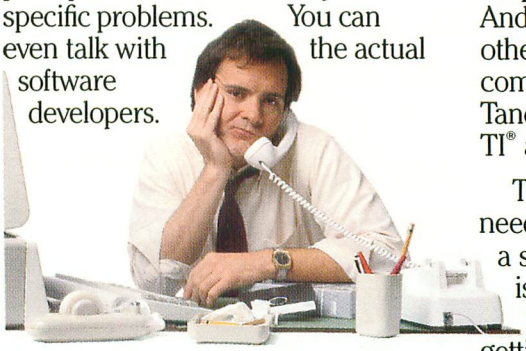

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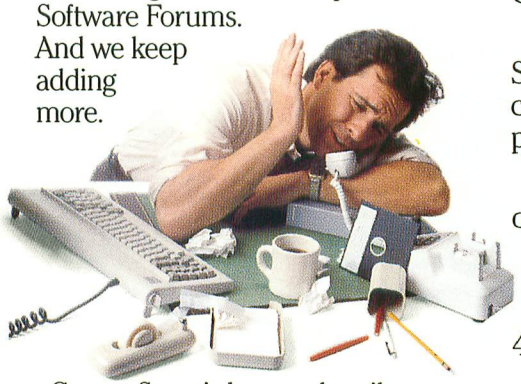

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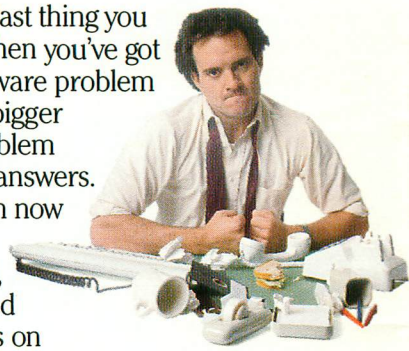

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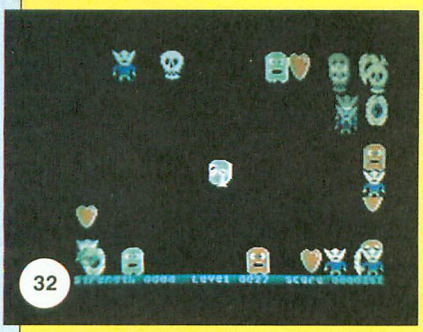

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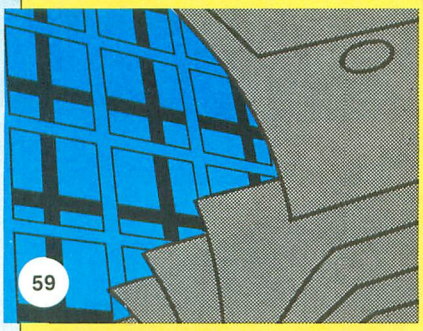

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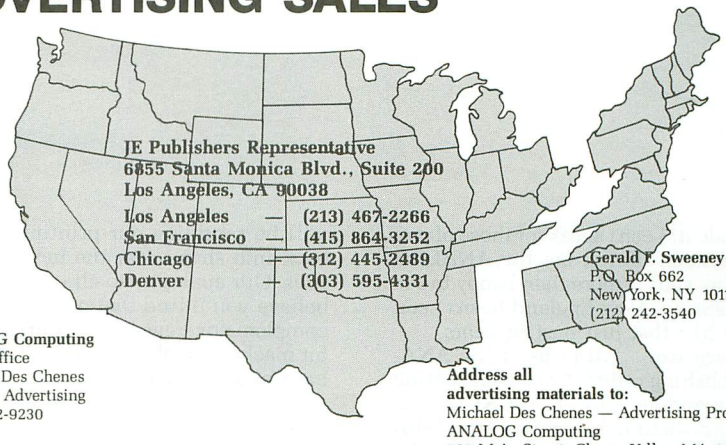

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Editorial

We made it! I can't speak for those of you in the sunnier climes, but the **ANALOG Computing** staff is more than happy to see signs of spring. New England hasn't seen a winter like that just past in *years*.

Nor have we. . . All of us at the ANALOG Publishing offices have been putting forth tremendous effort to get **ST-Log** off the ground—and to bring **The Atari 8-Bit Extra from ANALOG Computing** to the stands.

The **Extra** has finally been completed and is now shipping. You should be able to purchase it wherever **ANALOG Computing** is sold, or, to order it, see the ad on page 103 of this issue. We're pretty proud of its 132 pages. They're packed full of new games, utilities, tutorials, applications—all the things 8-bit Atarians have come to count on us for.

Now, we know many of our readers have noticed that the past few issues of **ANALOG Computing** have been late in arriving, by mail and on the newsstands. The work involved in putting out the **Extra** *and* the two magazines is the reason for our tardiness.

There's no truth to any rumor you hear that Time/Life wants to buy us out (although some of us will admit that Tierra del Fuego's solitude and tranquility have begun to look inviting). But ANALOG Publishing is stronger and more vital than ever. We've hired more production personnel, and everyone's hard at work, getting **ANALOG Computing** back to its normal schedule. While this may not happen overnight (read: in one month), rest assured that we will be prodding our printing deadlines back into shape over the next several issues. Our apologies to all our readers: we believe you'll find that our thorough and complete coverage of the Atari 8- and 16-bit machines makes us worth the wait you have experienced.

On to new business. . . In this telecommunications issue, you beginners will find André Molyneux's **Modems and the Atari 8-Bits** useful. It goes over everything you'll need in order to get started out in the world of telecommunications. When you're ready, we'll see you in the Atari Users' Group on Delphi.

For those more adept at using their computers with the phone lines, there's a piece by Maurice Molyneaux called **The Baud Warrior**. In it you'll find tips on keeping your telecommunications costs down. We also have reviews of BBS programs, plus a look at Atari's **The Learning Phone** for those who'd like to try the Plato system.

Anyone who's wanted more from issue 27's **MicroCheck** may find what they've been looking for in this month's **HardCopy** and **CheckWriter**. Our **Bits & Pieces** column will help readers set up an X-10 connection, to run their lights and appliances via computer.

On another note, **Music during the Vertical Blank Interrupt** is the third in our series on the VBI. Learn how to put some harmony into your programs. Then there are **Multicopy** and **Background Printer**, whose names are fairly self-explanatory, plus **Floyd the Droid Goes Blastin'**. The machine-language gladiator needs all the help he can get to conquer the mutants attacking him.

We've included plenty of reviews, too. Besides Steve Panak's commentary, you can look at **Soundwave 1** and **8** (and there's a new version on the way), **Screens**, **The New Technology Coloring Book**, **Video Vegas** and **Blazing Paddles**. For ST owners, we have a review of ***The Atari ST User's Guide***.

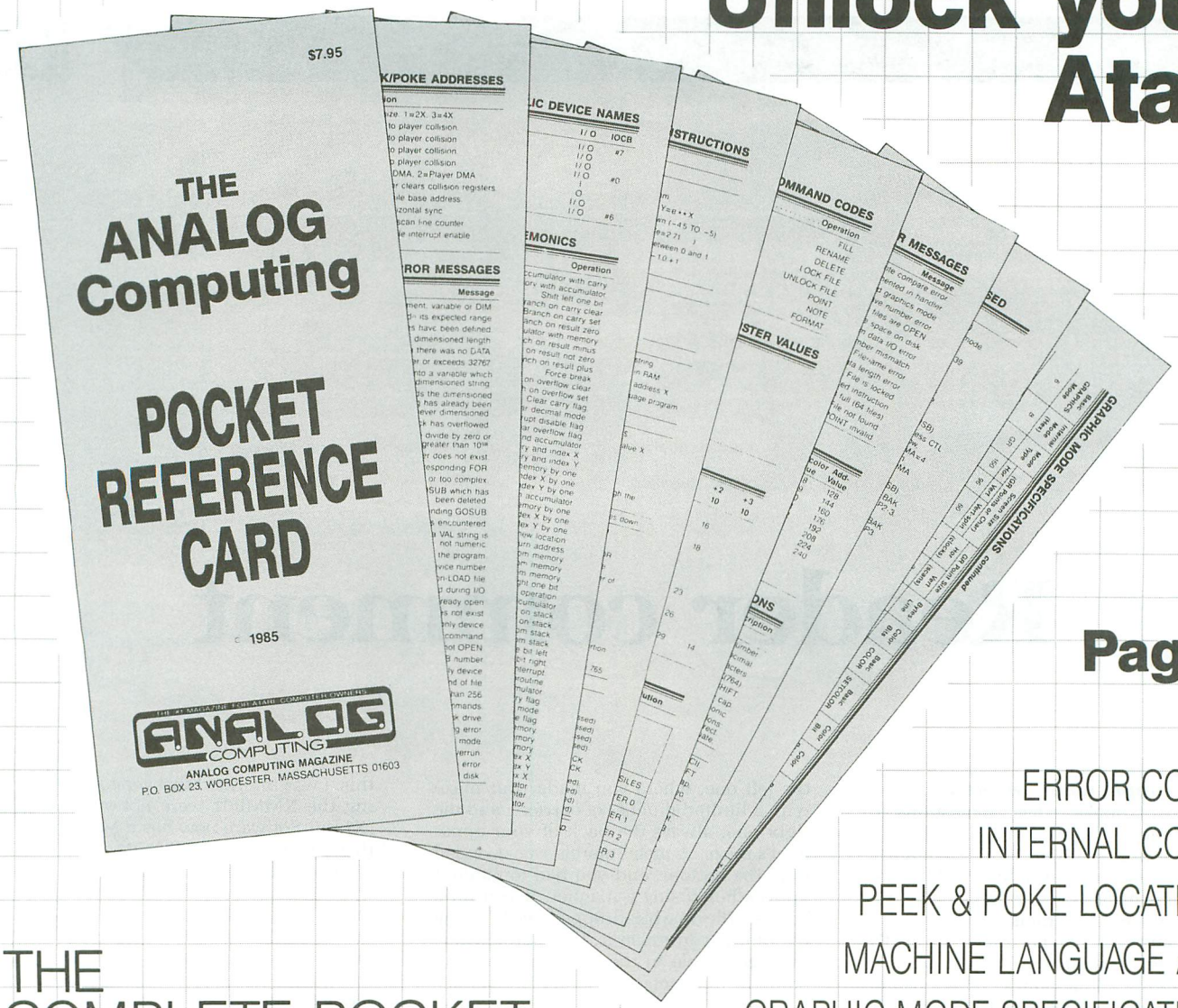
We'll warn you right here that Arthur Leyenberger has a dose of spring fever. His **End User** column this month pays due tribute to the strangely attractive foolishness of April 1st.

That's what's happening here. We're off and running on the next issue—and toward normalcy in our deadline dates. Of course, there is just a *bit* work to do for the upcoming Northeast Atari Computer Fair in October. . . But we wouldn't let a little thing like that stand in our way.

Till next issue, *au revoir*.

Diane L. Gaw
Managing Editor
ANALOG Computing

Unlock your Atari



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Reader comment

Programmers wanted.

I'd like to make a few suggestions to programmers who want a challenge.

At this time, the Atari 8-bit community is facing a lack of new software. The major Atari magazines have responded by trying to get new programs out. I'm not a programmer, but I do have some ideas. I'd love to see someone carry them out.

I'm talking about games. What's usually published in **ANALOG Computing** is fine, but many times unimaginative. The most exciting program I've seen in a while was **Modem Chess** (issue 48). I would really like to see more like it—games that let two people play each other, using modems. Here are my suggestions:

Modem Battleship. This would be a lot of fun, and a precedent already exists. . . there's been an electronic version on the market for years. Think of the ease of play, using a joystick to position your shots, and the visual and sound effects that could occur when you hit your opponent!

Modem Black Box. Black Box was a game Parker Brothers published in 1978. I have a copy, and it's really a good game. I've wanted a computer version for a long time—but a modem version, with players alternating as the Hider and the Seeker, would be great! It could have a science-fiction look, and visuals and sound could be great, too.

Modem ? There was a game I had as a kid (the name is lost), where each player set up a maze on his side of a vertical board that sat between them. You'd then take a marble and a magnet, and there'd be a race as each player tried to find his way through the opponent's maze first. The board was divided into two sections: the left one, where you made your maze with a limited number of barriers; and the right one, always the back of your opponent's maze. A metal marble was dropped in at the bottom, and you had to guide it up to a hole using a magnet. If you hit a barrier, the marble dropped back to the bottom. If you made it, the marble came through a hole in the board and clicked onto the magnet. You could always see where your opponent was, including when he/she dropped to the bottom.

Modem Battlezone. Now this would be about the ultimate! You'd each have a tank, radar and a human opponent.

Why have I suggested all this? I think **ANALOG** could offer programs you just won't be able to buy on the market—at least, not yet. I've also found that I'm getting tired of computer opponents; they get predictable. Let's do something really exciting! And why stop at my ideas so far? Why couldn't an ST run a multi-player **Pole Position**, with a bunch of 8-bit machines tied to it via null-modem cables?

One of the unattractive aspects of computer gaming is its solitude, but when an arcade game like Gauntlet comes along, that allows several people to play together, it becomes very popular.

Jeff Haas
Monterey, CA

XMM801 compatibility for *G:*

After recently purchasing the new Atari XMM801 dot-matrix graphics printer, I discovered it does not have the capability to print the special Atari graphics and inverse video characters. While searching for a commercial program to allow me to do this, I was informed that versions supporting the XMM801 were not yet available (XLEnt Software now has a **Megafont II+** that supports the XMM801).

Then I discovered the **G:** printer utility from issue 35, which would do this and more for Epson (with Graftrax) or Gemini printers. The XMM801's normal-density graphics function is compatible with Epson printers, however the high-density mode is not.

Utilizing the assembly listing provided with the article, I made the following changes, to make **G:** compatible with the XMM801. First, add *10* to the numbers following the commas in Lines 1110 through 1230; next change Line 1100 to:

```
1100 DATA A99B91D48CAA29A2
030EFA292EFB29CAD0F7ADAB29
C940D004A956D00CADA5294A4A
4A4AAACABDD8298DF929A9,581
```

Finally, change Line 1240 to:

```
1240 DATA 0000000000000000
000056564B4B08090C0026263C
2850781B401B4E051B4D051B41
081B000000E002E102D325,668
```

Edit the **G:** BASIC program to incorporate these changes, save it to disk, then run the program. A new AUTORUN.SYS file will be created, which will allow you to use the **G:** driver with your XMM801 printer.

Thanks to Charles F. Johnson and **ANALOG Computing** for an outstanding program. I fully agree with Mark A. Storin's praise of **G:** in issue 38's **Reader comment**. Only one question remains: why isn't Mr. Johnson *selling* this program?

Sincerely,
Louis E. Marcotte
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ISSUE 47 *(also on disk)* • DLIs: A minute to learn • Deathzone • BASIC Editor II • The ANALOG Database • DiskFile • ST-Log 7

ISSUE 48 *(also on disk)* • M-Windows • Cosmic Glob • DLIs - Part 2 • Modem Chess • Status Report • ST-Log 8

ISSUE 49 *(also on disk)* • The Atari 8-bit Gift Guide • Brickworks • TechPop • Fortune-Wheel • Smiles and other facial wrinkles • ST-Log 9

ISSUE 50 *(also on disk)* • Krazy Katerpillars • Atari Picture Storage Techniques • Trails in Action! • Scroll-It • Screen Scroller

ISSUE 51 *(also on disk)* • The BBK Monitor • Slither • The Tablet Typist • An Introduction to the Vertical Blank Interrupt (Part 1) • ST Color Tuner

ISSUE 52 *(also on disk)* • The Devil's Doorway • Rambug II • The Vertical Blank Interrupt: Scrolling (Part 2) • Midas Maze • Matching Shapes (ST)

Issues 12, 14, 15, 16, 17, 18, 19, 20, 21, 22 and up are also still available.

THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS
ANALOG COMPUTING
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Educational program list available.

As a computer-using educator, I am constantly reading or hearing people say that there isn't any educational software available for the 8-bit Atari computers. Over a period of time, I have compiled a database of educational program titles, their publishers, subject matter and appropriate grade levels for the Atari. By no means is this list complete, nor does it speak to the quality of these programs or include any public domain programs.

I would be glad to furnish this list to any of your readers, if they would send me a self-addressed, stamped envelope and $.50 to cover the cost of the printing. Also, I would like to update this database with any program(s) that I have left off or described incorrectly. Therefore, I welcome any program titles, publishers, subject matter and grade-level information your readers might send me.

Lastly, I could use some help finding a program that would run on the Atari 130XE, which would help in selecting doubles partners for a tennis tournament. I would like to try to keep the pairings competitive, so that two A players would never be partners. I would also like to be able to get a printout of these pairings. Ideally, this should work off a database of names which could have been previously established.

Thank you for your time and assistance.

Sincerely,
William S. Brooks, III
Rutland, MA

Holland needs help.

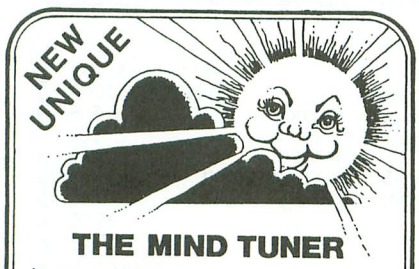
I am very happy that **ANALOG Computing** has now been available in the Netherlands for some months. I'd like to have all the volume numbers complete—is there a reader who would make me happy with back issues?

And could you help me get some addresses of U.S. Atari users/owners who would like to exchange disks with Dutch Atari users?

Max Terveen Textiel
Botermart 9 Leiden
Magerhorst 8 Alphen A/D RIJN
The Netherlands

Atari addiction.

I have owned an Atari 130XE for almost a year. I have been reading about the XL/



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WE KNOW it sounds IMPOSSIBLE, FANTASTIC, LUDICROUS! You've demanded ABSOLUTE **PROOF,** so HERE IT IS!... **Quotes** from numerous letters we have received from **BONAFIDE CUSTOMERS** (not our friends and relatives!) about **"TURBOBASE'S"™** predecessor, MICROMOD 3.0. Please request our complete unedited file of these letters and many more, with initials/city/state of customers YOU CAN CALL!

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COMPARING TO SYNFILE™ (SF), VISICALC™ (VC), HOME ACCOUNTANT™ (HA), PEACHTREE™ (PT), DATA PERFECT™ (DP):
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Need more power? You have two choices: 1. Buy an ST™ or IBM™ clone for **$1,150** + (two drives + software + the usual non-existent support), throw away your 8-bit software and the years it took to learn your system, or **2.** Buy MICROMOD TURBOBASE™ for **$159.95** and get **PROVEN** support/service and **GUARANTEED** success.

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CIRCLE #106 ON READER SERVICE CARD

XE vs. ST controversy and fail to see what the fuss is about.

I needed a computer to run a home office—i.e., do word processing and store correspondence, keep household accounts and track my income, handle simple business accounts—and to write up presentations and store data about patients.

The computer also had to be cheap, easy to operate and reliable. When I started looking, my choices lay between a TI99, an IBM clone, a Commodore, Apple or Mac, Amiga, ST or Atari XL/XE.

The TI99 is a wonderful machine, but it's an orphan for which it's difficult to find software. An IBM system, by the time you buy all the bits and pieces you need to make it work, is horrendously expensive . . . and then you have to learn PC/DOS. IBM invented the user-hostile computer.

I looked at the Commodore, with its incredible amount of useful software. I'd heard stories of Commodore disk drives being disasters, though, and it's still relatively expensive.

Apples and Macs are nice, but they cost too much. I do not see why I should spend so much for an Apple II—that uses the same chip as the Atari and Commodore, yet costs twice as much. Sorry Mr. Jobs, I do not want to pay a premium to support your corporate culture.

Both the Amiga and ST lay just outside of my price range and were more powerful than I really needed, to start.

That left only the Atari 8-bit. Being able to get a computer, disk drive and 1027 printer for less than $400 was an offer I could not refuse. **AtariWriter Plus** is the easiest to use full-featured word processor I have seen. Synapse provided my application software. I bought a couple of games. For under $500, I have a complete system that does everything I need.

Currently, nothing can beat the Atari price. If anything, I regret not buying a cheaper 800 than the 130XE, and using the money I saved to get a 256K RAMdisk upgrade for my spell checker.

I am now at the point where I am pushing the limitations of my machine, and do intend to replace it one of these days. In the meantime, I have found out how useful a computer is. If it was Atari's marketing strategy to hook people on home computing with an inexpensive machine, then create customer loyalty when it came time to buy a better system, they succeeded. I am going to wait for the next-generation PC—and look at the Atari lineup first.

About the only request I have of Atari is that, since PC and Mac emulator programs are on the market for the ST, why not a 800XL/XE emulator to let me transfer my files and still use my games? Surely it should be possible to somehow plug a 1050 disk drive into an ST and have the ST pretend it is an 8-bit. This would not only ensure a greater degree of user loyalty, since the 800XL/XE user would not have to abandon his software investment, but would also ensure longer support for the 8-bit line, since 8-bit software publishers would know that their programs could be sold to owners of the new machines. It would also allow the XL/XE to act as a printer buffer or I/O device.

In fact, how about a complete line of emulator programs and cable adaptors?—so that IBM, Apple, C64/128/CPM, and Mac programs and disk drives could be used on the ST and its successors. By making a universal machine, Atari could *become* the universal machine.

Sincerely yours,
David Blocker
Stockton, CA

New Replacement Printed Circuit Boards (PCB) w/parts

800 Main	$10	16K RAM	$10	810 side w/DS	$30
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RAM 6810	810 ROM C	VCS TIA 444

$12.00 each:
XL ANTIC E, XL/XE OS, 850 ROM B, 1050 ROM ($10.)
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Public domain software (520/1040ST and 8 Bit):
Too many titles to list ..... Disks are 5.00 each
Write for complete list. *Missing some chips.

SS 810 Disk Drive	$110.00
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M/L Editor

For use in machine language entry

by Clayton Walnum

M/L Editor provides an easy method to enter our machine language listings. It won't allow you to skip lines or enter bad data. For convenience, you may enter listings in multiple sittings. When you're through typing a listing with **M/L Editor**, you'll have a complete, runnable object file on your disk.

There is one hitch: it's for disk users only. My apologies to those with cassette systems.

Listing 1 is **M/L Editor**'s BASIC listing. Type it in and, when it's free of typos, save a copy to disk, then run it.

On a first run, you'll be asked if you're starting a new listing or continuing from a previously saved point. Press *S* to start, or *C* to continue.

You'll then be asked for a filename. If you're starting a new listing, type in the filename you want to save the program under, then press RETURN. If there's already a file by that name on the disk, you'll be asked if you wish to delete it. Press *Y* to delete the file, or *N* to enter a new filename.

If you're continuing a file, type in the name you gave the file when you started it. If the program can't find the file, you'll get an error message and be prompted for another filename. Otherwise, **M/L Editor** will calculate where you left off, then go on to the data entry screen.

Each machine language program in **ANALOG Computing** is represented by a list of BASIC data statements. Every line contains 16 bytes, plus a checksum. Only the numbers following the word *DATA* need be considered.

M/L Editor will display, at the top of the screen, the number of the line you're currently working on. As you go through the line, you'll be prompted for each entry. Simply type the number and press RETURN. If you press RETURN without a number, the default is the last value entered.

This feature provides a quick way to type in lines with repetitions of the same number. As an added convenience, the editor will not respond to the letter keys (except *Q*, for "quit"). You must either enter a number or press RETURN.

When you finish a line, **M/L Editor** will compare the entries' checksum with the magazine's checksum. If they match, the screen will clear, and you may go on to the next line.

If the checksums *don't* match, you'll hear a buzzing sound. The screen will turn red, and the cursor will be placed back at the first byte of data. Compare the magazine listing byte by byte with your entries. If a number's correct, press RETURN.

If you find an error, make the correction. When all data's valid, the screen will return to grey, and you'll be allowed to begin the next line.

Make sure you leave your disk in the drive while typing. The data is saved continuously.

You may stop at any time (except when you have a red screen) by entering the letter *Q* for byte #1. The file will be closed, and the program will return you to BASIC. When you've completed a file, exit **M/L Editor** in the same way.

When you've finished typing a program, the file you've created will be ready to run. In most cases, it should be loaded from DOS via the L option. Some programs may have special loading instructions; be sure to check the program's article.

If you want the program to run automatically when you boot the disk, simply name the file AUTORUN.SYS (make sure you have DOS on the disk).

That's **M/L Editor**. Use it in good health.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.
BASIC listing.

```
AZ 10 DIM BF(16),N$(4),A$(1),B$(1),F$(15)
   ,F1$(15)
LF 11 DIM MOD$(4)
BN 20 LINE=1000:RETRN=155:BACK$P=126:CHK$
   UM=0:EDIT=0
GO 30 GOSUB 450:POSITION 10,6:? "Start or
    Continue? ";:GOSUB 500:? CHR$(A)
ZG 40 POSITION 10,8:? "FILENAME";:INPUT F
   $:POKE 752,1:? " "
FE 50 IF LEN(F$)<3 THEN POSITION 20,10:?
   "  ":GOTO 40
NF 60 IF F$(1,2)<>"D:" THEN F1$="D:":F1$(
   3)=F$:GOTO 80
KL 70 F1$=F$
TN 80 IF CHR$(A)="S" THEN 120
FD 90 TRAP 430:OPEN #2,4,0,F1$:TRAP 110
HQ 100 FOR X=1 TO 16:GET #2,A:NEXT X:LINE
   =LINE+10:GOTO 100
WM 110 CLOSE #2:OPEN #2,9,0,F1$:GOTO 170
VT 120 TRAP 160:OPEN #2,4,0,F1$:GOSUB 440
   :POSITION 10,10:? "FILE ALREADY EXISTS
   !!":POKE 752,0
ZU 130 POSITION 10,12:? "ERASE IT? ";:GOS
   UB 500:POKE 752,1:? CHR$(A)
VH 140 IF CHR$(A)="N" OR CHR$(A)="n" THEN
    CLOSE #2:GOTO 30
QG 150 IF CHR$(A)<>"Y" AND CHR$(A)<>"y" T
   HEN 130
BH 160 CLOSE #2:OPEN #2,8,0,F1$
IE 170 GOSUB 450:POSITION 10,1:? "NOW ON
   LINE: ";LINE:CHK$UM=0
GH 180 L1=3:FOR X=1 TO 16:POSITION 13*(X(
   10)+12*(X)9),X+2:POKE 752,0:? "BYTE #"
   ;X;": ";:GOSUB 310
KH 190 IF EDIT AND L=0 THEN BYTE=BF(X):GO
   TO 210
FY 200 BYTE=VAL(N$)
OZ 201 MOD$=N$
BU 210 POSITION 22,X+2:? BYTE;"  "
YZ 220 BF(X)=BYTE:CHK$UM=CHK$UM+BYTE*X:IF
    CHK$UM>9999 THEN CHK$UM=CHK$UM-10000
M5 230 NEXT X:CHK$UM=CHK$UM+LINE:IF CHK$U
   M>9999 THEN CHK$UM=CHK$UM-10000
IG 240 POSITION 12,X+2:POKE 752,0:? "CHEC
   K$UM: ";:L1=4:GOSUB 310
EW 250 IF EDIT AND L=0 THEN 270
QM 260 C=VAL(N$)
SY 270 POSITION 22,X+2:? C;"   "
IL 280 IF C=CHK$UM THEN 300
DI 290 GOSUB 440:EDIT=1:CHK$UM=0:GOTO 180
LW 300 FOR X=1 TO 16:PUT #2,BF(X):NEXT X:
   LINE=LINE+10:EDIT=0:GOTO 170
FV 310 L=0
LG 320 GOSUB 500:IF A=ASC("Q") AND X=1 AN
   D  NOT EDIT THEN 420
PO 330 IF A<>RETRN AND A<>BACK$P AND (A<4
   8 OR A>57) THEN 320
DX 331 IF A=RETRN AND N$="" THEN N$=MOD$
TD 335 IF A=RETRN AND L=0 AND X>1 THEN 35
   0
JR 340 IF ((A=RETRN AND  NOT EDIT) OR A=B
   ACK$P) AND L=0 THEN 320
DW 350 IF A=RETRN THEN POKE 752,1:? " ":R
   ETURN
GG 360 IF A<>BACK$P THEN 400
5A 370 IF L>1 THEN N$=N$(1,L-1):GOTO 390
AS 380 N$=""
RE 390 ? CHR$(BACK$P);:L=L-1:GOTO 320
BB 400 L=L+1:IF L>L1 THEN A=RETRN:GOTO 35
   0
WX 410 N$(L)=CHR$(A):? CHR$(A);:GOTO 320
KN 420 GRAPHICS 0:END
YT 430 GOSUB 440:POSITION 10,10:? "NO SUC
   H FILE!":FOR X=1 TO 1000:NEXT X:CLOSE
   #2:GOTO 30
FD 440 POKE 710,48:SOUND 0,100,12,8:FOR X
   =1 TO 50:NEXT X:SOUND 0,0,0,0:RETURN
MY 450 GRAPHICS 23:POKE 16,112:POKE 53774
   ,112:POKE 559,0:POKE 710,4
XR 460 DL=PEEK(560)+256*PEEK(561)+4:POKE
   DL-1,70:POKE DL+2,6
HW 470 FOR X=3 TO 39 STEP 2:POKE DL+X,2:N
   EXT X:FOR X=4 TO 40 STEP 2:POKE DL+X,0
   :NEXT X
ZW 480 POKE DL+41,65:POKE DL+42,PEEK(560)
   :POKE DL+43,PEEK(561):POKE 87,0
AC 490 POSITION 2,0:? "analog ml editor":
   POKE 559,34:RETURN
WZ 500 OPEN #1,4,0,"K:":GET #1,A:CLOSE #1
   :RETURN
```

Atari Hardware & Software

For the Serious User

SBM ST $149.95

This system was designed to operate in a wholesale or retail Environment. **SBM ST** is an inventory control, point of sale program that produces invoices, purchase orders, statements, mailing labels, price labels, quotes, cash register receipts, inventory reports, sales and account reports, and more.

Program Environment:
Machine Language

Inventory Control:
Each inventory record consist of item number, part number, description, vendor number, quantity on hand, location, reorder point, quantity on order, cost, sale price, quantity sold, dollar amount sold, and product group.
Inventory reports can be printed by file, vendor number, or product group. Turn reports help let you know what you're selling and how much you're making on an individual item basis.

Accounts:
Account records consist of account number, name and address, terms, total purchased, total paid, last invoice date, and balance due. And you can search for accounts by number or name.

General:
Mailing labels may be printed for all or selected accounts and vendors. Sales reports consist of daily, periodic, and annual. And you can print them with or without clearing the totals. There are 10 tax rate keys that are programmable. They are recorded seperatly.

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Estimated Capacity per media:
Single sided drive-2,000 records
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20MB hard disk-100,000 records

Requirements:
Atari ST computer system with TOS in ROM, Disk Drive.
ST compatible printer.

Options:
Serial cash drawer (Indiana Cash Drawer SOP option compatible).

256KXL $69.95

This 256K ram memory upgrade is designed for the 800XL/1200XL computers. This upgrade gives you compatibility with the 130XE, plus gives you an additional 128K of ram for a total of 256K. With this upgrade, you can run software designed for the 130XE, including Basic XE, disk operating systems, etc. Internal installation. Does not use expansion bus. Some soldering required. **Mydos** and manual included.
Don't confuse our upgrade with others you may have heard about. Ours supports Antic CPU control, so you don't have to worry about overwriting the screen memory when doing banked operations. Our upgrade also protects the main memory, so you can't accidentally access the main memory bank and wipe it out.
Installation available

256KXLLM $39.95

Same as above, only without the RAM chips.

SCXM Sector Copier $17.95

This program was designed for use with 130XE, and 256K 800XL's with the Newell Industries 256KXL ram upgrade. This program supports 40 and 80 track disk drives up to 2880 sectors per disk, single or double density. Copies a full disk in just one pass. Make multiple copies while reading the source disk just once. Copies with or without format, and with or without verify.

MYDOS $29.95

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by Kurt Oestreich

With the introduction of the Atari 520ST and the Amiga, a new demand has been created for information on C, a language based on the principles of UNIX. C has become *the* programming language—so much so that many people will maintain you're not a programmer until you have learned C.

What makes C so great? Why not just use BASIC or machine language?

Easy: C source code is transportable. Programs can be moved quickly between different computer systems, and run with few (if any) modifications. Even machines having different microprocessors can exchange source code (for example: 520ST, Amiga, Atari 800, VAX, Nova 4, IBM PC, Northstar, PDP-11, TRS-80, Apple, or any other computer with a C compiler). This is not possible with BASIC or assembly.

Second, C is segmented into blocks. C by itself is totally incapable of any form of I/O. Libraries must be brought in to perform I/O, graphics, high-level math functions, etc. In this manner, memory is only occupied by what you need, not by zillions of never used functions. (How many times have you used COM or STR$ in Atari BASIC?)

For beginners and experienced programmers alike, C is structured. If you're used to Pascal, FORTH, or Action!, you're already programming structurally. If you're one of those BASIC programmers who leaves GOTOs littered about through the code, you have a new treat: no more global GOTO. What do I mean by *global GOTO*?

In a BASIC program, block structured code can be achieved by using GOSUBs to jump to a block, and RETURNs to go back to the main program. These blocks are analogous to the functions in C. Imagine only being able to GOTO within a block—not to another block or to the main program. Although **Lightspeed C** supports GOTO, I would suggest only using it as a debugging tool and for quick fixes, not as an everyday statement, as in BASIC.

The benefit of programming in structured code (i.e., programming in blocks and not using GOTO) is that another person should be able to look at your program and understand what you're doing—and even help you debug.

The problem for the 8-bit Atarian has been, "Where can I find a good C compiler for my Atari?"

Up until a month ago, I would have curtly responded, "There isn't any. C/65 from OSS ($79.95) and Deep Blue C ($19.95) originally from APX leave much to be desired." C/65 requires MAC/65 (an assembler from OSS, that retails for another $79.95) and is slower than a slug, while Deep Blue C is slower still and so primitive only the most desperate should attempt to use it. Either would be a nightmare of complexity for the beginner.

Then came **Lightspeed C**, a true godsend from Ralph Walden of Clearstar Softechnologies. My first clue to its difference was the inclusion of the scanf() function (comparable to the BASIC INPUT statement). Heretofore, this was unheard of. "You want scanf() in an Atari C? What do you think you have, a VAX?" C/65 and Deep Blue C both use a nonstandard call to the E: (editor) device as a substitute. It became a real pain to convert the scanf()s from other computers to Atari CIO calls. Integers (the counting numbers *1, 2, 3. . .*) were a mess to enter from the keyboard, and floating-point numbers (with an exponent or decimal point) were a disaster.

Lightspeed C is a snap to use, while at the same time staying out of the way of experienced programmers. Additionally, the package includes a number of demonstrations to show you what a C program looks like and how it appears when run. **Lightspeed C**'s clincher is its low cost.

For $39.95, you get a 74-page manual and two double-sided disks that contain editor, compiler, linker, custom DOS, runtime package and utility files. The manual is *not* a C tutorial, nor does it claim to be. It tells you how to use the software if you're familiar with C, and where to go for reference if you aren't. I found the manual's type small, blurry and hard to read. It would benefit from enlargement to a full 8½x11″ format. I've been told by the publisher that they *are* going to a larger print size. Hallelujah!

The editor is not a word processor. It's more like the editor from the Assembler/Editor Cartridge, with a menu. Options include autonumbering, mass line deletion, disk inventory, search and replace, move, print, renumber, limited syntax checking and "what" (similar to the Assembler/Editor SIZE command).

The **Lightspeed C** editor also includes macros for frequently used keystrokes. To use one, just hold CONTROL and press the key of the macro. As an example, pressing CONTROL-] prints $), used at the end of functions and blocks. Most of the more heavily used keywords, such as printf(″,

while and break, can be entered with macros.

Lightspeed C supports many of the features of standard C, and an avalanche of Atari-specific commands for input-output, graphics (including player/missile graphic support, and fast plot and circle commands), floating-point operations, assembly language interface and libraries of useful system functions (getting a filename, sorting a list of text entries, etc.)

If you're familiar with Deep Blue C (or, better yet, a standard K&R C), the transition to **Lightspeed C** will be easy. Most of the syntax and program structure is the same. It's not difficult to translate C programs to **Lightspeed**, and, with the runtime option, others can run your programs too.

Compiling code used to be a major pain in other Cs, but **Lightspeed C** has made the process less hazardous.

Linking and compilation is achieved by typing a single line and letting DOS process the commands. If an error is hit, no major problem: the compiler prompts you to insert your work disk with CEDIT and hit RETURN. When you return to the editor, the error is flagged and corrections can be made. CEDIT, as mentioned before, has a limited syntax checking ability of its own, and this limits trips back and forth from the compiler to the editor. If you're fortunate enough to have a RAMdisk, the process is so fast that bopping between compilation and the editor is virtually transparent.

Not only is compilation easy, it's fast. For this review, I used the sieve of Eratosthenes, as outlined in "A High-Level Language Benchmark" in the September 1981 *Byte* (see Table 1). **Lightspeed C** has a routine to speed up calculation time by turning off the screen, but to make the comparison fair, I did not use it. The linker performs a separate stage in the code-making process, but since **Lightspeed** makes its use so transparent, the only mention of it is in Table 1. It should be noted that this is a full-featured linker and, as such, shortens program development time considerably.

The **Lightspeed** DOS is actually a multipurpose utility package for programmers. The functions from the **Lightspeed** DOS are available for Action! and MAC/65. Support for both languages is included, in the form of I/O functions (especially disk I/O), graphics support (fast plot, drawto, circle and player/missile graphics), random number generation (*0* to maximum specified, or *1-255* if *0* is specified as maximum)—about three times faster than the Action! equivalent—and a wide array of string and floating-point commands.

As far as standard functions are concerned, the DOS supports up to two physical drives and one RAMdisk (either Mosaic or 130XE with **Lightspeed** DOS). Outwardly, the DOS bears a striking resemblance to DOS/XL, the major difference being a heavier dependence on utility files by **Lightspeed** DOS.

One of these files, DCOPY, contains most of the DUP-type functions found in

Listing 1.
C listing.

```
Program 1

/* PRIME.C */
/* The sieve of Eratoshenes Prime number benchmark */

#define TRUE 1
#define FALSE 0
#define SIZE 8190
#define COUNT 10

char flags[SIZE+1];

main() {
  int i,prime,k,count,iter;
  printf("%d iteration%s\n",COUNT,(COUNT == 1) ? "," : "s,");
    for(iter=1;iter <= COUNT;++iter) {
    count=0;
    for(i=0;i <= SIZE;++i) flags[i]=TRUE; /* could use setblock(flags,SIZE,1); */
    for(i=0;i <= SIZE;++i) {
      if(flags[i]) {
        prime=i+i+3;
        for(k=i+prime;k<=SIZE;k += prime) flags[k]=FALSE;
        ++count;
      }
    }
  }
  printf("%d primes\n",count);
}
```

Table 1. — Comparative times.

Times are expressed in minutes:seconds;
file sizes expressed in sectors.

	Lightspeed C	Deep Blue C
Sieve Runtime	8:50	11:15
	4:40 (optimized)	
Compiler Load Time	0:13	0:39
Compilation Time	0:06	0:58
Linker Load Time	0:05	1:19
Linking Time	0:10	1:17
	0:13 (optimized)	
Optimizer Load Time	0:05	
Optimizer Runtime	0:07	
Total Compilation and Linkage with RAMdisk	0:05	NA
Sieve File Size	3	45
	2 (optimized)	
DOS	Lightspeed	Atari DOS 2.0
DOS Size	104	39

How C programs are created.

C uses a multistep method to change a source file (what you type in) into an executable file.

Unlike BASIC, C must go through a series of steps, including a compilation process, before the program may be run (see Figure 1).

First, the program must be typed in. This may be done with a special-purpose editor or a word processor. Note that standard C has no means of syntax checking within the editor (unlike BASIC), and any errors made in entry show up when the program is compiled. During compilation, the code is (we hope) converted into a block of machine code. Most likely, your computer will bleep, informing you of a typo. You must then correct the errors and try again.

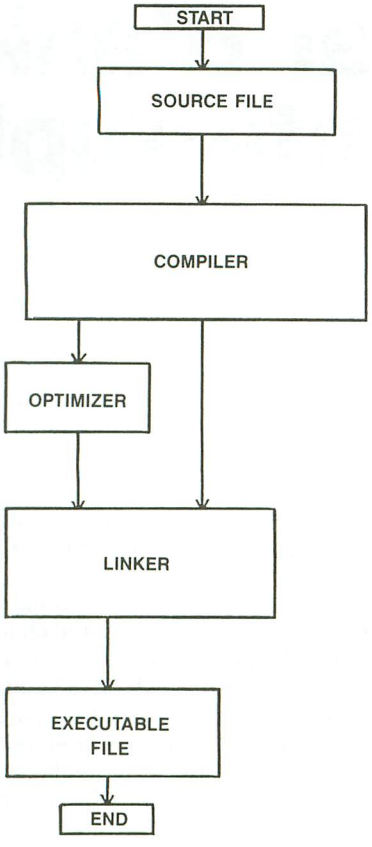

Figure 1.

The final step, linking, takes the block of machine code and combines (or "links") it with other, previously compiled blocks, to form your final product—an executable, binary load file. Some errors may crop up during linking, and if this happens, the editor must be reloaded and the bug stomped out, after which the compiler/linker process must again be completed.

All this switching between editors, compilers and linkers is why C programmers like RAMdisks.

Atari DOS. The options include single- or multiple-file copy, directory, erase file, format disk, unlock file, print directory, rename file and write DOS.SYS.

Other utilities are provided for making autorun files, creating self-booting disks, turning the BASIC ROM off, crunching segments of a program into one continuous piece of code, disk configuration (for double-density drives), file comparison, hex dumping and RAMdisk support.

The **Lightspeed C** package also supports other DOSs through the runtime library. This allows complete program development in other DOSs, including SpartaDOS. Three sizes of the runtime package are available: small, medium and large. Obviously, the small and medium versions have less functions than the large. Documentation on the runtime libraries is hidden in the introduction—for once, you *want* to read the introduction. Operating this system on a 320K XE with RAMdisk under SpartaDOS would be the ideal development (or an excellent learning) environment.

The manual is poorly organized, and would benefit from the addition of an index and greater detail in the table of contents. Even so, I would highly suggest the program to anyone interested in C programming, and especially to those interested in eventually programming the ST or Amiga.

Kurt Oestreich has been involved with computers for seven years and telecommunications for three. He's knowledgeable in electronics (digital) and machine language. He knows Atari and Microsoft BASIC, but uses neither. Instead, he programs in Pascal, C and FORTH. He's now working on a new language, PL/C.

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Music during the Vertical Blank Interrupt

Third in our VBI tutorial series, this article will add music to your Atari's life.

by Allan E. Moose and Marian J. Lorenz

A creaking door, gunfire, the sound of a rocket blasting off—sound effects such as these are easily programmed in BASIC. But would you like to set a mood, arouse emotions, or complement the action on-screen? Picture, if you will, a rocket blasting off to the strains of the theme from *2001*, or a hot-air balloon floating across the screen accompanied by the lilting theme from *Around the World in 80 Days*. With the sound system of the Atari and a machine language program running during the vertical blank, you can do just that.

The Atari's sound capabilities are extensive. The sound system is controlled by POKEY, a digital input/output chip that carries out several functions besides sound generation. POKEY provides four programmable sound channels which can play separately or together. Each channel has a frequency register that determines which note is played, and a control register that sets volume and noise content. In addition to these eight registers, there's a general control register that enables you to choose several options—such as channel pairing or clock frequency. Since this article is concerned with music, we'll mention only the music options when discussing the sound channels. Figure 1 summarizes the registers involved in music generation and gives the functions of the bits in each of the control registers.

The four AUDCx (x being a digit from 1 through 4) registers permit the programmer to set volume, and choose between music and sound effects for each channel. The volume bits are the lower 4 bits D_3 through D_0. The maximum volume is given by setting these bits to *1111*, the minimum is *0001*, and no sound at all results from *0000*. To prevent distortion, if you choose to use more than one sound channel, then the total decimal value of all the volume settings should not be greater than *32*. To choose a pure tone, bits D_7, D_6, D_5 must be set at *101*, respectively, and bit D_4 (the volume only option) must be set to *0*. Thus, for example, to set channel one to play music at half volume, you would store decimal *168* (*168* decimal=*128*+*32*+*8*=*10101000* in binary) into memory location 53761.

The basis of music is frequency (pitch). In the computer, notes are generated by "divide-by-N" circuits that remove pulses from a continuous stream of pulses provided by the system hardware. The stream of pulses can be "clocked" at either 15 thousand hertz (15KHz), 64KHz, or 1.79 million hertz (1.79MHz). Hertz, which stands for cycles per second, is the name of the nineteenth-century physicist who discovered radio waves. These frequencies are

Figure 1. — Sound channel summary.

Channel	Register Name	Memory Location
1	AUDF1	53760
	AUDC1	53761
2	AUDF2	53762
	AUDC2	53763
3	AUDF3	53764
	AUDC3	53765
4	AUDF4	53766
	AUDC4	53767

Control Registers AUDCx — What the bits do.

Decimal Value	128	64	32	16	8	4	2	1
Bit Number	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

Volume

Sets volume only mode

Sets pure tone for music,
or distortion for sound effects

Global Sound Control Register AUDCTL at 53768.

Decimal Value	128	64	32	16	8	4	2	1
Bit Number	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

D_7 1 Changes poly counterused in sound effects
D_6 1 Clocks channel 1 with 1.79 MHz
D_5 1 Clocks channel 3 with 1.79 MHz
D_4 1 Joins channels 1 and 2 (16-bit music)
D_3 1 Joins channels 3 and 4 (16-bit music)
D_2 1 Puts high pass filter in channel 1
D_1 1 Puts high pass filter in channel 2

D_0 0 uses 64KHz clock
1 uses 15KHz clock

far above normal human hearing, and so the divide-by-N circuits subtract out pulses to create audible sounds. There are three simple formulas that determine the notes played, according to the number stored in AUDFx and the clock frequency. They are:

$$\frac{\text{15KHz or 64KHz}}{2(\text{AUDF}+1)} = \text{frequency of note played}$$

$$\frac{\text{1.79MHz}}{2(\text{AUDF}+4)} = \text{note frequency channels singly}$$

$$\frac{\text{1.79MHz}}{2(\text{AUDF}+8)} = \text{note frequency channels paired}$$

The global sound control register, AUDCTL, allows you to select the clock frequency and to combine channels in pairs. The option to pair sound channels is provided to give the programmer more control in determining the output frequency. If you're operating the channels singly, then the divide-by number is an 8-bit number. This means you can produce at most 256 different frequencies. It's possible for some very high or low notes produced this way to sound either sharp or flat. If, on the other hand, two channels are paired, then the divide-by number is a 2-byte number (16 bits), and there are 65535 different possible frequencies as outcomes. Consequently, it's possible to match any desired frequency very closely. Since, in most cases, single channels clocked with 64KHz are adequate, we will concentrate on that mode of music here.

Calculating the AUDFx values to generate notes is an ideal task for a program such as the one in Listing 1. The program is menu driven, easy to use, and calculates note data for 15KHz and 64KHz clocking. What you will need to know is the note you want, whether it's a natural, sharp or flat, and what octave it's in. The octave can be figured out by noting that middle C is in octave 4, and working up and down from there as illustrated in Figure 2. Figure 3 is a worksheet we use when generating music data and in formulating the note table. Music notation uses a series of six notes of fixed length—whole note, half note, quarter note, eighth note, sixteenth note and thirty-second note. Each note in the series has a duration of half the time of the one before it. So a quarter note is sounded for half the time of a half note, but twice as long as an eighth note.

Now, let's put the above theory and the information presented in our previous articles on the vertical blank (VB) together, and add music to any of the scrolling programs. Basically, we have three tasks to do: (1) create a machine language routine to run during the VB; (2) generate a note duration table; and (3) link the routine into the VB.

The tasks of the routine in Table 1 are fairly simple. This routine will: (1) read a frequency and duration value for each note played from a data table; (2) load the frequency into an AUDF register; (3) load the duration into a timer; (4) turn the sound off briefly between notes; and (5) know when to quit. This routine is general, so you can use it with your own music. All you'll have to do is change the value of TABLEND to match the size of your note/duration table, as long as the size is 256 bytes or less.

Figure 2. — Octave Ranges.

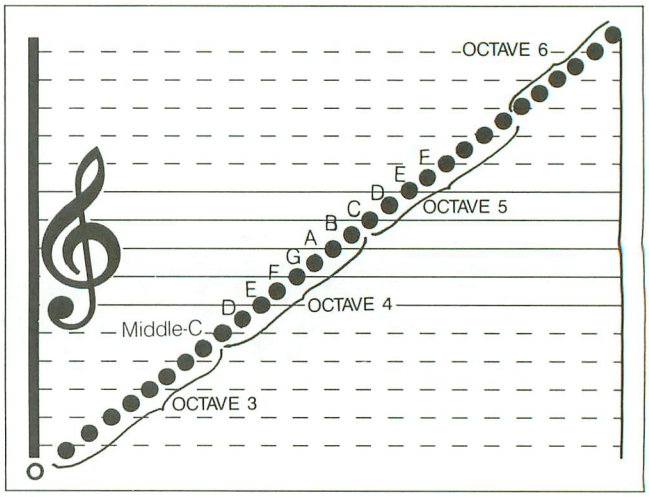

Figure 3. — Music programming worksheet.

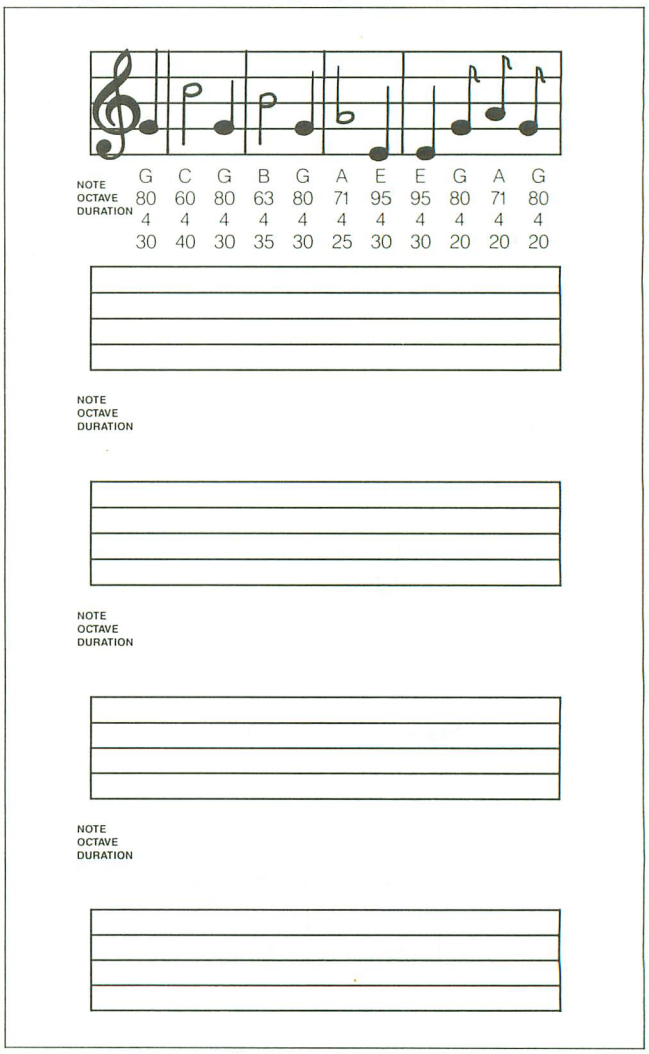

Table 1.

Assembly Language Listing
for
Music during the Vertical Blank

Around the World in 80 Days

Registers Used:

FLAG	203	Used to determine whether to load note
COUNTER	204	pointer to position in note table
CDTMV4	542	Lo-byte of system timer 4
CDTMF4	556	System timer 4 flag
TABLE	=	Starting address of note/duration table

Section 1: Timing Section

	LDY CDTMF4	172,44,2	See if system timer 4=0
	BEQ MAIN	240,3	Yes, go to main routine
	JMP XITVBL	76,98,228	No, exit the vertical blank

Section 2: Sound or Silence

MAIN	LDX FLAG	166,203	Determine sound or silence
	BEQ MUS	240,13	If FLAG=0 get note/duration
	LDA #0	169,0	Turn off sound
	STA AUDF1	141,0,210	To separate notes
	STX CDTMV4	142,30,2	Reset system timer 4 to 1
	DEC FLAG	198,203	Set FLAG=0 for music next time
	JMP XITVBL	76,98,228	Exit vertical blank

Section 3: Load Notes/durations

MUS	INX	232	Set FLAG=0
	STX FLAG	134,203	For silence next
	LDX COUNTER	166,204	Get pointer to position in table
	CPX TABLEND	224,168	Is the table complete?
	BEQ END	240,16	Yes, then end, no then . . .
	LDA TABLE,X	189,0,132	load and store
	STA AUDF1	141,0,210	note value
	INX	232	Increment X to point to duration
	LDA TABLE,X	189,0,132	Load and
	STA CDTMV4	141,30,2	store duration
	INX	232	Increment X for
	STX COUNTER	134,204	next note to come
	JMP XITVBL	76,98,228	Exit the vertical blank

The assembly language routine in Table 1 can be divided into three sections. Section 1 is the timing section. Although this is short, the reasons behind it bear some explaining. The scrolling program, with which this music routine is designed to work, makes use of system timer 2. System timer 2 is especially convenient to use in the vertical blank because, when it counts down to 0, the OS automatically does a JSR to whatever is at the address in memory locations 552, 553. Unfortunately, since that timer is already in use for scrolling, we must use one of the other, less convenient system timers to determine the duration of the notes. In this example routine, we chose to use system timer 4 (CDTMV4) which is decremented every VB. When this timer counts down to 0, it sets a flag register 556 (CDTMF4) to *0*. The main part of the routine loads a duration number into CDTMV4, and the job of Section 1 is to check the flag and take the proper action. If the flag is not *0*, the routine exits the VB. If the flag is *0*, it branches to Section 2.

Section 2 is the beginning of the main part of the music routine and has several tasks. Its first job is to check a flag in memory location 203, to see if we want to load in a note or turn a note off. If the flag is *0*, it means load a note, and the program branches forward. If the flag is *1*, it means turn the note off. This is done by loading a *0* into the frequency register. Changing the flag value and setting system timer 4 completes Section 2's work, and the routine ends.

Section 3 is the longest part of the routine, but its basic function is not hard to follow. The section starts out by changing the flag register, 203. Then it loads a number from COUNTER into the X-register. COUNTER is a register that keeps track of how far along the table we've read. First, this value is checked against the length of the table to see if the music is finished. If it is, the program branches to exit without resetting CDTMV4. Otherwise, after loading the X-register with this pointer to the table, the note value is loaded and then stored in a frequency register. X is incremented next, and the duration number's fetched and stored in CDTMV4. Finally, after X is incremented again, its value is stored back in COUNTER, and the routine ends.

The BASIC program in Listing 2 is the vertical scrolling program from our previous article, with "Around the World in 80 Days" playing during the VB. If you wish, you could add the music to either the horizontal or diagonal scrolling programs.

Allan E. Moose, Ph.D., is a Professor of Mathematics and Physics at Long Island University, Southampton campus, New York. He uses computers both recreationally and professionally.

Marian J. Lorenz, B.S., M.S., is Preschool Leader for the Special Education Program at Central Islip Public Schools, New York. She too has used computers recreationally and professionally.

The two have a book on 6502 assembly language to be published by Weber Systems, Inc., now in the proofing stage. They've published articles on graphics, bank-switching on the XE and Logo data management.

(Listing begins on page 22)

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CIRCLE #110 ON READER SERVICE CARD

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.
BASIC listing.

```
FX 10 REM 8-BIT MUSIC DATA GENERATOR
SC 20 REM BY ALLAN MOOSE/MARIAN LORENZ
QZ 30 REM VERSION 3.0
SQ 40 REM AUGUST 1985
RM 50 REM ********************************
PF 60 DIM PITCH$(1),KIND$(1),PULSE$(3),CH
   OICE$(1),NTE$(1)
IM 70 ? "ENTER THE TOTAL NUMBER OF NOTES"
JH 80 ? "YOU WANT TO PROGRAM":TRAP 90
RY 90 INPUT X
OF 100 DIM NTEDAT(X)
TE 110 PRINT :PRINT "ENTER THE CLOCK FREQ
   UENCY YOU WILL USE"
GW 120 PRINT "(15K OR 64K)"
LO 130 TRAP 140
RF 140 INPUT PULSE$
MN 150 IF PULSE$="15K" THEN CLOCK=15699.9
   :GOTO 170
5P 160 IF PULSE$="64K" THEN CLOCK=63921:G
   OTO 170
MS 165 GOTO 110
5G 170 PRINT "YOU WILL GET ";X;" DATA NUM
   BERS"
MI 180 PRINT :PRINT "AT A CLOCK FREQUENCY
    OF ";PULSE$
ID 190 FOR DELAY=0 TO 450:NEXT DELAY
QN 200 PRINT "ß"
XT 210 PRINT "ENTER NOTE (A,B,C,D,E,F,G)"
KQ 220 TRAP 210
DC 230 INPUT NTE$
XO 240 PRINT :PRINT "ENTER THE KIND OF NO
   TE"
WL 250 PRINT "N=NATURAL,S=SHARP,F=FLAT"
MQ 260 TRAP 250
NO 270 INPUT KIND$
UE 280 PRINT :PRINT "ENTER THE OCTAVE OF
   YOUR NOTE (0-7)"
OD 290 TRAP 280
KM 300 INPUT VOICE
5K 310 IF NTE$="A" THEN XPON=9:GOTO 390
GZ 320 IF NTE$="B" THEN XPON=11:GOTO 390
KH 330 IF NTE$="C" THEN XPON=0:GOTO 390
MZ 340 IF NTE$="D" THEN XPON=2:GOTO 390
PR 350 IF NTE$="E" THEN XPON=4:GOTO 390
RI 360 IF NTE$="F" THEN XPON=5:GOTO 390
UA 370 IF NTE$="G" THEN XPON=7:GOTO 390
MI 380 GOTO 200
V5 390 IF VOICE=0 THEN B=16.35:GOTO 480
ZD 400 IF VOICE=1 THEN B=32.7:GOTO 480
WO 410 IF VOICE=2 THEN B=65.41:GOTO 480
QJ 420 IF VOICE=3 THEN B=130.81:GOTO 480
VR 430 IF VOICE=4 THEN B=261.63:GOTO 480
VE 440 IF VOICE=5 THEN B=523.25:GOTO 480
VF 450 IF VOICE=6 THEN B=1046.5:GOTO 480
GR 460 IF VOICE=7 THEN B=2093:GOTO 480
MV 470 PRINT "YOU ENTERED AN INAPPROPRIAT
   E OCTAVE":GOTO 280
ZW 480 IF KIND$="N" THEN GOTO 520
PW 490 IF KIND$="S" THEN XPON=XPON+1:GOTO
    520
KE 500 IF KIND$="F" THEN XPON=XPON-1:GOTO
    520
VV 510 PRINT :PRINT "YOU ENTERED THE WRON
   G KIND OF NOTE":GOTO 240
IK 520 RATE=B*(1.05946^XPON)
RI 530 DNUM=INT((CLOCK/(2*RATE))-1)
QM 540 I=I+1
DJ 550 NTEDAT(I)=DNUM
YX 560 IF I<X THEN GOTO 200
WF 570 PRINT "HOW DO YOU WANT TO DISPLAY
   DATA?"
TW 580 PRINT
XQ 590 PRINT "ON THE SCREEN (S) OR PRINTE
   R (P)"
5K 600 INPUT CHOICE$
AK 610 IF CHOICE$="S" THEN GOTO 640
CC 620 IF CHOICE$="P" THEN GOTO 670
QE 630 GOTO 570
QZ 640 PRINT "ß"
DI 650 FOR COPY=1 TO X:PRINT NTEDAT(COPY)
   ;",";:NEXT COPY
QT 660 GOTO 760
TR 670 TRAP 40000:TRAP 680
BM 680 PRINT "TURN ON PRINTER"
EH 690 FOR DELAY=0 TO 400:NEXT DELAY
US 700 OPEN #1,8,0,"P:"
FQ 710 FOR COPY=1 TO X
FO 720 PRINT #1;NTEDAT(COPY);
TZ 730 PRINT #1;",";
OT 740 NEXT COPY
LN 750 CLOSE #1
OI 760 END
```

Listing 2.
BASIC listing.

```
BA 10 REM UP! UP! AND AWAY!
TG 20 REM **** MUSIC ****
MS 30 REM DURING THE VERTICAL BLANK
SE 40 REM BY ALLAN MOOSE/MARIAN LORENZ
AD 50 REM *****  1985  *****
LT 60 RESTORE 80
AC 70 FOR NUM=0 TO 17:READ EMPTY:POKE 160
   6+NUM,EMPTY:NEXT NUM
NJ 80 DATA 104,169,0,162,30,160,0,145,203
   ,200,208,251,230,204,202,208,246,96
BG 90 REM
RX 100 RESTORE 120
WZ 110 FOR NUM=0 TO 19:READ TRANS:POKE 16
   25+NUM,TRANS:NEXT NUM
TY 120 DATA 104,162,4,160,0,177,205,145,2
   03,200,208,249,230,206,230,204,202,208
   ,242,96
QS 130 REM
UJ 140 RESTORE 160
MQ 150 FOR NUM=0 TO 10:READ VB:POKE 1536+
   NUM,VB:NEXT NUM
MB 160 DATA 104,169,7,160,0,162,131,32,92
   ,228,96
RA 170 REM
RY 180 RESTORE 200
WB 190 FOR NUM=0 TO 12:READ CHANGE:POKE 1
   646+NUM,CHANGE:NEXT NUM
RU 200 DATA 104,160,0,177,205,145,203,200
   ,192,144,208,247,96
QP 210 REM
TR 220 RESTORE 240
5N 230 FOR NUM=0 TO 87:READ BALL:POKE 166
   1+NUM,BALL:NEXT NUM
OC 240 DATA 0,0,1,3,7,15,31,31,0,126,255,
   255,255,255,255,255,0,0,128,192,224,24
   0,248,248
XN 250 DATA 63,63,63,63,63,63,63,63,255,2
   55,255,255,255,255,255,255,252,252,252
   ,252,252,252,252,248
DJ 260 DATA 31,15,7,3,1,0,0,0,255,255,255
   ,255,255,255,126,126,248,240,224,192,1
   28,0,0,0,36,36,36,36
LF 270 DATA 255,255,255,255,255,255,255,1
   26,0,0,0,0
RD 280 REM
```

```
XJ 290 REM SET UP RESERVED SPACE AND CLEA
   R
ZA 300 POKE 106,130:POKE 203,0:POKE 204,1
   30
DY 310 EMPTY=USR(1606)
VZ 320 GOSUB 850
HM 330 REM SET GRAPHICS MODE AND COLORS
VV 340 GRAPHICS 18:POKE 752,1:POKE 708,88
   :POKE 712,160
FS 350 REM MOVE STANDARD CHARACTERS/REDEF
   INE
RI 360 POKE 205,0:POKE 206,224
CF 370 MOVE=USR(1625)
CU 380 POKE 205,125:POKE 206,6
BT 390 POKE 203,24:POKE 204,148
QN 400 CHANGE=USR(1646)
JY 410 REM SET UP CUSTOM DISPLAY LIST
IU 420 FOR I=0 TO 2:POKE 40192+I,112:NEXT
   I
DN 430 POKE 40195,103:REM SCROLLING BIT S
   ET (64+7+32=103)
GH 440 POKE 40196,0:POKE 40197,154
FF 450 FOR I=0 TO 9:POKE 40198+I,39:NEXT
   I:REM SCROLL BIT SET AT EVERY LINE (7+
   32=39)
TN 460 POKE 40208,7
CE 470 POKE 40209,65
QD 480 POKE 40210,0:POKE 40211,157
DN 490 REM TELL ANTIC AND OS WHERE DL AND
    SCREEN MERORY ARE
NM 500 POKE 559,0:REM TURN OFF SCREEN
AQ 510 POKE 560,0:POKE 561,157
EV 520 POKE 88,0:POKE 89,154
FG 530 POKE 756,148:REM INSTALL CHARACTER
    SET ADDRESS
MW 540 POKE 559,34:REM TURN ON SCREEN
CV 550 REM PUT BALLOON   IN MEMORY
XJ 560 POSITION 6,7:PRINT #6;"#$%"
IC 570 POSITION 6,8:PRINT #6;"&'("
SV 580 POSITION 6,9:PRINT #6;")*+"
UL 590 POSITION 7,10:PRINT #6;"■":REM INV
   ERSE VIDEO
VO 600 POSITION 7,11:PRINT #6;"■":REM INV
   ERSE VIDEO
KQ 610 REM LOAD IN SCROLL ROUTINE
WJ 620 RESTORE 650
BM 630 FOR I=0 TO 70:READ SCROLL:POKE 404
   48+I,SCROLL:NEXT I
QZ 640 REM
GY 650 DATA 164,205,200,192,120,240,19,13
   2,205,166,206,232,224,16,240,11,142,5,
   212,134
RD 660 REM
OA 670 DATA 206,169,6,141,26,2,96,216,24,
   173,4,157,105,20,176,16,141,4,157,169,
   0,141,5,212,133
RH 680 REM
VL 690 DATA 206,169,6,141,26,2,96,238,5,1
   57,141,4,157,169,0,141,5,212,133,206,1
   69,6,141,26,2,96
QS 700 REM
VL 710 REM INSTALL ADDRESS OF THE SCROLLI
   NG PROGRAM
DG 720 POKE 552,0:POKE 553,158
ZU 730 REM SET REGISTERS USED BY SCROLLIN
   G ROUTINE
MO 740 POKE 205,0:POKE 206,0:POKE 54277,0
RH 750 REM START SYSTEM TIMER 2
MT 760 POKE 538,10
SV 770 REM SET REGISTERS USED BY MUSIC
JL 780 POKE 203,0:POKE 204,0:POKE 53775,3
   :POKE 53761,168
TT 790 REM START SYSTEM TIMER 4
JZ 800 POKE 542,10
SI 810 REM LINK IN MUSIC PROGRAM
HY 820 VBSTART=USR(1536)
PS 830 GOTO 830
RB 840 REM
ZH 850 RESTORE 880
UQ 860 FOR I=0 TO 52:READ MUSIC:POKE 3353
   6+I,MUSIC:NEXT I
RH 870 REM
AV 880 DATA 172,44,2,240,3,76,98,228,166,
   203,240,13,169,0,141,0,210,142,30,2
RL 890 REM
CC 900 DATA 198,203,76,98,228,232,134,203
   ,166,204,224,168,240,16,189,0,132,141,
   0,210,232,189,0,132,141,30,2
QW 910 REM
BQ 920 DATA 232,134,204,76,98,228
RA 930 REM
VR 940 FOR I=0 TO 167:READ NUM:POKE 33792
   +I,NUM:NEXT I
HP 950 DATA 80,30,60,40,80,30,63,35,80,30
   ,71,25,95,30,95,30,80,20,71,20,80,20,7
   1,30,80,20,71,20,80,20,71,30,80
RG 960 REM
NY 970 DATA 20,71,20
RK 980 REM
PN 990 DATA 80,20,71,25,128,30,128,25,80,
   20,60,25,71,30,63,25,80,30,71,25,128,3
   0,128,30,80,20,71,20,80,20,71,30
HW 1000 REM
SR 1010 DATA 80,20,71,20,80,20
IC 1020 REM
YV 1030 DATA 71,30,80,20,71,20,80,20,71,2
   5,95,30,95,25,80,30,60,25,80,30,63,25,
   80,30,71,25,95,30,95,30,80,20
II 1040 REM
UE 1050 DATA 71,20,80,20,71,30
IO 1060 REM
WP 1070 DATA 80,20,71,20,80,20,67,30,71,2
   0,75,20,71,20,47,25,53,30,53,25,71,30,
   53,25,60,30,63,30,71,20,75,20
IU 1080 REM
GQ 1090 DATA 71,20,60,25,95,30,80,30,85,2
   0,80,20,75,20,71,25,90,30,63,25,80,25,
   60,25
AB 1100 RETURN
```

●

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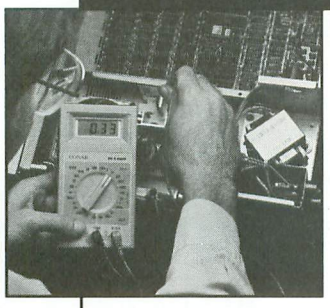

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Background Printer

Lets you keep on clicking while your printer's producing.

by Angelo Giambra

I hate to wait for things. I get impatient when printing out a long listing. On the mainframe system at my job, I can continue to work on my terminal, even though the printer is busy. Wouldn't it be nice if you could do the same thing on your Atari?

With **Background Printer**, you can. This program will install a new device handler on your Atari, which will allow you to keep working on a BASIC program—even run a BASIC program—while your printer is simultaneously producing your listing. If you have a disk drive and a parallel printer, read on.

Setting it up.

Key in the program in Listing 1 and save it. Then insert a formatted disk containing Atari 2.0S or 2.5 DOS in your drive, and run the program. If there are errors in your data statements, the program will tell you. Correct them, save the program again, and run it.

It will create an AUTORUN.SYS file on your disk. Be sure you *do not* insert a disk which already contains an AUTORUN.SYS file.

Now reboot your system from this disk. The AUTORUN.SYS file will load itself and install a device handler called B: into low memory.

Load any BASIC program into memory. Make sure your printer and interface module (if used) are turned on. The printer should be on-line. Key in *LIST "B:"*. The **Background Printer** will first write your program to the disk in ATASCII format, using a file called PRINT.SPL. Next, it will fire up a Vertical Blank Interrupt (VBI) routine, which will begin to print the file on your printer. The BASIC *READY* prompt will appear at this point, and you can go back to work on your computer. You may enter more lines into your program, save the program to disk, load another file, or even run a program—while the **Background Printer** continues to work independently.

How does it work? It's simple. Every sixtieth of a second, during the VBI, control passes to the **Background Printer**. It reads one sector from the PRINT.SPL file into a buffer in low memory. In each successive interrupt, it sends one character to the resident print handler, which collects the characters in its own buffer. When the print handler buffer is full, the print handler sends it to the printer. As each sector is printed, the **Background Printer** loads the next disk sector into memory until the job is completed. The VBI routine then disables itself.

The program pushes your Atari to its limit. We're making it do two things simultaneously, which it wasn't designed to do. So if you run a BASIC program, you'll notice it won't be quite as fast. There may even be moments when the screen seems to freeze for a fraction of a second, as a printer buffer is sent out on the I/O port.

Also, if you run a program which makes a lot of function calls (PRINT CHR$(65), etc.), you may periodically hear I/O errors taking place. (You know, the sound you hear when you try to print something to your printer if it's not on.) Don't worry. The **Background Printer** knows when an I/O error has occurred and keeps retrying until the buffer is accepted by the printer.

Programs using the sound registers will be affected as well, since the **Background Printer** uses the sound register during I/O.

There are also a few things you cannot do while the **Background Printer** is running. Obviously, you cannot run a program which accesses the printer, nor can you use the LIST "P:" or LIST "B:" command. If you try to LIST "B:" you'll get a message *PRINT.SPL IN USE*.

You cannot remove the disk inserted in drive 1 either, since the **Background Printer** is reading the PRINT.SPL file. (You can, however, read and write files from this disk.)

Finally, you cannot use the DOS command. The reason for this is that the DUP.SYS file loads into memory right on top of **Background Printer**. The **Background Printer** won't let you key in DOS while it is running. If you do, instead of going to the DOS menu, the system will do a warmstart, and **Background Printer** will immediately cease executing.

Keying in DOS at any other time will cause the **Background Printer** to check to see if you have a MEM.SAV file on your disk. If so, DUP.SYS will load into memory as usual, and, when you return to BASIC, the **Background Printer** will still be available for use. If there's no MEM.SAV file, **Background Printer** will reset all of the modified memory pointers, including LOMEM, to their initial state and transfer control to DUP.SYS. When you return again to BASIC, the **Background Printer** will no longer be available.

A final note. When I wrote **Background Printer**, I figured it would also be great for printing out word-processing documents using **AtariWriter** or other word processors. It would be a matter of simply substituting **Background Printer** for the resident print handler. But when I tried using the program with **AtariWriter**, I discovered that **AtariWriter** doesn't follow standard protocol. When you key in *LIST "B:"* in BASIC, BASIC first issues an OPEN command to the B: device, followed by a WRITE CHARACTERS command, and finally a CLOSE command. The VBI routine in **Background Printer** is triggered by the CLOSE command. **AtariWriter** issues an OPEN and a WRITE CHARACTERS command, but never issues a CLOSE.

Also, **Background Printer** won't work very well if you use a letter-quality serial printer. These generally print so slowly that your screen freezes up while each line is being printed.

Still, I'm happy with this device handler, and I think you will be, too. No more sitting and twiddling your thumbs while your printer is busy. **Background Printer** will make you more productive than ever.

Angelo Giambra is a Specialist in Systems Software for General Electric in Largo, Florida. He has been an avid Atari hobbyist since he bought his first 800 over four years ago. He enjoys writing machine language utilities and extensions to the OS and DOS.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.
BASIC listing.

```
EU 10 REM *** BACKGROUND PRINTER ***
WB 20 REM BY A. GIAMBRA
DY 30 DATA 0,1,2,3,4,5,6,7,8,9,0,0,0,0,0,
   0,0,10,11,12,13,14,15
YE 40 DIM DAT$(96),HEX(22):FOR X=0 TO 22:
   READ N:HEX(X)=N:NEXT X:LINE=160:RESTOR
   E 170:TRAP 120:? "{CLEAR}CHECKING DATA"
AF 50 TOTAL=0:LINE=LINE+10:POSITION 2,2:?
   "LINE:";LINE:READ DAT$:IF LEN(DAT$)<>
   96 THEN 150
YC 60 DATLIN=PEEK(183)+PEEK(184)*256:IF D
   ATLIN<>LINE THEN ? "LINE ";LINE;" MISS
   ING!":END
JZ 70 FOR X=1 TO LEN(DAT$)-1 STEP 2:D1=AS
   C(DAT$(X,X))-48:D2=ASC(DAT$(X+1,X+1))-
   48:BYTE=HEX(D1)*16+HEX(D2)
FG 80 IF PASS=2 THEN PUT #1,BYTE:NEXT X:R
   EAD CHKSUM:GOTO 50
NC 90 TOTAL=TOTAL+HEX(D1)+HEX(D2):NEXT X
ZX 100 READ CHKSUM:IF TOTAL=CHKSUM THEN 5
   0
NL 110 GOTO 150
OR 120 IF PEEK(195)<>6 AND PEEK(195)<>5 T
   HEN 150
OF 130 IF PASS=0 THEN OPEN #1,8,0,"D:AUTO
   RUN.SYS":PASS=2:LINE=160:RESTORE 170:T
   RAP 140:? "{CLEAR}CREATING FILE":GOTO 50
IF 140 CLOSE #1:END
GM 150 IF LEN(DAT$)=30 AND LINE=330 THEN
   TRAP 130:GOTO 60
MP 160 ? "BAD DATA: LINE ";LINE:END
LW 170 DATA FFFF00220E2215228222792274227
   92279224C7A2216221123A5CCF0298A48A200A
   90B9D4203A9FA9D4403A9239D4503,545
TO 180 DATA A9119D4803A9009D49032056E468A
   AA081989D430360A5CDD0D3A9E69D4403A9239
   D4503A90185CBA000B91A03C944F0,597
EA 190 DATA 05C8C8C810F4C8B91A0385CEC8B91
   A0385CFA4CBB1CE4888B1CE48A5D06085D0A90
   785CBD0D2A5CBC907D0F1A90385CB,728
JX 200 DATA 205522A210A9039D4203A9E69D440
   3A9239D4503A9049D4A032056E4A9269D42032
   056E4BD4C0385CCBD4D0385CDA90C,587
NZ 210 DATA 9D42032056E4A90085CE85D085CF8
   5D1A974850AA9E4850BA907A0E2A222205CE46
   04C62E4A5D1D0F9A5D0D02D85CB8D,659
XC 220 DATA 1522A9018D0103A9528D0203A90B8
   D0403A9248D0503A5CC8D0A03A5CD8D0B03205
   3E4983012230A24CCE6D0D0C8EE15,563
BG 230 DATA 22AD1522C902D0BEA9008D1522A5C
   FD07BE6D1A4CEB90B2448A057A228A94E8D0A0
   38C0203861EA61D689DC003E8E41E,649
SI 240 DATA F015861DC99BF005A0014C8F23A92
   09DC003E8E41ED0F8A900851DA2C0A0038E040
   38C0503A9408D0003A9018D0103A9,565
KT 250 DATA 808D0303A51E8D0803A9008D0903A
   51C8D06032059E4C6D1981004E6CFD00AA4CEC
   8CC8A24B02584CE4CDF22C6CFE6D1,656
EV 260 DATA 4C60232000000AD13228D2402AD142
   28D2502A98B850AA924850BD0DDA90085CE85D
   0AD8824290385CDF002E6CBAD8924,587
NZ 270 DATA 85CCF002E6CBA5CBF0C94CDF22443
   A5052494E542E53504C443A4D454D2E534156D
   0D2C9CED4AED3D0CCA0C9CEA0D5D3,711
CW 280 DATA C59B8B247D25A210A90D9D4203A9F
   19D4403A9239D45032056E4C0AAD034A000B91
   A03C942F005C8C8C810F4A900991A,593
MS 290 DATA 03A9008DE702A9228DE802AD0F228
   50CAD1022850DAD1122850AAD1222850B6C0A0
   0AD11228500AD12228501 6C0000A9,512
FQ 300 DATA 0085CC85CDAD0F228DF724AD10228
   DF8242000004C0E25A50C8D0F22A50D8D1022A
   9E4850CA924850DA50A8D1122A50B,595
QK 310 DATA 8D1222A98B850AA924850BAD24028
   D1322AD25028D1422A97E8DE702A9258DE802A
   000B91A03F00CC950D003205B25C8,573
JR 320 DATA C8C810EFA942991A03C8A90099 1A0
   3C8A922991A03609848C8B91A0385CEC8B91A0
   385CFA00218B1CE69018DAD23C8B1,651
NB 330 DATA CE69008DAE2368A860E002E102FC2
   4,195
```

Listing 2.
Assembly listing.

```
          .OPT NO LIST
;BACKGROUND PRINTER
;by
;A. Giambra
;
ADDR      =   $2200    ;START ADDRESS
DDEVIC    =   $0300    ;DEVICE
DUNIT     =   $0301    ;DEVICE
DCOMND    =   $0302    ;I/O COMMAND
DSTATS    =   $0303    ;DEVICE
DBUFLO    =   $0304    ;BUFFER ADDRESS
DTIMLO    =   $0306    ;BUFFER ADDRESS
DBYTLO    =   $0308    ;BUFFER ADDRESS
DBYTHI    =   $0309    ;BUFFER ADDRESS
DAUX1     =   $030A    ;SECTOR NUMBER
DSKINV    =   $E453    ;OS I/O ROUTINE
CIOV      =   $E456    ;OS I/O ROUTINE
NOTE      =   $26      ;NOTE SECTOR
READ      =   $04      ;OPEN FOR READ
PUTCHAR   =   $0B      ;PUT CHARACTERS
READCOM   =   $52      ;READ SECTOR CMND
STATUS    =   $0D      ;STATUS COMMAND
OPEN      =   $03      ;OPEN DEVICE
CLOSE     =   $0C      ;CLOSE DEVICE
OPENERROR =   129      ;CHANNEL OPEN
NOTFOUND  =   $AA      ;WORK FLAG
IOCB0     =   $00      ;CHANNEL 0
IOCB1     =   $10      ;CHANNEL 1
HATABS    =   $031A    ;HANDLER TABLE
ICCOM     =   $0342    ;I/O COMMAND
ICSTA     =   $0343    ;I/O STATUS
ICBAL     =   $0344    ;BUFFER ADDRESS
ICBLL     =   $0348    ;BUFFER LENGTH
ICAX1     =   $034A    ;AUXILIARY BYTE
ICAX3     =   $034C    ;AUXILIARY BYTE
DOSVEC    =   $0A      ;DUP SYS ADDRESS
DOSINI    =   $0C      ;DOS INIT
PBPNT     =   $1D
PBUFSZ    =   $1E
PRNBUF    =   $03C0
PTIMOT    =   $1C
LOMEM     =   $02E7    ;LOW MEMORY
WARMSTART =   $E474
XITVBV    =   $E462    ;VBI EXIT
SETVB     =   $E45C    ;SET VBI ROUTINE
VVBLKD    =   $0224    ;VBI VECTOR ADDR
CR        =   $9B      ;CARRIAGE RETURN
COMMAND   =   $CB      ;TEMP STORAGE
SECTOR    =   $CC      ;SECTOR COUNT
INDEX     =   $CE      ;WORK INDEX
RETRY     =   $CF      ;RETRY FLAG
FLAG      =   $D0      ;WROK FLAG
BUSY      =   $D1      ;BUSY FLAG
;OFFSET TO RESIDENT PRINT HANDLER
;RETRY LOGIC
PRINTOFF  =   $EECB-$EEA7
;
;HANDLER TABLE
;
          *=  ADDR
          .WORD OPENIT-1
          .WORD CLOSEIT-1
          .WORD RETURN-1
          .WORD WRITE-1
          .WORD RETURN-1
          .WORD RETURN-1
          JMP RETURN
DOS
          *=  *+2
DUPSAV
          *=  *+2
VBISAV
          *=  *+2
TIMER
          *=  *+1
;
;THE OPEN ROUTINE SUBSTITUES THE
;PRINT.SPL FILE NAME INTO THE
;IOCB, THEN CALLS THE DISK
;OPEN ROUTINE
;
OPENIT
          LDA SECTOR   ;PRINT.SPL INUSE?
          BEQ OPEN1    ;TEST OTHER BYTE
INUSE
          TXA          ;SAVE X REGISTER
          PHA
          LDX #IOCB0   ;CHANNEL 0-EDITOR
          LDA #PUTCHAR ;WRITE CHARS
          STA ICCOM,X
          LDA # <MSG   ;IN USE MESSAGE
          STA ICBAL,X
          LDA # >MSG
          STA ICBAL+1,X
          LDA #17
          STA ICBLL,X ;MESSAGE LENGTH
          LDA #0
          STA ICBLL+1,X
          JSR CIOV     ;WRITE IT
          PLA
          TAX          ;RESTORE X REG
          LDY #OPENERROR
          TYA          ;GIVE ERROR MSG
          STA ICSTA,X ;TO BASIC
          RTS
OPEN1
          LDA SECTOR+1
          BNE INUSE
          LDA # <DISKNAME
          STA ICBAL,X ;SUBSTITUTE NAME
          LDA # >DISKNAME
          STA ICBAL+1,X
          LDA #1       ;SET COMMAND TO 1
          STA COMMAND
LOOKUP
          LDY #0
LOOK
          LDA HATABS,Y ;FIND DISK HNDLR
          CMP #'D      ;IS IT A 'D'?
          BEQ FOUND    ;YES
          INY          ;NO, SKIP 2 BYTES
          INY
          INY
          BPL LOOK     ;LOOK AGAIN
FOUND
          INY
          LDA HATABS,Y ;VECT TABLE ADDR
          STA INDEX    ;STORE IN INDEX
          INY
          LDA HATABS,Y
          STA INDEX+1
          LDY COMMAND ;OFFSET TO OPEN
;ROUTLINE
          LDA (INDEX),Y ;TRANSFER CNTRL
          PHA          ;WITH INDIRECT JP
          DEY
          LDA (INDEX),Y
          PHA          ;TARGET ADDRESS
;           IS NOW ON THE STACK
          LDA FLAG     ;RESTORE THE CHAR
;                SENT BY CIO
RETURN
          RTS          ;DO INDIRECT JUMP
WRITE
          STA FLAG     ;SAVE CHAR SENT
;                BY CIO
          LDA #7       ;USED AS OFFSET
;                TO WRITE ROUTINE
          STA COMMAND
          BNE LOOKUP
;
;THE CLOSE ROUTINE CLOSES THE
;PRINT.SPL FILE,REOPENS IT AND
;NOTES THE FIRST SECTOR. FINALLY
;IT CLOSES THE FILE AND FIRES UP
;THE VBI SERVICE ROUTINE
;
CLOSEIT
          LDA COMMAND ;LAST CIO OP?
          CMP #7       ;A WRITE?
          BNE RETURN   ;NO, SO EXIT
          LDA #3       ;STORE OFFSET TO
;                TO CLOSE ROUTINE
          STA COMMAND
          JSR LOOKUP   ;CALL DISK CLOSE
;                ROUTINE
          LDX #IOCB1   ;CHANNEL 1
          LDA #OPEN    ;LOAD OPEN CMND
          STA ICCOM,X ;STORE IN IOCB
          LDA # <DISKNAME
          STA ICBAL,X ;STORE FILE NAME
          LDA # >DISKNAME
          STA ICBAL+1,X
          LDA #READ    ;OPEN INPUT
          STA ICAX1,X
          JSR CIOV     ;CALL OS I/O
          LDA #NOTE    ;NOTE SECTOR CMND
          STA ICCOM,X
          JSR CIOV     ;CALL I/O ROUTINE
          LDA ICAX3,X ;GET THE SECTOR #
          STA SECTOR
          LDA ICAX3+1,X
          STA SECTOR+1
          LDA #CLOSE   ;CLOSE COMMAND
          STA ICCOM,X
          JSR CIOV     ;CLOSE THE FILE
          LDA #0       ;INIT WORK AREAS
          STA INDEX
          STA FLAG
          STA RETRY
          STA BUSY
          LDA # <WARMSTART
          STA DOSVEC   ;MAKE SURE CAN'T
          LDA # >WARMSTART ;USE DOS CMD
          STA DOSVEC+1
          LDA #7       ;CALL AN IND VBI
          LDY # <VB    ;ADDR VBI ROUTINE
          LDX # >VB
          JSR SETVB    ;SET VBI
          RTS
OUT
          JMP XITVBV
VB
          LDA BUSY     ;DON'T LET VBI
          BNE OUT      ;INTERRUPT ITSELF
          LDA FLAG     ;TIME TO PRINT?
          BNE PRINTER ;YES
          STA COMMAND ;INIT WORK AREA
          STA TIMER    ;INITIALIZE TIMER
          LDA #1
          STA DUNIT    ;DRIVE 1
          LDA #READCOM ;READ COMMAND
          STA DCOMND
          LDA # <DATA ;DATA BUFFER ADDR
          STA DBUFLO
          LDA # >DATA
          STA DBUFLO+1
          LDA SECTOR   ;LOAD SECTOR NO.
          STA DAUX1
          LDA SECTOR+1
          STA DAUX1+1
          JSR DSKINV   ;READ A SECTOR
          TYA          ;GET I/O STATUS
          BMI OUT      ;WAS IT BAD I/O?
          INC FLAG     ;SET FLAG
          BNE OUT      ;EXIT
PRINTER
          INC TIMER    ;INCREMENT TIMER
          LDA TIMER
          CMP #2       ;SLOW DOWN OUTPUT
          BNE OUT
          LDA #0       ;RESET TIMER
          STA TIMER
          LDA RETRY    ;LAST I/O BAD?
          BNE TRYAGAIN ;YES,TRY AGAIN
          INC BUSY     ;SET BUSY FLAG
          LDY INDEX    ;CHARACTER INDEX
          LDA DATA,Y   ;LOAD A CHARACTER
;
;THE FOLLOWING ROUTINE EMULATES
;THE OPERATING SYSTEM PRINT
;HANDLER WRITE ROUTINE
;
PRINT
          PHA          ;SAVE CHARACTER
          LDY #$57     ;WRITE COMMAND
          LDX #$28     ;BUFFER SIZE
          LDA #$4E     ;NORMAL MODE
          STA DAUX1
          STY DCOMND
          STX PBUFSZ
          LDX PBPNT
          PLA          ;GET CHARACTER
          STA PRNBUF,X ;PUT IN BUFFER
          INX          ;INC BUFF POINTER
          CPX PBUFSZ  ;= BUFFER SIZE?
          BEQ BUFFUL
          STX PBPNT    ;SAVE POINTER
          CMP #$9B     ;EOL?
          BEQ BLFILL   ;YES, BLANK FILL
          LDY #1       ;GOOD STATUS
          JMP IN
BLFILL
          LDA #$20     ;LOAD A SPACE
FILLBF    STA PRNBUF,X
          INX
          CPX PBUFSZ  ;BUFFER FULL?
          BNE FILLBF
BUFFUL
          LDA #0       ;CLEAR BUFFER
          STA PBPNT    ;POINTER
          LDX #$C0     ;SET BUFF POINTER
          LDY #$03
          STX DBUFLO
          STY DBUFLO+1
          LDA #$40     ;STORE DEVICE
          STA DDEVIC
          LDA #1
          STA DUNIT
          LDA #$80     ;DIRECTION=OUTPUT
          STA DSTATS
          LDA PBUFSZ  ;STORE BUFF SIZE
          STA DBYTLO
          LDA #0
          STA DBYTHI
          LDA PTIMOT   ;TIMEOUT VALUE
          STA DTIMLO
          JSR $E459
IN
          DEC BUSY     ;BUST FLAG OFF
          TYA          ;GET STATUS
          BPL AHEAD    ;GOOD I/O
          INC RETRY    ;SET RETRY FLAG
          BNE JP
AHEAD
          LDY INDEX
          INY          ;INC CHAR INDEX
          CPY DATA+127 ;END OF SECTOR?
          BCS NEXTSECTOR ;YES
          STY INDEX    ;NO, SAVE IT
JP
          JMP OUT
TRYAGAIN
          DEC RETRY    ;RETRY FLAG OFF
          INC BUSY     ;SET BUSY FLAG
;
RETADDR
          JMP BUFFUL   ;RETRY WRITING
;                THE BUFFER
EXITVB
          JSR $00      ;PRINT HANDLER
;                CLOSE ROUTINE
          LDA VBISAV   ;RESTORE VBI VECT
          STA VVBLKD
          LDA VBISAV+1
          STA VVBLKD+1
          LDA # <DUPEXIT ;RESTORE
;                     DOSVEC
          STA DOSVEC
          LDA # >DUPEXIT
          STA DOSVEC+1
          BNE JP
NEXTSECTOR
          LDA #0       ;RESET WORK AREAS
          STA INDEX
          STA FLAG
          LDA DATA+125 ;GET NEXT SECTOR
          AND #$03     ;GET HIGH BYTE
          STA SECTOR+1
          BEQ NEXT1
          INC COMMAND ;THERE IS MORE
NEXT1
          LDA DATA+126 ;GET LOW BYTE
          STA SECTOR
          BEQ NEXT2
          INC COMMAND ;THERE IS MORE
NEXT2
          LDA COMMAND ;MORE SECTORS?
          BEQ EXITVB   ;NO, END VBI
          JMP OUT      ;EXIT VBI
DISKNAME  .BYTE "D:PRINT.SPL"
MEMSAV
          .BYTE "D:MEM.SAV"
MSG
          .BYTE "PRINT.SPL IN USE",CR
DATA      ;            DISK DATA BUFFER
          *=  *+128
DUPEXIT
          LDX #IOCB1   ;CHANNEL 1
          LDA #STATUS ;GET STATUS OF
          STA ICCOM,X ;MEM.SAV FILE
          LDA # <MEMSAV
          STA ICBAL,X
          LDA # >MEMSAV
          STA ICBAL+1,X
          JSR CIOV
          CPY #NOTFOUND ;IS IT THERE?
```

```
        BNE JUMPDUP ;YES, GET OUT
        LDY #0
FINDB
        LDA HATABS,Y ;FIND B DEVICE
        CMP #'B
        BEQ FOUNDB  ;FOUND IT
        INY
        INY
        INY
        BPL FINDB
FOUNDB
        LDA #0      ;TAKE OUT OF TABL
        STA HATABS,Y
        LDA # <ADDR ;RESTORE LOMEM
        STA LOMEM   ;TO ORIGINAL VAL
        LDA # >ADDR
        STA LOMEM+1
        LDA DOS     ;RESTORE DOSINI
        STA DOSINI  ;TO ORIGINAL VAL
        LDA DOS+1
        STA DOSINI+1
        LDA DUPSAV  ;RESTORE DOSVEC
        STA DOSVEC  ;TO ORIGINAL VAL
        LDA DUPSAV+1
        STA DOSVEC+1
        JMP (DOSVEC) ;JUMP TO DUP.SYS
JUMPDUP
        LDA DUPSAV
        STA $00
        LDA DUPSAV+1
        STA $01
        JMP ($00)
RESET
        LDA #0      ;RESET SECTOR NUM
        STA SECTOR
        STA SECTOR+1
        LDA DOS     ;GET DOSINI VECT
        STA DOSADDR+1 ;CREATE JSR ADR
        LDA DOS+1
        STA DOSADDR+2
DOSADDR
        JSR $00     ;DOS INIT
        JMP INITMORE ;REINIT HANDLER
;               TABLE
INIT
        LDA DOSINI  ;GET DOSINI VECT
        STA DOS     ;AND SAVE IT
        LDA DOSINI+1
        STA DOS+1
        LDA # <RESET ;POINT DOSINI TO
        STA DOSINI  ;OUR RESET LOGIC
        LDA # >RESET
        STA DOSINI+1
INITMORE
        LDA DOSVEC  ;SAVE DOSVEC
        STA DUPSAV  ;IN DUPSAV
        LDA DOSVEC+1
        STA DUPSAV+1
        LDA # <DUPEXIT ;POINT DOSVEC
        STA DOSVEC  ;TO DUPEXIT
        LDA # >DUPEXIT
        STA DOSVEC+1
        LDA VVBLKD  ;SAVE ORIG VBI
        STA VBISAV  ;VECTOR
        LDA VVBLKD+1
        STA VBISAV+1
        LDA # <FINI ;SET LOMEM TO
        STA LOMEM   ;POINT PAST END
        LDA # >FINI ;OF THIS PROGRAM
        STA LOMEM+1
        LDY #0
SEEK
        LDA HATABS,Y ;LOOK IN HANDLER
;               TABLE
        BEQ PUTIT   ;FOR A FREE SPACE
        CMP #'P     ;IS IT THE
;             PRINTER HANDLER?
        BNE PUT1
        JSR GETIT   ;YES, PROCESS IT
PUT1
        INY         ;SKIP 2 BYTES
        INY
        INY
        BPL SEEK
PUTIT
        LDA #'B     ;HANDLER NAME
        STA HATABS,Y ;IN TABLE
        INY
        LDA # <ADDR ;STORE ADDRESS OF
        STA HATABS,Y ;OUR VECT TABLE
        INY
        LDA # >ADDR
        STA HATABS,Y
        RTS         ;EXIT
GETIT
        TYA         ;SAVE THE Y REG
        PHA         ;ON THE STACK
        INY
        LDA HATABS,Y ;GET VECT TABLE
        STA INDEX   ;ADDRESS
        INY
        LDA HATABS,Y
        STA INDEX+1
        LDY #2      ;OFFSET TO CLOSE
;             ROUTINE
        CLC
        LDA (INDEX),Y ;LOAD CLOSE ADR
        ADC #1      ;ADD 1 TO IT
        STA EXITVB+1 ;MODIFY JSR CODE
        INY
        LDA (INDEX),Y
        ADC #0
        STA EXITVB+2
        PLA         ;RESTORE Y INDEX
        TAY
        RTS
FINI
        *=  $02E0
        .WORD INIT
```


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by Charles F. Johnson

The Atari ST is the first personal computer to include a MIDI interface as part of its standard hardware. You can connect a synthesizer directly to the computer and —with the right software—save and load MIDI data, save your synthesizer sounds (patches), and lots more.

One of the most important functions a computer can perform is MIDI sequencing. This allows you to enter music into the computer either by playing the synthesizer (real-time) or from the keyboard, one note at a time (step-time). A good sequencer program also allows you to change the speed at which a piece is played, edit individual notes or groups of notes, and autocorrect any timing errors you make when playing a part (this is called *quantizing*).

The *Soundwave-1*.

Which brings us to the **Soundwave-1** (or **SW-1**) sequencer. Opening this book-sized package reveals a 3½-inch disk and a poorly written 2½-page manual. There are two versions of the program on the disk, one for medium and one for high resolution. At first I was dismayed by the scanty documentation, but after playing with the program a bit, I realized that the manual more than does it justice. The **SW-1** sequencer has exactly four (count 'em) options—RECORD, PLAY, SAVE and LOAD. The only way to enter data into the sequencer is by playing your synthesizer; as you play, the notes are displayed on a piano keyboard at the top of the screen. To record, you click on the RECORD box, play the piece on your synthesizer and press a key (on the computer) when you're done. To play the piece back, you click on the PLAY box. SAVE and LOAD are equally self-explanatory; clicking on either one brings up the familiar GEM item selector box to let you save or load pieces you've recorded.

It's hard to know where to start listing what's wrong with this program, so instead I'll begin with some faint praise. **SW-1** seems to do a pretty good job of capturing the exact phrasing you use when recording a piece, which is no simple task. Also, when recording **SW-1** captures all the MIDI data, including pitch wheel, patch changes, velocity, etc.

Now for the downside. **SW-1** has no editing or quantizing, which means that you have to play your part perfectly the first time, no mistakes allowed. And once you've recorded something, you can't even change the tempo. The speed you play it at is the speed you'll hear it at. These deficiencies alone make the program useless, even as a rudimentary composing or arranging tool. It's a musical catch-22: you have to be an accomplished keyboard player to produce a pleasing sequence; but if you're enough of a musician to play keyboards well, this program does absolutely nothing for you that can't be done equally well by a cheap tape recorder.

To make matters even worse, the copy of **SW-1** that I reviewed also seemed to have some fairly serious bugs. Occasionally, the program would just hang, making it necessary to reboot. The window display includes a close box in the upper left corner, which I assumed was the way to exit to the GEM desktop. But clicking on the close box did absolutely nothing. In fact, I couldn't find any way to exit at all. Again, rebooting was necessary. The piano keyboard display on-screen did not accurately reflect what was coming out of my **Casio CZ-101** synthesizer, either. This program seems more like a beta-test version than a finished product! At the current suggested retail price of $19.95, it could be purchased as an interesting toy.

The *Soundwave-8*.

So we move on to the **Soundwave-8** "professional" sequencer. At first glance, this program seems much more comprehensive than **SW-1**. Many of the features mentioned above, such as auto-correct, tempo changing, etc. are included here, along with a host of other useful functions. You can record in real- or step-time, insert, delete, copy and duplicate phrases, filter out certain types of MIDI data (such as program changes or pitch bends), combine and uncombine separate tracks, and synchronize the program to an external MIDI clock source. You even get a 43-page manual that does a pretty good job of explaining **SW-8**'s operation. This is a much more polished program, but unfortunately, still not without problems.

SW-8 is set up to emulate an 8-track tape recorder. The screen display shows the familiar drop-down menu bar, a piano keyboard (which shows notes entered using step-time) and buttons representing the standard tape recorder controls (i.e., PLAY, STOP, RECORD, REWIND, FORWARD and LOCATE). To record a sequence, you simply click on the RECORD button and start playing (after connecting your synthesizer to the ST, of course); to play back, you first REWIND to the beginning, then PLAY. In addition, there is a help window that displays messages about screen ob-

jects as the mouse pointer passes over them, a status window which shows free memory and other important data, and a "note-scope" which can display a visual representation of what's been recorded on a track. **SW-8** uses the GEM interface for all user input; for instance, selecting "Tempo" from the drop-down menu brings up a dialog box in which you adjust the beats-per-minute by clicking the mouse on up or down arrows.

This reliance on GEM has advantages and disadvantages. It makes it much easier to learn to use the program, but it tends to slow you down once you know your way. It would have been nice to have keyboard equivalents for most of the commands, so the "expert user" wouldn't have to wade through levels of menus and dialog boxes.

Soundwave-8 is really intended to be used with a multiple-synthesizer setup. It provides you with 8 tracks on which to record MIDI data; you can assign each track to one of sixteen MIDI channels. You can give each track a name and a comment line. There is a nice MIDI THRU function that lets you play any synthesizer in your chain with a single "master" synthesizer. There are commands to save and load entire pieces or individual tracks. You can also save and load configuration files, so that you can quickly change the sequencer's settings, or have it come up with the same settings each time you load and run it.

SW-8's most serious fault lies in its auto-correct function. This feature is supposed to allow you to play your synthesizer and record in real time, while any timing errors you make are automatically compensated for. You can choose to correct to the nearest quarter note, eighth note, sixteenth note, etc. Sounds great, right? Even if you're a keyboard klutz, you can sound like Keith Jarrett. Unfortunately, **SW-8**'s auto-correct function just plain *doesn't work*. I experimented a great deal with it, and even asked a friend who's a professional keyboard player to try it out. In all cases, the tracks sounded *worse* with auto-correct on than they did with it turned off. To make doubly sure it wasn't just my terrible playing, I booted **MIDITRACK 3** (by Hybrid Arts) on my 8-bit computer, played the same part and used *their* auto-correct feature (they call it "quantizing"). There was no problem with the Hybrid Arts auto-correction.

Anyone who works with MIDI synthesizers knows what a drag it is when a synthesizer receives a "note-on" command but doesn't get the corresponding "note-off." The result is a "hanging" note—one that won't shut off. I mention this because, every time you stop a playback, **SW-8** leaves notes hanging. This is very sloppy programming; I know of no other MIDI sequencer that fails to send "note-off" commands when you interrupt a playback, and it becomes very annoying very quickly.

There are other instances of slipshod programming. If you try to move a phrase, you may see a box with the message *This operation may cause some notes to hang.* The problem is that some of this text extends past the edges of the box, and is unreadable. Again, when the program begins, the authors neglect to change the mouse pointer to an arrow; they simply leave the "busy-bee" pointer on the screen. These are, of course, not fatal problems, but they do reveal a certain slovenliness of approach.

To be fair, many of **SW-8**'s features do work as advertised, but I find its claim to be a "professional" sequencing program greatly overstated. All one has to do is look at some of the truly professional MIDI sequencers available for the Macintosh or IBM PC to discover the emptiness of this claim. If you're looking for a full-featured MIDI sequencer for your ST, neither of these sequencers fit the bill.

*We understand that **Soundwave-8** is now out of production. Its replacement, to be priced at about $130.00, should be out as you read this. We'll keep you posted.—Ed.*

*Charles F. Johnson is a musician by trade, drawn into Atari computers by **Star Raiders** about five years ago. When he got the BASIC cartridge, he was seriously hooked. He currently lives in Los Angeles with his wife and the most intelligent cat in the world.*

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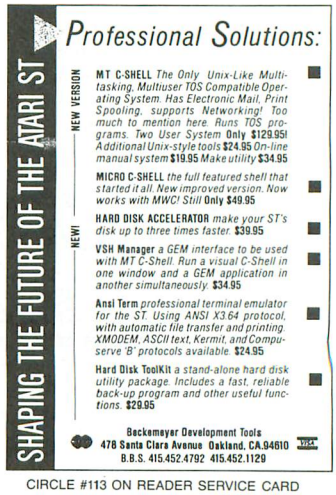

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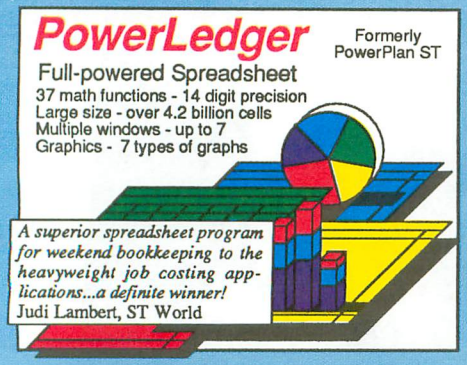

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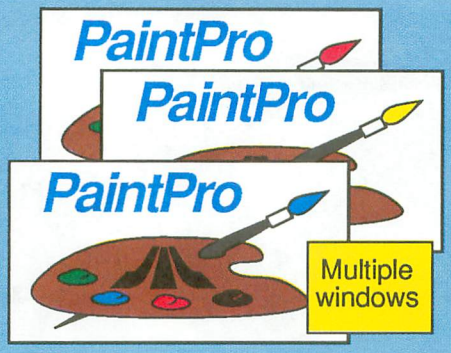

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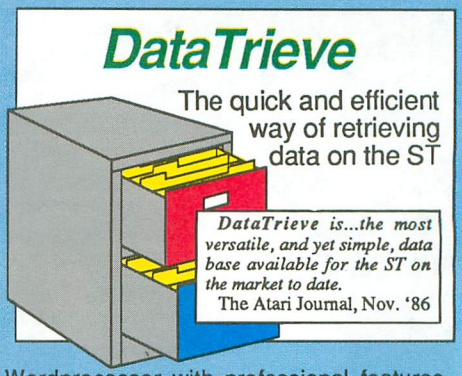

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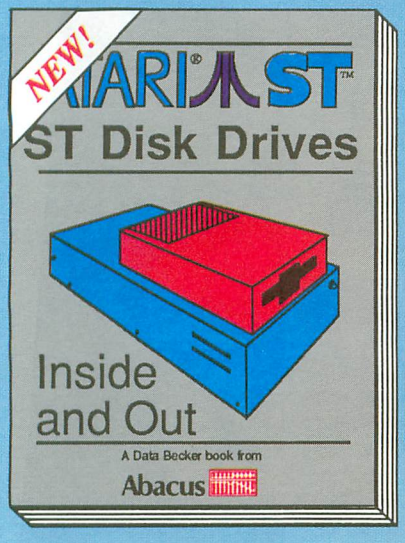

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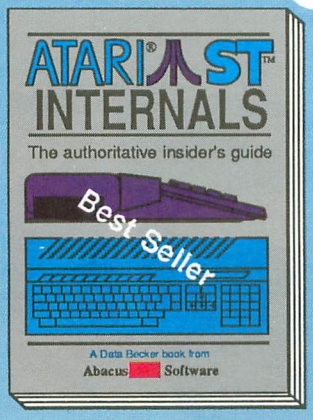

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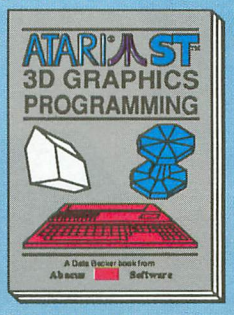

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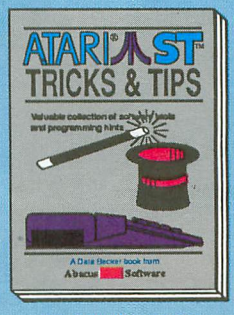

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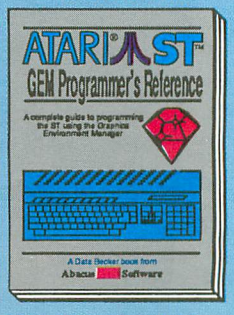

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This game is set not too far into our future (sometime around the year 2048). A new form of entertainment has developed, based loosely on the ancient "sport" of gladiator fighting. In the center of the arena a single droid stands alone, armed with an infinite supply of photon missiles and a protective shield dependent upon the droid's own strength. This is Floyd.

All around him, multitudes of ghastly mutated life forms move vertically and horizontally across the arena at near-lightning speed. When these reach one side of the arena, they're transported to some new location—and their trail of terror continues.

It is Floyd's objective to exterminate these progressively increasing waves of foul creatures, by either blasting each one with a photon missile (up to four missiles can be fired at any one time), or by coming into contact with a creature, destroying it with his protective shield. This, unfortunately, results in the droid's strength diminishing. If it's reduced to zero, Floyd's destruction results.

However, also whizzing around the arena are lonely hearts, which, when collected by the droid, yield an increase in his strength. (Note that shooting the lonely hearts has no effect on Floyd's stamina.)

This then sets the scenario for **Floyd the Droid Goes Blastin'**—with the player controlling Floyd.

Listing 1 is the BASIC data used to create your copy of **Floyd the Droid Goes Blastin'**. Please refer to **M/L Editor** on page 11 for typing instructions.

Playing.

Your START key will begin the game. If you want to pause the action, hit OPTION. A second press of OPTION continues the game.

The droid is controlled via a joystick connected to port 1. Moving the joystick in the particular direction results in Floyd's moving that way. Pressing the trigger and moving the joystick in the appropriate direction will fire a photon missile.

You begin the game at level 1, with a strength of 10. For every alien with which you come into contact, you lose a strength point. Every lonely heart you collect gains you two strength points. For every creature you help Floyd destroy, your score in incremented by 1, and when all the creatures are annihilated, you advance to the next level. (Level 1 begins with one creature, level 2 with two creatures, and so on.) The game is over when your strength is reduced to zero.

If your score is high enough, you'll be able to enter your name (up to eight characters), at the appropriate position on the high-score table. To enter your name, move the joystick left and right to move the cursor. Moving the joystick up and down will alter the character under the cursor. When you've finished entering your name, press the trigger to leave the high-score table.

Floyd is waiting for your help. Enjoy the blasting!

Paul Lay studied Computing Science at Imperial College in London. He's owned his Atari 800 for about four years, and has had several programs published in various English magazines (Personal Computer World, Page 6 Magazine *and* Atari User). *He also wrote an arcade game,* ***Sprong****, released by Bignose Software in the U.K.*

(Listing begins on next page)

Listing 1.

```
1000 DATA 255,255,0,32,100,47,0,0,0,0,
0,0,0,0,1,7,2802
1010 DATA 23,95,95,95,95,95,85,255,255
,255,255,255,255,255,80,244,8267
1020 DATA 244,253,213,85,69,65,95,93,9
3,93,93,95,95,95,95,87,4205
1030 DATA 103,151,87,95,95,95,81,85,85
,85,85,213,245,253,95,31,8122
1040 DATA 31,7,7,1,1,5,95,95,95,95,95,
93,84,85,253,253,6661
1050 DATA 253,244,244,80,0,0,5,31,31,1
27,87,85,81,65,85,255,3970
1060 DATA 255,255,255,255,255,255,64,2
08,212,245,245,245,245,245,69,85,7530
1070 DATA 85,85,85,87,95,127,245,213,2
17,214,213,245,245,245,245,117,8122
1080 DATA 117,117,117,245,245,245,127,
127,127,31,31,5,0,0,245,245,6811
1090 DATA 245,245,245,117,21,85,245,24
4,244,208,208,64,64,80,1,7,6721
1100 DATA 7,31,29,21,20,20,85,255,255,
255,85,85,85,20,64,208,6668
1110 DATA 208,244,116,84,20,20,117,117
,117,117,117,125,127,127,20,85,4564
1120 DATA 85,85,85,85,85,255,93,93,93,
93,93,125,253,253,127,127,378
1130 DATA 95,71,71,65,80,84,255,255,25
5,255,255,85,0,0,253,253,3082
1140 DATA 245,209,209,65,5,21,1,7,7,31
,29,29,29,29,85,255,82
1150 DATA 85,85,85,65,85,0,64,208,208,
244,116,116,116,116,117,116,8180
1160 DATA 117,116,117,116,117,117,85,8
5,85,85,85,85,85,0,93,29,1420
1170 DATA 93,29,93,29,93,93,125,127,95
,71,71,65,80,84,85,255,5327
1180 DATA 255,255,255,85,0,0,125,253,2
45,209,209,65,5,21,60,106,6278
1190 DATA 191,245,95,251,110,60,60,106
,191,245,95,251,110,60,60,106,8430
1200 DATA 191,245,95,251,110,60,60,106
,191,245,95,251,110,60,170,170,1114
1210 DATA 170,170,170,170,170,170,0,63
,63,63,63,63,0,0,0,8749
1220 DATA 15,15,15,15,0,0,0,0,0,5,5,0,
0,0,0,124,3459
1230 DATA 238,238,238,238,124,0,0,56,1
20,56,56,56,254,0,0,124,2892
1240 DATA 238,28,56,112,254,0,0,254,28
,56,28,238,124,0,0,28,1488
1250 DATA 60,124,236,254,28,0,0,254,22
4,252,14,238,124,0,0,124,6596
1260 DATA 224,252,238,238,124,0,0,254,
14,28,56,112,112,0,0,124,2112
1270 DATA 238,124,238,238,124,0,0,124,
238,126,14,28,120,0,0,124,2470
1280 DATA 224,124,14,254,124,0,0,224,2
24,224,224,224,254,0,0,56,8828
1290 DATA 254,56,56,62,30,0,0,124,254,
230,224,224,224,0,0,124,7848
1300 DATA 238,254,224,254,124,0,0,252,
254,230,230,230,230,0,0,126,1252
1310 DATA 246,246,126,14,124,0,0,224,2
24,252,238,238,238,0,0,248,1966
1320 DATA 120,120,120,120,252,0,0,238,
238,238,124,56,16,0,0,124,4434
1330 DATA 224,224,224,252,124,0,0,124,
238,238,238,254,124,0,0,5,7174
1340 DATA 31,31,127,127,127,127,0,1,71
,223,221,255,255,255,0,64,9996
1350 DATA 208,208,244,116,116,116,127,
127,127,31,31,31,31,7,255,255,6923
1360 DATA 255,255,255,255,255,255,244,
244,244,208,208,208,208,64,7,7,3252
1370 DATA 1,1,0,0,0,0,255,255,253,253,
116,16,0,0,64,64,3457
1380 DATA 0,0,0,0,0,0,1,5,21,21,85,85,
86,84,85,85,8710
1390 DATA 85,85,85,85,86,144,128,96,88
,88,86,86,86,86,88,88,3898
1400 DATA 84,22,21,21,5,5,88,100,100,7
0,69,101,85,85,150,86,2638
1410 DATA 86,88,88,88,96,96,6,0,1,5,5,
1,0,0,102,68,6130
1420 DATA 17,153,85,85,16,0,96,0,0,96,
96,128,0,0,2,26,7088
1430 DATA 41,170,153,165,101,165,154,1
69,170,255,127,93,93,93,160,154,823
1440 DATA 169,230,90,85,86,86,149,165,
173,111,31,63,63,63,157,157,6320
1450 DATA 127,243,255,247,209,64,150,1
50,94,253,255,255,255,127,61,61,3720
1460 DATA 63,15,15,3,0,0,0,0,64,209,24
7,255,255,0,31,31,4329
1470 DATA 127,252,252,240,192,0,1,7,31
,31,127,125,117,117,85,255,6840
1480 DATA 255,255,255,255,125,190,64,2
08,244,244,253,125,93,93,117,117,2964
1490 DATA 125,127,127,127,125,116,190,
125,255,255,255,85,0,0,93,93,7962
1500 DATA 125,253,253,253,125,29,125,1
27,127,127,127,127,29,4,0,85,3719
1510 DATA 255,255,255,247,209,64,125,2
53,253,253,253,253,244,80,1,5,3369
1520 DATA 5,23,21,21,85,93,93,117,213,
117,93,85,105,170,64,80,5403
1530 DATA 80,84,84,84,117,93,117,214,1
18,86,86,86,214,117,170,138,9118
1540 DATA 130,130,146,146,162,170,87,1
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1550 DATA 21,23,21,5,5,1,170,105,85,85
,215,221,117,117,85,85,6187
1560 DATA 84,84,84,80,80,64,64,80,85,8
4,21,21,21,5,20,85,8347
1570 DATA 85,85,150,150,85,85,1,5,85,2
1,84,84,84,80,5,1,9067
1580 DATA 1,42,42,170,170,162,105,130,
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1590 DATA 64,168,168,170,170,138,162,1
46,82,64,3,3,35,42,170,170,4914
1600 DATA 170,255,255,195,195,130,138,
134,133,1,192,192,200,168,169,255,4808
1610 DATA 141,68,2,169,0,141,229,0,162
,255,169,1,157,0,59,173,6591
1620 DATA 10,210,157,0,60,202,208,242,
169,0,141,14,210,141,14,212,8971
1630 DATA 32,25,40,169,224,141,9,212,1
62,4,189,108,37,157,22,208,7443
1640 DATA 202,16,247,169,56,141,7,212,
169,1,141,29,208,169,29,141,7353
1650 DATA 18,208,169,113,141,2,212,169
,37,141,3,212,169,190,141,0,7888
1660 DATA 2,169,38,141,1,2,169,128,141
,14,212,32,34,40,169,54,3428
1670 DATA 141,0,212,173,229,0,240,55,1
69,238,133,203,169,37,133,204,2178
1680 DATA 162,0,160,0,177,203,24,105,2
9,217,86,56,48,27,208,5,3684
1690 DATA 200,192,7,208,239,165,203,24
,105,20,133,203,165,204,105,0,8545
1700 DATA 133,204,232,224,5,208,219,24
0,9,32,52,46,76,108,36,238,6932
1710 DATA 229,0,173,31,208,201,6,208,2
49,32,34,37,32,56,39,32,2210
1720 DATA 47,37,32,17,40,32,3,41,32,23
3,44,32,192,42,32,222,3348
1730 DATA 41,162,7,173,10,210,61,100,3
7,157,40,33,157,48,33,157,3804
1740 DATA 56,33,157,64,33,202,16,235,3
2,47,37,32,17,40,32,74,9952
1750 DATA 40,32,3,41,32,233,44,32,192,
42,32,45,40,173,214,0,3341
1760 DATA 201,255,240,94,169,4,141,219
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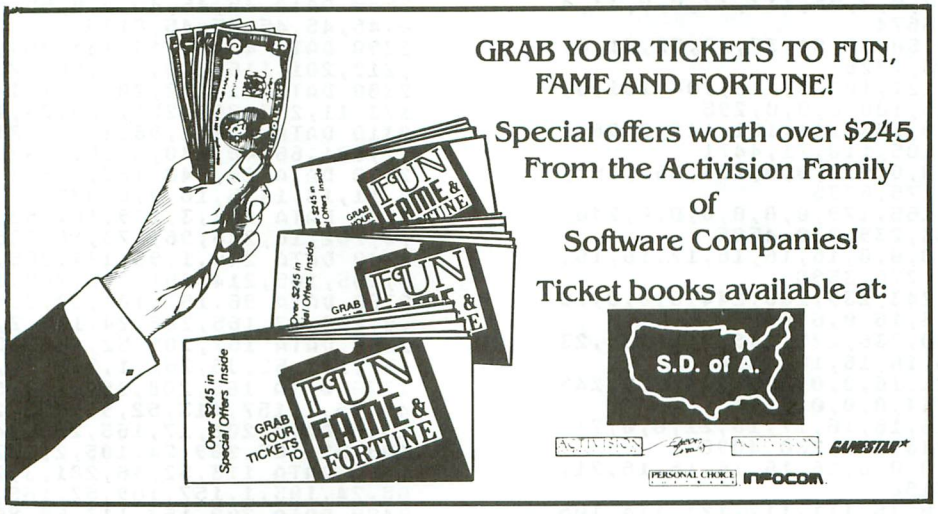

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08,6,32,157,42,76,28,1611
1780 DATA 37,201,2,208,6,32,168,42,76,
28,37,201,3,208,6,32,2127
1790 DATA 181,42,76,28,37,201,4,208,9,
32,168,42,32,144,42,76,2509
1800 DATA 28,37,201,5,208,9,32,181,42,
32,157,42,76,28,37,201,3371
1810 DATA 6,208,9,32,168,42,32,157,42,
76,28,37,32,181,42,32,941
1820 DATA 144,42,32,222,41,76,121,36,1
62,4,173,31,208,201,7,208,7552
1830 DATA 247,202,16,246,96,173,31,208
,201,3,208,17,32,88,37,32,3958
1840 DATA 34,37,173,31,208,201,3,208,2
49,32,34,37,96,201,6,208,7381
1850 DATA 12,32,88,37,32,34,37,162,0,1
54,76,226,35,96,169,0,3679
1860 DATA 162,5,157,0,210,202,202,16,2
49,96,60,126,255,255,255,255,6470
1870 DATA 126,60,140,14,0,74,0,112,112
,112,176,70,146,37,112,7,3044
1880 DATA 48,6,48,112,7,112,6,112,6,11
2,6,112,6,112,6,112,289
1890 DATA 2,0,2,0,2,65,113,37,0,0,33,4
6,33,44,47,39,6674
1900 DATA 0,48,50,37,51,37,46,52,51,0,
0,0,0,0,102,108,7226
1910 DATA 111,121,100,0,116,104,101,0,
100,114,111,105,100,0,0,0,295
1920 DATA 0,0,0,103,111,101,115,0,98,1
08,97,115,116,105,110,71,4471
1930 DATA 0,0,0,0,0,0,0,0,168,169,167,
168,0,179,163,175,6736
1940 DATA 178,165,179,0,0,0,0,0,0,240,
236,225,249,243,239,230,4585
1950 DATA 244,0,0,0,16,16,16,17,16,16,
16,0,0,240,236,225,3598
1960 DATA 249,243,239,230,244,0,0,0,16
,16,16,16,21,16,16,0,6961
1970 DATA 0,240,236,225,249,243,239,23
0,244,0,0,0,16,16,16,16,3398
1980 DATA 18,21,16,0,0,240,236,225,249
,243,239,230,244,0,0,0,212
1990 DATA 16,16,16,16,17,18,21,0,0,240
,236,225,249,243,239,230,4090
2000 DATA 244,0,0,0,16,16,16,16,16,21,
16,0,0,0,0,0,3190
2010 DATA 0,0,0,35,111,112,121,114,105
,103,104,116,0,8,35,9,428
2020 DATA 17,25,24,22,0,48,108,97,121,
115,111,102,116,0,0,0,259
2030 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,48
,114,111,6188
2040 DATA 103,114,97,109,109,101,100,0
,98,121,0,48,97,117,108,0,2136
2050 DATA 44,97,121,0,0,0,0,0,0,0,0,0,
0,0,0,0,2651
2060 DATA 0,0,0,48,114,101,115,115,0,1
79,180,161,178,180,0,116,7545
2070 DATA 111,0,98,101,103,105,110,0,1
03,97,109,101,0,0,0,0,9102
2080 DATA 0,0,0,0,72,138,72,152,72,162
,160,172,231,0,189,0,6918
2090 DATA 60,141,10,212,141,4,208,140,
24,208,200,222,0,60,138,41,7341
2100 DATA 1,240,3,222,0,60,202,208,229
,142,4,208,160,2,185,8,7948
2110 DATA 39,162,7,141,10,212,141,24,2
08,56,233,1,202,16,244,141,9332
2120 DATA 10,212,136,16,233,238,231,0,
104,168,104,170,104,64,202,138,522
2130 DATA 26,72,138,72,169,14,162,170,
141,10,212,142,24,208,141,23,7537
2140 DATA 208,202,141,10,212,142,24,20
8,202,224,162,208,245,169,134,162,5448
2150 DATA 204,141,10,212,141,23,208,14
2,24,208,104,170,104,64,169,0,7212
2160 DATA 141,14,212,32,25,40,169,32,1
41,9,212,169,117,133,205,169,9778
2170 DATA 52,133,206,169,0,162,3,160,0
,145,205,200,208,251,230,206,5124
2180 DATA 202,16,244,162,39,189,228,39
,157,53,56,202,16,247,169,196,1351
2190 DATA 141,2,212,169,39,141,3,212,1
69,11,141,0,2,169,39,141,4820
2200 DATA 1,2,169,128,141,14,212,162,4
,189,12,40,157,22,208,202,8032
2210 DATA 16,247,169,18,141,208,0,169,
10,141,209,0,169,0,141,219,8219
2220 DATA 0,32,222,41,162,3,169,255,15
7,101,52,169,0,157,105,52,6793
2230 DATA 202,16,243,141,220,0,141,221
,0,32,192,42,169,0,141,8,4988
2240 DATA 210,169,3,141,15,210,32,34,4
0,96,112,112,68,117,52,4,2454
2250 DATA 4,4,4,4,4,4,4,4,4,4,4,4,4,4,
4,4,2794
2260 DATA 4,4,4,4,4,132,2,65,196,39,55
,57,58,59,60,61,545
2270 DATA 57,62,0,45,45,46,45,0,0,56,5
9,64,59,63,0,45,7793
2280 DATA 45,45,45,0,0,55,65,66,58,59,
0,45,45,45,45,45,8125
2290 DATA 45,45,14,134,204,56,0,173,11
,212,201,116,208,249,96,173,1963
2300 DATA 11,212,208,251,141,0,212,96,
173,11,212,208,251,169,34,141,2210
2310 DATA 0,212,96,173,0,211,41,15,162
,7,221,66,40,240,5,202,7325
2320 DATA 16,248,162,255,142,214,0,96,
7,11,13,14,5,10,9,6,8020
2330 DATA 162,3,189,101,52,201,255,240
,4,202,16,246,96,173,16,208,1062
2340 DATA 240,1,96,134,205,32,45,40,16
6,205,165,214,201,255,208,1,2504
2350 DATA 96,157,101,52,254,105,52,201
,0,208,17,165,208,24,105,2,6037
2360 DATA 157,109,52,165,209,24,105,1,
157,113,52,96,201,1,208,14,5721
2370 DATA 165,208,157,109,52,165,209,2
4,105,1,157,113,52,96,201,2,5868
2380 DATA 208,17,165,208,24,105,1,157,
109,52,165,209,24,105,2,157,6110
2390 DATA 113,52,96,201,3,208,14,165,2
08,24,105,1,157,109,52,165,6646
2400 DATA 209,157,113,52,96,201,4,208,
17,165,208,24,105,2,157,109,6719
2410 DATA 52,165,209,24,105,2,157,113,
52,96,201,5,208,11,165,208,8415
2420 DATA 157,109,52,165,209,157,113,5
2,96,201,6,208,14,165,208,157,365
2430 DATA 109,52,165,209,24,105,2,157,
113,52,96,165,208,24,105,2,5214
2440 DATA 157,109,52,165,209,157,113,5
2,96,162,3,189,101,52,201,255,746
2450 DATA 208,4,202,16,246,96,189,105,
52,208,21,189,109,52,141,212,4
2460 DATA 0,189,113,52,141,213,0,32,68
,42,169,0,160,0,145,203,6018
2470 DATA 169,0,157,105,52,189,101,52,
208,8,254,109,52,189,109,52,7890
2480 DATA 16,102,201,1,208,11,222,109,
52,169,40,56,253,109,52,16,5960
2490 DATA 87,201,2,208,8,254,113,52,18
9,113,52,16,75,201,3,208,7345
2500 DATA 11,222,113,52,169,24,56,253,
113,52,16,60,201,4,208,11,5305
2510 DATA 254,109,52,254,113,52,189,11
3,52,16,45,201,5,208,14,222,7532
2520 DATA 109,52,222,113,52,169,24,56,
253,113,52,16,27,201,6,208,6495
2530 DATA 11,222,109,52,254,113,52,189
,113,52,16,12,254,109,52,222,8361
2540 DATA 113,52,169,24,56,253,113,52,
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74,141,0,210,169,138,141,1,7221
2550 DATA 210,189,109,52,48,33,201,40,
16,29,141,212,0,189,113,52,5540
2560 DATA 48,21,201,24,16,17,141,213,0
,32,68,42,138,24,105,165,4139
2570 DATA 160,0,145,203,76,12,41,169,0
,141,1,210,169,255,157,101,9747
2580 DATA 52,76,12,41,165,208,141,212,
0,165,209,141,213,0,32,68,7718
2590 DATA 42,169,2,133,205,165,219,10,
10,10,24,101,219,170,160,0,6429
2600 DATA 189,23,42,145,203,232,200,19
2,3,208,245,165,203,24,105,40,856
2610 DATA 133,203,165,204,105,0,133,20
4,198,205,16,226,96,1,2,3,5608
2620 DATA 4,5,6,7,8,9,10,11,12,13,14,1
5,16,17,18,19,4524
2630 DATA 20,21,22,23,24,25,26,27,28,2
9,30,31,32,33,34,35,6710
2640 DATA 36,0,0,0,0,0,0,0,0,0,169,117
,133,203,169,52,3877
2650 DATA 133,204,173,213,0,133,205,16
9,0,133,206,160,2,6,205,38,7456
2660 DATA 206,136,16,249,165,203,24,10
1,205,133,203,165,204,101,206,133,3873
2670 DATA 204,160,1,6,205,38,206,136,1
6,249,165,203,24,101,205,133,818
2680 DATA 203,165,204,101,206,133,204,
165,203,24,109,212,0,133,203,165,2162
2690 DATA 204,105,0,133,204,96,169,0,1
33,219,165,208,201,37,16,2,7516
2700 DATA 230,208,96,169,1,133,219,165
,208,240,2,198,208,96,169,2,1251
2710 DATA 133,219,165,209,201,21,16,2,
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2720 DATA 209,240,2,198,209,96,238,228
,0,173,220,0,208,30,173,221,2723
2730 DATA 0,201,255,240,3,238,221,0,16
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2740 DATA 0,208,247,142,220,0,142,222,
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2750 DATA 48,201,4,48,3,76,114,43,173,
222,0,240,3,76,178,43,6135
2760 DATA 189,101,51,240,3,76,185,43,1
69,4,141,223,0,32,55,44,4139
2770 DATA 173,228,0,41,1,240,7,173,221
,0,201,20,144,78,189,101,8296
2780 DATA 48,208,8,254,101,49,189,101,
49,208,31,201,1,208,9,222,9100
2790 DATA 101,49,189,101,49,76,68,43,2
01,2,208,8,254,101,50,189,8184
2800 DATA 101,50,208,6,222,101,50,189,
101,50,141,4,210,169,38,141,8157
2810 DATA 5,210,189,101,49,48,13,201,3
8,16,9,189,101,50,48,4,2104
2820 DATA 201,22,48,8,169,0,141,5,210,
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2830 DATA 223,0,32,55,44,76,168,43,201
,13,240,50,41,14,56,233,6041
2840 DATA 4,74,141,223,0,208,7,169,0,1
41,5,210,16,14,201,4,4424
2850 DATA 208,10,206,220,0,169,0,141,3
,210,16,12,10,10,10,10,9745
2860 DATA 141,2,210,169,46,141,3,210,3
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2870 DATA 221,0,240,3,76,232,42,96,169
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2880 DATA 101,51,76,102,43,173,10,210,
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2890 DATA 173,10,210,41,3,157,101,48,2
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2910 DATA 101,49,173,10,210,41,31,157,
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2920 DATA 173,10,210,41,63,157,101,49,
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2930 DATA 10,210,41,63,157,101,49,169,
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2940 DATA 38,48,5,41,37,157,101,49,189
,101,50,201,22,48,5,41,2841
2950 DATA 21,157,101,50,173,10,210,41,
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2960 DATA 101,49,133,212,189,101,50,13
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2970 DATA 173,223,0,10,10,10,24,109,22
3,0,170,160,2,189,116,44,5692
2980 DATA 145,203,232,136,16,247,165,2
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2990 DATA 0,133,204,198,205,16,228,166
,224,96,41,41,41,41,41,41,5002
3000 DATA 41,41,41,170,170,170,170,170
,170,170,170,170,43,43,43,43,7980
3010 DATA 43,43,43,43,43,44,44,44,44,4
4,44,44,44,44,0,0,7615
3020 DATA 0,0,0,0,0,0,0,197,196,195,20
0,199,198,203,202,201,4560
3030 DATA 78,77,76,81,80,79,84,83,82,8
7,86,85,90,89,88,93,4738
3040 DATA 92,91,96,95,94,99,98,97,102,
101,100,233,232,231,236,235,5882
3050 DATA 234,239,238,237,114,113,112,
117,116,115,120,119,118,224,223,222,49
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3060 DATA 227,226,225,230,229,228,215,
214,213,218,217,216,221,220,219,162,19
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3070 DATA 0,189,101,48,201,4,16,73,189
,101,49,133,212,189,101,50,8231
3080 DATA 133,213,32,68,42,169,2,133,2
05,160,2,177,203,41,127,240,858
3090 DATA 54,201,41,16,50,201,37,48,16
,56,233,37,168,169,255,153,366
3100 DATA 101,52,169,0,141,1,210,240,1
6,189,101,47,201,5,208,6,7521
3110 DATA 32,213,45,76,51,45,32,87,45,
169,4,157,101,48,32,27,2372
3120 DATA 46,232,228,221,208,171,96,13
6,16,193,165,203,24,105,40,133,9859
3130 DATA 203,165,204,105,0,133,204,19
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3140 DATA 62,56,56,233,1,201,45,48,20,
153,62,56,192,3,208,12,5238
3150 DATA 185,62,56,201,45,208,5,136,1
6,246,48,10,96,169,54,153,7151
3160 DATA 62,56,136,16,218,96,169,0,14
1,1,210,141,3,210,169,174,234
3170 DATA 141,5,210,169,31,133,225,169
,255,133,226,165,208,133,212,165,6984
3180 DATA 209,133,213,32,68,42,162,2,1
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3190 DATA 41,131,24,105,41,145,203,136
,16,240,165,203,24,105,40,133,8874
3200 DATA 203,165,204,105,0,133,204,20
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3210 DATA 208,197,162,0,142,5,210,154,
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3220 DATA 2,201,55,16,4,141,65,56,96,5
6,233,10,141,65,56,160,5872
3230 DATA 2,185,62,56,24,105,1,201,55,
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3240 DATA 136,16,238,96,153,62,56,96,1
60,3,185,74,56,24,105,1,3851
3250 DATA 201,55,48,9,169,45,153,74,56
,136,16,238,96,153,74,56,6811
3260 DATA 96,160,6,185,86,56,24,105,1,
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3270 DATA 86,56,136,16,238,96,153,86,5
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3280 DATA 169,38,133,204,169,4,56,229,
227,170,240,38,165,203,24,105,1699
3290 DATA 20,133,205,165,204,105,0,133
,206,160,19,177,203,145,205,136,3272
3300 DATA 16,249,165,203,56,233,20,133
,203,165,204,233,0,133,204,202,4674
3310 DATA 16,216,169,226,133,203,169,3
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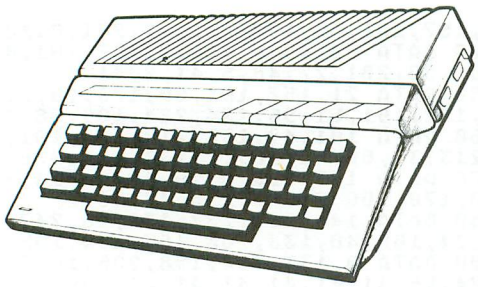

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Floyd the Droid *continued*

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7,133,204,165,227,10,10,72,24,8041
3320 DATA 101,203,133,203,165,204,105,
0,133,204,104,10,10,24,101,203,7552
3330 DATA 133,203,165,204,105,0,133,20
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3340 DATA 47,145,203,136,208,244,165,2
03,24,105,12,133,205,165,204,105,2822
3350 DATA 0,133,206,160,6,185,86,56,56
,233,29,145,205,136,16,245,686
3360 DATA 165,203,24,105,1,133,205,165
,204,105,0,133,206,160,0,32,7893
3370 DATA 40,47,169,127,145,205,32,40,
47,185,93,47,170,189,56,47,7326
3380 DATA 145,205,173,16,208,240,65,32
,45,40,165,214,208,9,200,192,1799
3390 DATA 8,48,220,160,0,16,216,201,1,
208,7,136,16,209,160,7,7454
3400 DATA 16,205,201,2,208,12,185,93,4
7,56,233,1,16,20,169,36,4745
3410 DATA 16,16,201,3,208,185,185,93,4
7,24,105,1,201,37,48,2,3975
3420 DATA 169,0,153,93,47,76,201,46,17
3,16,208,240,251,96,162,2,840
3430 DATA 173,11,212,208,251,173,11,21
2,240,251,202,16,243,96,0,225,4346
3440 DATA 226,227,228,229,230,231,232,
233,234,235,236,237,238,239,240,241,55
36
3450 DATA 242,243,244,245,246,247,248,
249,250,208,209,210,211,212,213,214,38
09
3460 DATA 215,216,217,0,0,0,0,0,0,0,0,
226,2,227,2,200,3904
3470 DATA 35,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,3505
```


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The Learning Phone

ATARI PLATO ACCESS CARTRIDGE

by Vincent Wu
ATARI CORP.
1265 Borregas Avenue
Sunnyvale, CA 94086
$24.99

by Fred Du Buron

In today's world of telecommunications, home computer owners have a number of services available. Thanks to the dedication of a few people inside Atari Corp.—and, in particular Vincent Wu, the principal author of **The Learning Phone**—one of the most exciting offerings is now available to owners of all Atari computers: Control Data Corporation's Plato.

No review of **The Learning Phone** (we'll call it **TLPhone**) cartridge could possibly be written without some background on Control Data's Plato educational computer system. First, we must attempt to describe one of the most technically superb computer networks available to the general public today.

Plato was conceived in 1960 by Donald L. Bitzer, as a research project in Computer Assisted Instruction at the University of Illinois. By 1962, Plato was in operation, one of the first time-sharing computer systems. In 1976, Control Data Corporation took over Plato and now operates the system, which runs on CDC Cyber 170 mainframe computers based at Minneapolis, Minnesota.

It has evolved through the years, and its on-line library has grown to more than 6,000 lessons. It's been said that Plato contains over 200,000 hours of study material, in both its published and unpublished lessons. These lessons cover levels from preschool to engineering graduate work.

One afternoon I was determined to look through Plato's on-line catalog, from A through Z. Well, the task proved formidable, and—an hour and a half later, after reaching only the *Es*—I threw in the towel. To give you an idea of the depth in which subjects are covered by this database, let's look at the subject *medicine*. There are more than 475 medically oriented lessons, covering such areas as Clinical Case Studies, Basic Brain Anatomy, Fetal Heart Monitor Training, Genetic Engineering, Emergency Room Simulations, and . . .the list goes on.

Let's take a look at some of the impressive capabilities that make the Plato system such a powerful tool, and the ways **TLPhone** emulates them.

A standard CDC IST-II Plato terminal has a 512x512 screen resolution and a touch-sensitive screen. Simulating those specifications—on *any* personal computer—is no easy task. The Atari, with its high-resolution graphics mode 8 (192x320 resolution) and its versatile operating system, was a good place to start.

The Atari's graphics 8 is adequate for reading the 60 columns of text common on Plato. But the resolution was not enough for Plato's fine detail. A way was needed to "zoom" in on the high-resolution graphics. Vincent Wu and his associates soon had the Plato screen bit mapped in the Atari RAM, in a fashion similar to that of Chris Crawford's **Eastern Front**. With **TLPhone**, moving the joystick produces movement of a "window" that scrolls smoothly over the mapped Plato screen. This mode of operation is referred to as "Zoom," and the name is very descriptive of the effect.

Switching between the normal viewing 192x320 mode (which is compressed vertically) and the Zoom mode is accomplished by using the joystick firebutton. This makes for a very workable system. There are only a few lessons unusable by the Atari because their graphics are too detailed.

Plato uses some special keys not found on Atari computers to access the special functions of the Plato system. Emulating these keys is simply a matter of depressing the START button and depressing the letter that corresponds to the first letter of the Plato function key (i.e., the Plato function key called "Data" is simulated by depressing START-D). Sometimes there's a requirement for the shifted function to be used (such as SHIFT-Data), and that's simulated on the Atari by hitting START-SHIFT-D. It may appear that the user has to be quite agile to use these keys, but the process soon becomes comfortable and natural.

For those who find all this key pressing depressing, the more commonly used function keys may be joystick controlled, simply by holding the OPTION key and hitting the *F* key. These joystick controls are: up=Next, down=Back, left=Lab and right=Data. Also, depressing the fire button simulates the "shifted" function of the keys. For instance, the "Back" function backs you up to the previous page in a lesson. Shift-Back might take you all the way back to a menu at the beginning of the lesson.

Still another joystick-controlled function is the simulation of Plato's touch-sensitive CRT screen. If a lesson calls for the touch screen, then a player appears in the upper left corner of the screen. The joystick is used to move the player to a point on the screen that might be, let's say, a box for menu selection. Hitting the fire button at

this point simulates actually touching the screen.

Plato also has very powerful communication capabilities. It's not uncommon to find 800-plus people using the system at any given time during the day. The ability to "Page" (Term-Talk) and converse with these other users is unmatched by any system available to the general public. Not only can two users communicate, but they have the ability to enter into "Monitor" mode, and show each other what lesson they're in. As an educational system, this ability allows an instructor to help a student across the country. The student can do a task while the instructor watches, then, by taking the student into Monitor mode, the instructor can show him the correct solution.

For those folks who enjoy authoring software, there are several lessons available that allow you to write your own lessons. If your lesson has enough applications, you could receive royalties for its installation on Plato's library.

Though Plato is primarily an educational database, there are more than 200 recreational activities on the system. Most have an educational twist to them, but it is in interactive gaming that Plato shines. Whether it's **Air to Air** combat or **Destroyer vs. Submarines**, the system's ability to pit thirty players against each other in real-time combat is unmatched anywhere. **Empire**, one of Plato's most popular games, gets almost 200 players challenging it daily. It's a space conquest game made up of four teams. The objective of this complex, fast-paced game is conquest of the Empire. The ship-to-ship battles are fast and furious and, since it's in real time, if you're slow on the keys, death is swift!

Tank War is similar to the arcade game **Battle Zone**, except there are two teams seeking and destroying each other's headquarters. It's also in real time, and the 3-D graphics are fantastic.

Not all of Plato's games are destructive in nature. **Tenure** is a teaching simulation, in which you're hired as a teacher at the local high school. You must get through a school year, facing all sorts of realistic challenges—from angry parents to the principal's whims—then get rehired the following year with **Tenure**.

Mahjong is a representation of the ancient Chinese tile game, featuring spectacular graphics. Using the joystick to simulate the touch panel, tiles must be removed in pairs from a pyramid. The intricate pictures on the tiles require the Zoom mode to determine their differences. This is one game that sets Atari apart from other PCs accessing the Plato system. Neither the IBM nor the Zenith Z-100, for instance, can display the detailed tile drawings at all. Nor can either of these computers simulate Plato's touch panel. Moreover, a recent Plato software upgrade has incorporated a "Term-Touch" option that produces an on-screen box to be moved with the Plato arrow keys. Once the box is positioned, hitting SHIFT-RETURN will simulate touching the screen at the position of the box.

For information on Plato's Homelink access, call 1-800-233-3784.
Homelink is available during the following hours:

Time Zone	Weekdays	Saturdays	Sundays/Holidays
Eastern	6 pm - 4 am	6 am - 4 am	6 am - 12 pm
Central	6 pm - 3 am	5 am - 3 am	5 am - 11 pm
Western	6 pm - 2 pm	4 am - 2 am	4 am - 10 pm
Pacific	6 pm - 1 am	3 am - 1 am	3 am - 9 pm

Hours of operation are subject to change. The system is unavailable Christmas day.

Plato also has special interest note files. Several files let Atari owners present problems, ask questions and offer help. One file in particular (besides the very active Atari note file) is "Micronotes." A base note left in the morning can have twenty-five responses by evening—on hobbies, women's issues, games, even the space shuttle.

The note files' structure is a joy to all system users, and warrants a quick description. Base notes are shown in the index, with responses. Both may be copied to other notes or forwarded to other users. While reading a note, you can page the author by hitting *T* (for talk), or a personal note may be sent by hitting *P* (for personal note).

TLPhone supports a printer, and screen dumps of text can be made by hitting OPTION-P, a handy option for dumping notes and game directions.

To make this Plato access system more user friendly, **TLPhone** comes with an extremely well written, digestible 76-page user's guide. It's filled with illustrations of the many aspects of the system. Also in the user's guide, you'll find a page to record your sign-in name and password. The package includes a coupon that will allow your first year's dues ($25.00) and your first hour on line ($7.75), free. These fees are subject to change.

Whatever you look for in Plato, you'll find it. It's a wonderful world of learning and experience, and the costs are not unlike CompuServe or The Source. There are no additional charges for 1200 baud, and it should be noted that 1200 baud is essential, due to the real-time aspect of the system.

TLPhone runs with all Atari modems and MPP direct connect. Or, by using the Atari 850 interface, any of the RS232-type modems may be utilized. **TLPhone** also works with all Atari 8-bit computers, although owners of the 600XL will discover that the Zoom feature will not work, since it needs at least 48K of RAM to function. A word of caution to owners of interface units other than the Atari 850: **TLPhone** was designed to work with the 850 circuit architecture only.

The Learning Phone's $24.99 cost is a small price to pay for a key to the educational world of Plato.

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HardCopy and CheckWriter

Turn *MicroCheck* into *MacroCheck* with these two new modules.

HardCopy by Boyd E. Arnold

I congratulate Clayton Walnum on his most useful program **MicroCheck**, from **ANALOG Computing**'s issues 27 and 28. It is a super way to electronically handle your checking account and to prepare the related bank reconciliation statement.

My uses of **MicroCheck** were extended into my volunteer "treasurerships" once the following two options were added: (1) the ability to prepare one copy or multiple copies of the checking account activity and the bank reconciliation statement. (yes, we still have a paper society); and (2) the option to begin the year with any month, as many organizations have a year that begins with a month other than January.

After many hours of writing and debugging these program options, I was able to add them to Mr. Walnum's already splendid program.

To add these options to your existing **MicroCheck** programs from issues 27 and 28, type in Listings 1 through 5, using the **BASIC Editor II** from issue 47, and LIST each of them to your disk. If you're using the **MicroCheck** two-drive enhancement from issue 40, you'll have to do some modifications:

All occurrences of *D:* in Lines 695 and 698 of Listing 1, Lines 140, 440 and 710 of Listing 3, and Lines 985, 1110 and 1640 of Listing 5 must be changed to *D2:* Line 160 of Listing 3 should be changed to:

```
160 FILE$="D2:MONTH   .DAT":FILE$(9,10)
=CK$:CLOSE #2:OPEN #2,4,0,FILE$:INFO=0
```

Note: You must make these changes after the listings have been correctly typed with the **BASIC Editor II**. If you try to type these modifications while still using the **BASIC Editor II**, the checksums will not match.

Now, follow the instructions below for the **HardCopy** listings that follow this article.

Listing 1:

(1) Type *NEW* and hit RETURN, then type *ENTER "D:LISTING1"*. Insert your **MicroCheck** data disk and run Listing 1. The files needed to print the "all data" and "new data" reports will be created.

(2) Eliminate Lines 0 and 20 from Listing 1. Remove your **MicroCheck** data disk. List the modified Listing 1 to your work disk: i.e., LIST "D:LISTING1".

(3) Insert your **MicroCheck** program disk and load "D:UTILITY". Then insert your work disk and merge the modified Listing 1 with the command ENTER "D:LISTING1". Now, reinsert your **MicroCheck** program disk and save "D:UTILITY".

Listing 2:

(1) With the **MicroCheck** program disk inserted in the drive, load "D:MENU", then place the work disk with Listing 2 in the drive and type: *ENTER "D:LISTING2"*. The Menu and Listing 2 have now been combined to accommodate the "Print Report" option.

(2) With your program disk reinserted in the drive, save "D:MENU".

Listing 3:

(1) Type *NEW* and press RETURN, then type *ENTER "D:LISTING3"*. The "PUT" statements in Lines 490 and 500 contain the codes to create double-width printing on the Epson MX-80. You may need to change these codes to conform to your printer's needs.)

(2) On your **MicroCheck** program disk, save "D:REPORT".

Listing 4:

(1) Load "D:CHECKBOO" from your **MicroCheck** program disk, then place the work disk containing List-

ing 4 in the drive and type: *ENTER "D:LISTING4"*. The CHECKBOO and Listing 4 have now been combined, to accommodate a year beginning with any month.

(2) Save "D:CHECKBOO" to your program disk.

Listing 5:

(1) Load "D:CHECKBAL" from your program disk, then insert the work disk containing Listing 5 and type: *ENTER "D:LISTING5"*. The CHECKBAL and Listing 5 have now been combined, to permit a printout of the bank reconciliation statement. (The "PUT" statements in Lines 1670 and 1680 contain the codes to create double-width printing on the Epson MX-80. You may need to change these codes to conform to your printer's needs.)

(2) Save "D:CHECKBAL" to your program disk.

Print Report option.

When you select the "Print Report" option on the main menu, you'll be presented with a title screen, followed by a menu that allows you to print [1] ALL DATA, [2] NEW DATA, or to return to [3] MENU. When you choose [1] or [2], a *three-part* report will be printed.

Part One will be the heading. It contains your three-line name and address, page number (automatically determined), columnar headings (Date, Payee, Ck.#, Deposits, Checks, Balance), and "Balance Carried Forward."

The balance carried forward on page 1 of an ALL DATA report will be the balance with which your year started; on page 2, the ending balance of page 1; etc. If this is a NEW DATA report, the balance carried forward will be the ending balance of the last NEW DATA report printed. For example, if you prepare a NEW DATA report at the end of each month and your year begins with January, your NEW DATA report for April will be page 4 and the Balance Carried Forward will be the balance at the end of the March NEW DATA report.

Part Two will be a listing of all checking account activity you specify by choosing ALL DATA or NEW DATA.

An ALL DATA report will list all activity entered from the beginning of your year to the present. NEW DATA reports will contain all account activity entered since the last NEW DATA report was prepared. For example, if your year begins with January and you prepare a NEW DATA report at the end of each month, your April 30 ALL DATA report will contain all entered activity from January 1 through April 30; the NEW DATA report, April 1 through April 30.

If you entered a memo for a DEP, this memo will appear in the "Payee" column. If you do not wish this feature, REM Line 220 of Listing 3.

If the activity is *not* a DEP and you entered a memo, this memo will be printed in the "Payee" column beneath the payee. If you do not wish this feature, REM Line 280 of Listing 3.

The pagination will not be affected by your REMing either or both of these lines.

Part Three will consist of three lines: "Totals This Report," "Totals to Date," and "End of Report." The two totals will appear for the "Deposits" and "Checks" columns.

After the report is printed, you will be presented again with the menu: [1] ALL DATA, [2] NEW DATA, [3] MENU. You may prepare as many copies of either or both reports as you desire. However, after you've printed the desired reports, *always* choose the [3] MENU option to end this part of the program. Returning to the main menu causes the computer to "remember" the ending point of the last NEW DATA report you printed.

If you change the amount of an item included on a NEW DATA report, the totals and running balance on the NEW DATA reports will be incorrect. To remedy this situation, follow step 1 under "Listing 1" above; this will have your next NEW DATA report start from the beginning of your year and thus include the corrected amount.

Balance Account option.

When you now choose the "Balance Account" option from the main menu and a bank reconciliation statement is displayed on your screen, you're given the option "P=Printout." When you choose it, you'll be asked to enter a date to appear on the report. This date, your three-line name and address, and the screen display will be printed. Additionally, the Check#/DEP/AUTO, date and amount of every outstanding item will be listed under the proper "Outstanding Checks" or "Outstanding Deposits" section.

Upon completion of the printout, you will again be presented with the menu containing P. If you wish, you may print out another copy of the bank reconciliation statement.

I hope these additional features will satisfy your hardcopy needs as well as they have mine.

Boyd E. Arnold, a self-taught BASIC programmer, is an Associate Professor of Business at York College of Pennsylvania. He earned a B.S. at Bloomsburg State University and his M.Ed. and Ph.D. from Penn State. He is a member of SPACE (Southcentral Pennsylvania Atari Computer Enthusiasts) users' group.

***CheckWriter* by Jeff Killeen**

Note: In order for this enhancement to run properly, you must have completed the modifications to the ***MicroCheck*** *menu module presented in the previous enhancement,* ***HardCopy.***

ANALOG Computing has provided me with many useful programs. One I boot up often is **MicroCheck** by Clayton Walnum. Since I do use it so much, I thought it would be a real timesaver if the program could write my checks for me. This would eliminate the duplication of entering the data into **MicroCheck** and manually writing a check. After studying the original, I decided that a simple enhancement would do the trick.

Listing 6 contains the changes that need to be made to the main MENU program. Type it in and list it to disk. Load the MENU program, then ENTER the LISTed program lines. Finally, resave the MENU program. It will now substitute a selection for **CheckWriter** in place of *END*.

Listing 2 is the **CheckWriter** program. Type it in and save it to disk under the name of *CHECKWTR* (note the

REM statements if you're using two disk drives). Be sure to put it on the same disk as the **MicroCheck** system.

The **CheckWriter** program is designed to be used with personal computer checks from Deluxe Computer Forms, a division of Deluxe Check Printers, Inc. (Form 1050). You can order these checks through your bank.

To use **CheckWriter**, first select CHECK WRITER from the main menu. Answer the prompts and **CheckWriter** will load the data for the selected month. Once loaded, it will search for the first check to print (skipping deposits, service charges or cancelled checks). When a check is found, you will be prompted before printing begins. When all checks are printed (if any), a final prompt will ask if you want to do another month, or return to the main menu.

Jeff Killeen is currently a training specialist for Electronic Data Systems Corp., in the Detroit area. He teaches mainframe programming, using both high- and low-level languages. He got interested in microcomputers in mid-1984, when he bought at Atari 800XL.

HARDCOPY

Listing 1.
BASIC listing.

```
TO 0 DIM BALANCE$(8):? CHR$(125):POSITION
    2,10:? "YOUR STARTING BALANCE";:INPUT
    BALANCE$:GOTO 682
ZY 20 OPEN #1,4,0,"K:":GET #1,A:CLOSE #1:
   RETURN
RQ 682 TRAP 682:? CHR$(125):POSITION 2,10
   :? "ENTER STARTING MONTH (EXAMPLE: 01)
   ":INPUT X
RB 683 IF X<0 OR X>12 THEN 682
NP 684 TRAP 40000:POKE 752,1:? :? "IS THI
   S THE CORRECT STARTING MONTH?":? X
WG 685 GOSUB 20:IF A<>ASC("Y") AND A<>ASC
   ("N") THEN 685
IF 686 IF A=ASC("N") THEN 682
JK 695 OPEN #1,8,0,"D:BEGINFO":? #1;BALAN
   CE$:? #1;X:? #1;"0":? #1;"1":? #1;"0":
   ? #1;"0":CLOSE #1
UV 698 OPEN #1,8,0,"D:PRNTINFO":? #1;BALA
   NCE$:? #1;X:? #1;"0":? #1;"1":? #1;"0"
   :? #1;"0":CLOSE #1
```

Listing 2.
BASIC listing.

```
GN 40 POSITION 3,12:? #6;"PRINT REPORT"
GB 42 POSITION 3,14:? #6;"END"
HG 50 POSITION 7,18:? #6;"USE SELECT TO C
   HOOSE ITEM":POSITION 9,22:? #6;"PRESS
   START TO BEGIN"
HI 100 ON CHOICE GOTO 110,120,130,140,145
   ,150
TO 145 RUN "D:REPORT"
DU 160 OLDROW=ROW:ROW=ROW+2:IF ROW=16 THE
   N ROW=4
OY 220 IF OLDROW=10 THEN POSITION 3,10:?
   #6;"UTILITIES":POSITION 3,12:? #6;"pri
   nt report"
JO 225 IF OLDROW=12 THEN POSITION 3,12:?
   #6;"PRINT REPORT":POSITION 3,14:? #6;"
   end"
RE 230 IF OLDROW=14 THEN POSITION 3,14:?
   #6;"END":POSITION 3,4:? #6;"enter chec
   ks"
JL 310 POKE DL-1,198:POKE DL+2,135:POKE D
   L+3,134:POKE DL+16,134:POKE DL+18,134
```

Listing 3.
BASIC listing.

```
LX 2 REM ****************************
DG 3 REM *     REPORT GENERATOR     *
VY 4 REM *     by BOYD E. ARNOLD    *
NL 5 REM *      FEBRUARY, 1985      *
FM 6 REM *  for use with MICROCHECK *
JK 7 REM *     by Clayton Walnum    *
SB 8 REM *   #27-28, A.N.A.L.O.G.   *
ME 9 REM ****************************
BA 10 DIM INFO$(63),CK$(5),DATE$(8),PAYEE
   $(21),AMT$(9),MEMO$(22),FILE$(15),SP$(
   6),DLR$(9),NAME$(60),K(2):SP$="      "
DB 20 TIME$=0:K(1)=0:K(2)=0:GOTO 570
KX 30 REM LINES 40-90 FORMAT DOLLARS
JZ 40 AMT=LEN(AMT$):DLR$="          ":CNT=
   0:X=0:FOR N=AMT TO 1 STEP -1:X=X+1:IF
   AMT$(N,N)="." THEN CNT=X:POP :GOTO 60
PC 50 NEXT N:AMT$(LEN(AMT$)+1)=".00":GOTO
    80
NU 60 CNT=3-CNT:IF CNT<0 THEN AMT$=AMT$(1
   ,LEN(AMT$)+CNT)
WU 70 IF CNT>0 THEN FOR N=1 TO CNT:AMT$(L
   EN(AMT$)+1)="0":NEXT N
AA 80 CNT=LEN(AMT$):IF VAL(AMT$)<0 THEN C
   NT=CNT-1
SX 90 DLR$(10-LEN(AMT$))=AMT$:IF CNT>6 TH
   EN DLR$(1,2)=DLR$(2,3):DLR$(3,3)=","
YX 100 RETURN
UL 110 TRAP 820:CLOSE #2:OPEN #2,4,0,FILE
   $:INPUT #2;INFO$:BALANCE=VAL(INFO$):IN
   PUT #2;INFO$:MONTH=VAL(INFO$)
DI 120 INPUT #2;INFO$:ITEM=VAL(INFO$):INP
   UT #2;INFO$:PAGE=VAL(INFO$):INPUT #2;I
   NFO$:DEPTTL=VAL(INFO$)
SZ 130 INPUT #2;INFO$:CKTTL=VAL(INFO$):DE
   PG=0:CKPG=0:LINE=0:CLOSE #2
XQ 140 OPEN #1,4,0,"D:NAME.DAT":FOR N=1 T
   O 3:INPUT #1;MEMO$:SP=N*20:NAME$(SP-19
   ,SP)=MEMO$:NEXT N:CLOSE #1:GOSUB 460
FX 150 CK$=STR$(MONTH):IF LEN(CK$)<2 THEN
    CK$(2)=STR$(MONTH):CK$(1,1)="0"
ZB 160 FILE$="D:MONTH  .DAT":FILE$(8,9)=C
   K$:CLOSE #2:OPEN #2,4,0,FILE$:INFO=0
PW 170 IF PEEK(764)<>255 THEN CLOSE #2:TI
   ME$=TIME$-1:GOTO 640
CD 180 POKE 764,255:INPUT #2;INFO$:IF INF
   O$="END" THEN GOTO 310
TT 190 CK$=INFO$(1,5):INFO=INFO+1:IF INFO
   <=ITEM THEN GOTO 170
ZD 200 LINE=LINE+1:ITEM=ITEM+1
LC 210 DATE$=INFO$(6,13):PAYEE$=INFO$(14,
   34):AMT$=INFO$(35,41):MEMO$=INFO$(42,6
   3)
RG 220 IF CK$=" DEP " AND MEMO$(1,6)<>SP$
    THEN PAYEE$=MEMO$
QK 230 AMT$=STR$(VAL(AMT$))
DL 240 CLOSE #3:OPEN #3,8,0,"P:":PRINT #3
   ;SP$;DATE$;"  ";PAYEE$;" ";CK$;" ";
KF 250 GOSUB 40:IF CK$=" DEP " THEN PRINT
    #3;DLR$;SP$;SP$(2);:DEPG=DEPG+VAL(AMT
   $)
BA 260 IF CK$<>" DEP " THEN PRINT #3;SP$;
   SP$(3);DLR$;" ";:CKPG=CKPG+VAL(AMT$)
BU 270 BALANCE=BALANCE+VAL(AMT$)*(CK$=" D
   EP ")-VAL(AMT$)*(CK$<>" DEP "):AMT$=ST
   R$(BALANCE):GOSUB 40:PRINT #3;DLR$
BE 280 IF CK$<>" DEP " AND MEMO$(1,6)<>SP
   $ THEN PRINT #3;SP$;SP$;SP$(2);MEMO$:L
   INE=LINE+1
AG 290 IF LINE>=48 THEN GOSUB 550:GOSUB 4
   60
OH 300 GOTO 170
BK 310 REM ROUTINE TO CHECK END OF FILE
HJ 320 IF INFO=0 THEN GOTO 360
TL 330 MONTH=MONTH+1:IF MONTH=13 THEN MON
   TH=1
```

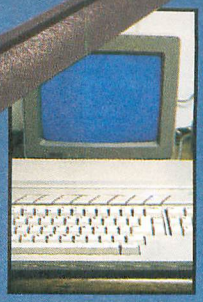
```
KS 340 IF K(2)=1 THEN K(1)=ITEM
AX 350 ITEM=0:GOTO 150
NG 360 REM ROUTINE TO END THIS PRINTOUT
QW 370 IF LINE=0 THEN OPEN #3,8,0,"P:"
OT 380 FOR NN=1 TO 2:PRINT #3:PRINT #3;SP
   $;:INFO$="TOTALS THIS REPORT":IF NN=2
   THEN INFO$="TOTALS TO DATE     "
VP 390 PRINT #3;INFO$;SP$;SP$;SP$;SP$;SP$(5);
   :AMT=DEPG:IF NN=2 THEN AMT=AMT+DEPTTL
YR 400 AMT$=STR$(AMT):GOSUB 40:PRINT #3;D
   LR$;" ";:AMT=CKPG:IF NN=2 THEN AMT=AMT
   +CKTTL
LE 410 AMT$=STR$(AMT):GOSUB 40:PRINT #3;D
   LR$:NEXT NN
PK 420 MONTH=MONTH-1:PRINT #3:PRINT #3;SP
   $;"END OF REPORT":LINE=LINE+5:GOSUB 55
   0:CLOSE #3:IF MONTH=0 THEN MONTH=12
PF 430 GOTO 640
BL 440 TRAP 820:CLOSE #2:OPEN #4,8,0,"D:P
   RNTINFO":PRINT #4;BALANCE:PRINT #4;MON
   TH:PRINT #4;ITEM:PRINT #4;PAGE
ZZ 450 PRINT #4;DEPG+DEPTTL:PRINT #4;CKPG
   +CKTTL:CLOSE #4:RETURN
RP 460 REM ROUTINE TO PRINT PAGE HEADING
HS 470 TRAP 820:CLOSE #3:OPEN #3,8,0,"P:"
   :FOR N=1 TO 2:PRINT #3:NEXT N
LC 480 FOR N=1 TO 3:SP=N*20:INFO$=NAME$(S
   P-19,SP)
WZ 490 FOR NN=1 TO 40-LEN(INFO$):PRINT #3
   ;" ";:NEXT NN:PUT #3,27:PUT #3,87:PUT
   #3,1:PRINT #3;INFO$
EP 500 PUT #3,27:PUT #3,87:PUT #3,0:NEXT
   N:FOR X=1 TO 74-7:PRINT #3;" ";:NEXT X
   :PRINT #3;"Page ";PAGE
HR 510 PRINT #3:PRINT #3:PRINT #3;SP$;"
   DATE          PAYEE                CK. #  D
   EPOSITS    CHECKS    BALANCE"
NU 520 AMT$=STR$(BALANCE):GOSUB 40:PRINT
   #3
NV 530 PRINT #3;SP$;"BALANCE CARRIED FORW
   ARD ";:FOR N=1 TO 5:PRINT #3;SP$;:NEXT
    N:PRINT #3;SP$(3);DLR$
FN 540 PRINT #3:CLOSE #3:RETURN
BC 550 REM TO END PAGE
LT 560 FOR N=1 TO 54-LINE:PRINT #3:NEXT N
   :PAGE=PAGE+1:LINE=0:RETURN
JZ 570 GRAPHICS 17:POSITION 1,4:PRINT #6;
   "********************":POSITION 1,5:PRIN
   T #6;"*                  *"
EH 580 POSITION 1,6:PRINT #6;"*report gen
   erator*":POSITION 1,7:PRINT #6;"*
            *"
UY 590 POSITION 1,8:PRINT #6;"*       BY
         *":POSITION 1,9:PRINT #6;"*
            *"
BT 600 POSITION 1,10:PRINT #6;"* BOYD E.
   ARNOLD *":POSITION 1,11:PRINT #6;"*
               *"
ND 610 POSITION 1,12:PRINT #6;"**********
   *********":POSITION 4,14:PRINT #6;"FOR
   USE WITH"
KN 620 POSITION 5,15:PRINT #6;"MICROCHECK
   ":POSITION 9,16:PRINT #6;"by":POSITION
    3,17:PRINT #6;"CLAYTON WALNUM"
CF 630 FOR N=1 TO 750:NEXT N
WO 640 TIME$=TIME$+1:GRAPHICS 1:POSITION
   4,6:PRINT #6;"PRINT REPORT":POSITION 4
   ,9:PRINT #6;"[1] ALL DATA"
ZU 650 POSITION 4,11:PRINT #6;"[2] NEW DA
   TA":POSITION 4,13:PRINT #6;"[3] RETURN
   ":POSITION 8,14:PRINT #6;"TO MENU"
ZP 660 ? :? "Enter CHOICE (1/2/3) and PRE
   SS RETURN";
RQ 670 OPEN #1,4,0,"K:":GET #1,K:CLOSE #1
   :IF K<ASC("1") OR K>ASC("3") THEN GOTO
    670
FJ 680 IF K=ASC("2") THEN K(2)=1
AC 690 IF K=ASC("3") AND TIME$>=2 AND K(2
   )>0 THEN ITEM=K(1):GOSUB 440
BK 700 IF K=ASC("3") THEN INFO$="PROGRAM"
   :PS=1:GOSUB 790:RUN "D:MENU"
OV 710 FILE$="D:PRNTINFO":IF K=ASC("1") T
   HEN FILE$="D:BEGINFO"
ZO 720 IF TIME$=1 THEN INFO$="DATA":PS=0:
   GOSUB 790
AI 730 GRAPHICS 17:POSITION 3,9:PRINT #6;
   "PREPARE PRINTER":POSITION 9,12:PRINT
   #6;"AND":POSITION 2,15
NS 740 PRINT #6;"PRESS 'P' TO PRINT":POKE
    756,224
DK 750 OPEN #1,4,0,"K:":GET #1,K:CLOSE #1
   :IF K<>ASC("P") THEN GOTO 750
KZ 760 GRAPHICS 17:POSITION 3,9:PRINT #6;
   "PRESS ANY KEY":POSITION 9,11:PRINT #6
   ;"TO"
KO 770 POSITION 3,13:PRINT #6;"abort PRIN
   TING"
MN 780 GOTO 110
IF 790 GRAPHICS 17:POSITION 4,8:PRINT #6;
   "please insert":POSITION 3-PS,10:PRINT
    #6;"your ";INFO$;" disk"
RI 800 POSITION 4,12:PRINT #6;"into drive
    #1":POSITION 4,22:PRINT #6;"PRESS ANY
    KEY":POKE 756,224
II 810 OPEN #1,4,0,"K:":GET #1,K:CLOSE #1
   :RETURN
HE 820 CLOSE #1:CLOSE #2:CLOSE #3:TRAP 40
   000:IF PEEK(195)=138 THEN GOTO 730
UL 830 IF PEEK(195)=170 THEN INFO$="DATA"
   :GOSUB 790
BY 840 TIME$=TIME$-1:GOTO 640
```

Listing 4.
BASIC listing.

```
BO 2205 IF YR$>0 THEN YEAR=YR$
NW 2520 YR$=0:IF M=N1 THEN POSITION N20,N
   16:? "   YEAR ";YEAR;"? (Y/N) ":GOSUB
   IN2:IF A=ASC("Y") THEN 2528
PC 2521 IF M<>N1 THEN 2528
BH 2522 POSITION N20,N16:? "      YEAR?
         ":COL=36:ROW=N5:GOSUB IN:FOR X=N1
    TO N2
ML 2524 IF TEMP$(X,X)<"0" OR TEMP$(X,X)>"
   9" THEN GOSUB SND2:POP :GOTO 2522
HQ 2525 NEXT X:YEAR=VAL(TEMP$(N1,N2)):YR$
   =YEAR:GOTO 2520
AN 2528 POSITION 0,N16:? B$:DATE$(N3,N6)=
   "/  /":DATE$(N7,N8)=STR$(YEAR):POSITIO
   N 30,N5:? DATE$
```

Listing 5.
BASIC listing.

```
GT 985 CLOSE #N2:OPEN #N2,N4,N0,"D:BEGINF
   O":INPUT #N2;STARTMO:INPUT #N2;STARTMO
   :CLOSE #N2
FT 1005 MONTHDAT$=""
DN 1040 POSITION N11,N11:? #N6;MONTH;" "
HI 1080 IF CHECK$(N2,N5)="DEP " THEN UCDE
   P=UCDEP+N1:UCDAMNT=UCDAMNT+VAL(CHECK$(
   35))
CS 1085 IF CHECK$(N2,N5)="DEP " THEN MONT
   HDAT$(LEN(MONTHDAT$)+N1)=CHECK$(N1,41)
   :GOTO 1060
TV 1090 UNCAN=UNCAN+N1:UCAMNT=UCAMNT+VAL(
   CHECK$(35)):MONTHDAT$(LEN(MONTHDAT$)+N
   1)=CHECK$(N1,41):GOTO 1060
MY 1100 STMTH=N0:IF MONTH=N0 THEN STMTH=N
   1:IF STARTMO<>N1 THEN MONTH=STARTMO-N1
RL 1105 MONTH=MONTH+N1:IF MONTH=N13 THEN
   MONTH=N1
```



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ANALOG COMPUTING

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```
QS 1108 IF MONTH<>STARTMO+STMTH THEN 1010
GM 1110 CLOSE #N2:OPEN #N2,N4,N0,"D:BALAN
   CE.DAT":INPUT #N2;BALANCE$:CLOSE #N2
PG 1480 POSITION N11,22:? #N6;"M=MENU  P=
   PRINTOUT"
JA 1515 IF A=ASC("P") THEN GOTO 1600
WG 1600 FOR XX=0 TO N2:POSITION N0,N20+XX
   :? B$:NEXT XX:POSITION N2,21:? "Report
    Date (MM/DD/YY)";:INPUT AMOUNT$
YA 1610 POSITION N0,21:? B$:TRAP 40000:PO
   SITION N1,21:? "Prepare PRINTER & Pres
   s P to Print";
QD 1620 OPEN #N1,N4,N0,"K:":GET #N1,X:CLO
   SE #N1:IF X<>ASC("P") THEN GOTO 1620
JV 1630 POSITION N0,21:? B$
XH 1640 CLOSE #3:CLOSE #N4:OPEN #N4,N4,0,
   "D:NAME.DAT"
XT 1650 TRAP 1610:OPEN #N3,N8,0,"P:":PRIN
   T #N3;B$(N20);AMOUNT$:PRINT #N3
MP 1660 FOR N=N1 TO N3:INPUT #N4;MEMO$
UQ 1670 FOR X=N1 TO 40-LEN(MEMO$):PRINT #
   N3;" ";:NEXT X:PUT #N3,27:PUT #N3,87:P
   UT #N3,N1:PRINT #N3;MEMO$
XH 1680 PUT #N3,27:PUT #N3,87:PUT #N3,0:N
   EXT N:PRINT #N3:PRINT #N3:CLOSE #N4
RK 1690 PRINT #N3;B$(N20);"BANK STATEMENT
    BALANCE";
HA 1700 FOR X=N1 TO N17-LEN(EBAL$):PRINT
   #N3;".";:NEXT X:PRINT #N3;"$";EBAL$:PR
   INT #N3
OJ 1710 PRINT #N3;B$(N20);"LESS OUTSTANDI
   NG CHECKS:":PRINT #N3
BI 1720 IF UNCAN=0 THEN PRINT #N3;B$(N15)
   ;"NONE":PRINT #N3:GOTO 1740
SJ 1730 COUNT=0:GOSUB 1870:PRINT #N3;B$(N
   15);"TOTAL";
JJ 1740 FOR X=N1 TO 29-LEN(UCAMNT$):PRINT
    #N3;".";:NEXT X:PRINT #N3;"(";UCAMNT$
   ;")":PRINT #N3
XL 1750 TEMP$=STR$(EBAL-UCAMNT):GOSUB DOL
   FORMAT:PRINT #N3;B$(N15);"SUBTOTAL";
KM 1760 FOR X=N1 TO 27-LEN(TEMP$):PRINT #
   N3;".";:NEXT X:PRINT #N3;TEMP$:PRINT #
   N3
MT 1770 PRINT #N3;B$(N20);"PLUS OUTSTANDI
   NG DEPOSITS:":PRINT #N3
QC 1780 IF UCDEP=0 THEN PRINT #N3;B$(N15)
   ;"NONE":? #N3:GOTO 1800
TL 1790 COUNT=N1:GOSUB 1870
ZN 1800 PRINT #N3;B$(N15);"TOTAL";:FOR X=
   N1 TO 30-LEN(UCDAMNT$):PRINT #N3;".";:
   NEXT X:PRINT #N3;UCDAMNT$:PRINT #N3
OJ 1810 TEMP$=STR$(EBAL-UCAMNT+UCDAMNT):G
   OSUB DOLFORMAT:PRINT #N3;B$(N20);"YOUR
    BALANCE SHOULD BE";
XH 1820 FOR X=N1 TO N17-LEN(TEMP$):PRINT
   #N3;".";:NEXT X:PRINT #N3;"$";TEMP$
FN 1830 PRINT #N3:PRINT #N3;B$(N20);"YOUR
    BALANCE IS";
WG 1840 FOR X=N1 TO 24-LEN(BALANCE$):PRIN
   T #N3;".";:NEXT X:PRINT #N3;"$";BALANC
   E$:PRINT #N3
AT 1850 TEMP$=STR$(DIF):GOSUB DOLFORMAT:P
   RINT #N3;B$(N20);"DIFFERENCE";
VH 1860 FOR X=N1 TO 29-LEN(TEMP$):PRINT #
   N3;".";:NEXT X:PRINT #N3;"$";TEMP$:CLO
   SE #N3:GOTO 1470
XO 1870 FOR XX=N1 TO LEN(MONTHDAT$) STEP
   41:IF MONTHDAT$(XX,XX+N4)=" DEP " AND
   COUNT=0 THEN GOTO 1920
CY 1880 IF MONTHDAT$(XX,XX+N4)<>" DEP " A
   ND COUNT=N1 THEN GOTO 1920
OJ 1890 CHECK$=MONTHDAT$(XX,XX+40):PRINT
   #N3;B$(N15);CHECK$(N2,N5);" ";CHECK$(N
   6,N13);" ";
JT 1900 TEMP$=STR$(VAL(CHECK$(35,41))):GO
   SUB DOLFORMAT
UY 1910 FOR X=N1 TO N8-LEN(TEMP$):PRINT #
   N3;" ";:NEXT X:PRINT #N3;TEMP$
JI 1920 NEXT XX:PRINT #N3:RETURN
```

●

CHECKWRITER
Listing 6.
BASIC listing.

```
DL 42 POSITION 3,14:? #6;"WRITE CHECKS"
PD 150 RUN "D:CHECKWTR"
XD 225 IF OLDROW=12 THEN POSITION 3,12:?
   #6;"PRINT REPORT":POSITION 3,14:? #6;"
   Write checks"
OD 230 IF OLDROW=14 THEN POSITION 3,14:?
   #6;"WRITE CHECKS":POSITION 3,4:? #6;"E
   nter checks"
```

●

Listing 7.
BASIC listing.

```
WD 100 REM Microcheck - Check Writer
DC 105 REM by Jeff Killeen
OY 110 DIM FILE$(6300),REC$(63),SW$(3),NU
   M$(2),NAME$(15),MONTH$(3),AMT$(4)
CQ 115 DIM DATE$(5),MSG$(50),WORD$(8),PAY
   EE$(30),AMOUNT$(11),CHECK$(5)
TW 130 SW$="OFF"
LW 140 GRAPHICS 0:GOSUB 325
MG 145 CLOSE #2
DI 147 REM IF USING TWO DRIVES, CHANGE TH
   E WORD "ONE" TO "TWO" IN LINE 150
WX 150 ? "K":POSITION 9,10:? "Ready drive
    one with":POSITION 9,12:? "Microcheck
    data disk"
FP 155 POSITION 9,14:POKE 752,1:? "and pr
   ess START."
XV 160 IF PEEK(53279)<>6 THEN 160
VB 163 REM IF USING TWO DRIVES, CHANGE TH
   E DEVICE "D1" TO "D2" IN LINE 165
WC 165 NAME$(1,8)="D1:MONTH":NAME$(9,10)=
   NUM$:NAME$(11,15)=".DAT "
FN 170 TRAP 145:OPEN #2,4,0,NAME$
TM 180 X=1:N=0
RH 185 INPUT #2;REC$:N=N+1
XV 190 FILE$(X,X+62)=REC$
JZ 192 IF REC$(1,3)="END" AND N=1 THEN 24
   7
MU 193 IF REC$(1,3)="END" THEN 200
YK 195 X=X+63:GOTO 185
LL 200 CLOSE #2:X=1:N=N-1
JB 205 FOR Y=1 TO N
BQ 210 IF FILE$(X+1,X+3)="DEP" THEN 245
DO 215 IF FILE$(X+1,X+4)="0000" THEN 245
HX 220 IF FILE$(X,X)="*" THEN 245
GX 223 CHKNUM=VAL(FILE$(X+1,X+4))
SP 225 IF CHKNUM<CHECK THEN 245
WM 227 GOSUB 390
WE 230 GOSUB 490
VB 240 GOSUB 415
BZ 245 X=X+63:NEXT Y
PH 247 IF SW$="OFF" THEN FILE$(X+5,X+6)=N
   UM$:GOSUB 390:GOTO 270
BY 248 REM MASTER RESET FOR EPSON RX80
YK 249 PUT #3,27:PUT #3,64:CLOSE #3
BC 270 CLOSE #4:OPEN #4,4,0,"K:"
PX 275 IF SW$="ON" THEN 290
KR 280 ? "K":POSITION 7,12:? "No checks t
   o print for ";DATE$(3,5);"."
ZW 283 POSITION 13,14:POKE 752,1:? "(Pres
   s any key)"
EB 285 GET #4,A
GI 290 GRAPHICS 2+16
OZ 295 POSITION 4,4:? #6;"N - NEW MONTH":
   POSITION 6,6:? #6;"M - MENU"
```

```
CX 300 GET #4,A
SQ 302 REM IF USING TWO DRIVES CHANGE THE
    NUMBER "316" TO "320" IN LINE 305
BH 305 IF A=ASC("M") THEN 316
WK 310 IF A=ASC("N") THEN 140
WV 315 REM IF USING TWO DRIVES REMOVE LIN
   ES 316 TO 318
VB 316 ? "K":POSITION 9,10:? "Remove data
    disk and":POSITION 9,12:? "insert MIC
   ROCHECK disk,"
US 317 POSITION 9,14:POKE 752,1:? "then p
   ress START ."
EG 318 IF PEEK(53279)<>6 THEN 318
TA 319 REM IF USING TWO DRIVES REMOVE "TR
   AP 316" FROM LINE 320
WZ 320 CLOSE #4:TRAP 316:? "K":RUN "D1:ME
   NU"
MG 325 NUM$="":POSITION 13,10:? "Enter mo
   nth ==>";:INPUT NUM$
EY 330 TRAP 325:NUM=VAL(NUM$):TRAP 40000
EF 335 IF NUM>9 AND NUM<13 THEN 386
BH 340 IF NUM=9 THEN NUM$="09":GOTO 386
AK 345 IF NUM=8 THEN NUM$="08":GOTO 386
YL 350 IF NUM=7 THEN NUM$="07":GOTO 386
XO 355 IF NUM=6 THEN NUM$="06":GOTO 386
VP 360 IF NUM=5 THEN NUM$="05":GOTO 386
US 365 IF NUM=4 THEN NUM$="04":GOTO 386
ST 370 IF NUM=3 THEN NUM$="03":GOTO 386
RW 375 IF NUM=2 THEN NUM$="02":GOTO 386
PX 380 IF NUM=1 THEN NUM$="01":GOTO 386
OR 382 IF NUM=0 THEN NUM$="00":GOTO 386
QL 385 GOTO 325
CN 386 CHECK$="":POSITION 8,13:? "Startin
   g check # ==>";:INPUT CHECK$
WZ 387 TRAP 386:CHECK=VAL(CHECK$):TRAP 40
   000
AQ 389 RETURN
VD 390 RESTORE 1000
KX 395 READ DATE$
VM 400 IF DATE$(1,2)=FILE$(X+5,X+6) THEN
   MONTH$=DATE$(3,5):RETURN
SV 405 GOTO 395
NR 415 IF SW$="ON" THEN 450
MC 420 CLOSE #3
BU 425 ? "K":POSITION 7,10:? "Ready print
   er with checks,":POSITION 7,12:? "star
   ting with No. ";FILE$(X+1,X+4)
DX 430 POSITION 7,14:POKE 752,1:? "and pr
   ess START ."
DY 435 IF PEEK(53279)<>6 THEN 435
JB 440 TRAP 420:OPEN #3,8,0,"P:":SW$="ON"
   :? "K":POSITION 10,10:POKE 752,1:? "Pr
   inting....."
LX 442 REM MASTER RESET, DOUBLE STRIKE &
   ELITE MODE CODES FOR EPSON RX80
AI 445 PUT #3,27:PUT #3,64:PUT #3,27:PUT
   #3,71:PUT #3,27:PUT #3,77
YW 450 ? #3:? #3:? #3,,,,"  ";MONTH$;" ";
   FILE$(X+8,X+9);", 19";FILE$(X+11,X+12)
FJ 455 ? #3:? #3:? #3:"     ";M5G$;
ZV 460 AMOUNT$="********.00":AMOUNT$(12-L
   ENGTH,11)=STR$(AMT)
PZ 465 FOR Z=1 TO 48-LEN(M5G$):? #3;" ";:
   NEXT Z
```


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```
5X 470 ? #3;AMOUNT$
DV 475 ? #3:? #3:? #3;"      ";PAYEE$:? #
   3:? #3:? #3
DU 480 ? #3:? #3:? #3:? #3
AF 485 RETURN
VA 490 MSG$="":PAYEE$="":PAYEE$(1,LEN(FIL
   E$(X+13,X+33)))=FILE$(X+13,X+12+LEN(FI
   LE$(X+13,X+33)))
EB 493 AMOUNT=VAL(FILE$(X+34,X+40))
MC 495 AMT=AMOUNT
ZR 500 IF AMOUNT>999 THEN LENGTH=7:GOTO 5
   20
AJ 505 IF AMOUNT>99 THEN LENGTH=6:GOTO 59
   5
UE 510 IF AMOUNT>9 THEN LENGTH=5:GOTO 620
KL 515 LENGTH=4:GOTO 680
UV 520 IF INT(AMOUNT/100)-INT(AMOUNT/1000
   )*10=0 THEN LINENO=INT(AMOUNT/1000):GO
   TO 535
TA 525 IF INT(AMOUNT/100)>10 AND INT(AMOU
   NT/100)<20 THEN LINENO=INT(AMOUNT/100)
   :GOTO 555
YL 530 LINENO=INT(AMOUNT/1000)*10:GOTO 55
   5
LW 535 RESTORE LINENO+1000:READ WORD$
AZ 540 MSG$(1,LEN(WORD$))=WORD$(1,LEN(WOR
   D$))
KP 545 MSG$(LEN(MSG$)+1,LEN(MSG$)+10)=" T
   HOUSAND "
ZP 550 AMOUNT=AMOUNT-INT(AMOUNT/1000)*100
   0:GOTO 620
MA 555 RESTORE LINENO+1000:READ WORD$
BD 560 MSG$(1,LEN(WORD$))=WORD$(1,LEN(WOR
   D$))
SC 565 IF INT(AMOUNT/100)<20 THEN 590
NO 570 MSG$(LEN(MSG$)+1,LEN(MSG$)+1)=" "
AQ 575 LINENO=INT(AMOUNT/100)-INT(AMOUNT/
   1000)*10
LR 580 RESTORE LINENO+1000:READ WORD$
EY 585 MSG$(LEN(MSG$)+1,LEN(MSG$)+LEN(WOR
   D$))=WORD$(1,LEN(WORD$))
YC 590 AMOUNT=AMOUNT-INT(AMOUNT/1000)*100
   0:GOTO 610
GY 595 LINENO=INT(AMOUNT/100)
LC 600 RESTORE LINENO+1000:READ WORD$
BH 605 MSG$(1,LEN(WORD$))=WORD$(1,LEN(WOR
   D$))
FD 610 MSG$(LEN(MSG$)+1,LEN(MSG$)+9)=" HU
   NDRED "
SW 615 AMOUNT=AMOUNT-INT(AMOUNT/100)*100
MA 620 IF INT(AMOUNT)=0 THEN 705
BJ 625 IF INT(AMOUNT)<10 THEN 685
OY 630 IF INT(AMOUNT)>9 AND INT(AMOUNT)<2
   0 THEN LINENO=INT(AMOUNT):AMOUNT=AMOUN
   T-INT(AMOUNT/10)*10:GOTO 690
ZJ 635 LINENO=INT(AMOUNT/10)*10
LK 640 RESTORE LINENO+1000:READ WORD$
ER 645 MSG$(LEN(MSG$)+1,LEN(MSG$)+LEN(WOR
   D$))=WORD$(1,LEN(WORD$))
XB 650 IF INT(AMOUNT)-INT(AMOUNT/10)*10=0
    THEN 675
OA 655 MSG$(LEN(MSG$)+1,LEN(MSG$)+1)=" "
PA 675 AMOUNT=AMOUNT-INT(AMOUNT/10)*10
MM 680 IF INT(AMOUNT)=0 THEN 705
JA 685 LINENO=INT(AMOUNT)
LU 690 RESTORE LINENO+1000:READ WORD$
FB 695 MSG$(LEN(MSG$)+1,LEN(MSG$)+LEN(WOR
   D$))=WORD$(1,LEN(WORD$))
ZA 700 AMOUNT=AMOUNT-INT(AMOUNT)
NI 702 MSG$(LEN(MSG$)+1,LEN(MSG$)+1)=" "
NJ 705 MSG$(LEN(MSG$)+1,LEN(MSG$)+4)="AND
    "
SL 710 AMT$="0000"
GP 715 IF AMOUNT=0 THEN 735
IA 720 AMOUNT$=STR$(AMOUNT)
FO 725 IF LEN(AMOUNT$)=4 THEN AMT$=AMOUNT
   $(1,4):GOTO 735
GA 730 AMT$(1,3)=STR$(AMOUNT)
EP 735 MSG$(LEN(MSG$)+1,LEN(MSG$)+2)=AMT$
   (3,4)
TR 740 MSG$(LEN(MSG$)+1,LEN(MSG$)+4)="/10
   0"
PD 745 MSG$(LEN(MSG$)+1,LEN(MSG$)+8)=" DO
   LLARS"
ZN 750 RETURN
YM 1000 DATA 00'86,01JAN,02FEB,03MAR,04AP
   R,05MAY,06JUN,07JUL,08AUG,09SEP,10OCT,
   11NOV,12DEC
OP 1001 DATA ONE
AA 1002 DATA TWO
TS 1003 DATA THREE
LW 1004 DATA FOUR
CT 1005 DATA FIVE
YG 1006 DATA SIX
ZS 1007 DATA SEVEN
TJ 1008 DATA EIGHT
CT 1009 DATA NINE
RA 1010 DATA TEN
NR 1011 DATA ELEVEN
YD 1012 DATA TWELVE
QO 1013 DATA THIRTEEN
UA 1014 DATA FOURTEEN
GF 1015 DATA FIFTEEN
UW 1016 DATA SIXTEEN
TK 1017 DATA SEVENTEEN
FB 1018 DATA EIGHTEEN
KX 1019 DATA NINETEEN
KE 1020 DATA TWENTY
HO 1021 DATA THIRTY
LA 1022 DATA FOURTY
CC 1023 DATA FIFTY
QT 1024 DATA SIXTY
FN 1025 DATA SEVENTY
WB 1026 DATA EIGHTY
BX 1027 DATA NINETY
HN 1030 DATA THIRTY
KY 1040 DATA FOURTY
BZ 1050 DATA FIFTY
QP 1060 DATA SIXTY
FI 1070 DATA SEVENTY
VV 1080 DATA EIGHTY
BQ 1090 DATA NINETY
```


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Screens

by Joseph J. Wrobel
THE SOFT CELLAR
P.O. Box 16393
Rochester, NY 14616-0393
32K Disk $19.95

by Karl E. Wiegers

Windows is a major contender for the leading personal computing buzzword of the mid-1980s. Between the Macintosh's Finder, the Atari ST's GEM and similar operating environments on the IBM PC, it seems nearly all micros can do windows now. Nor have the Atari 8-bits been neglected, as evidenced by **M-Windows** in issue 48 of **ANALOG Computing**.

However, by far the most impressive display of windows I've seen on an 8-bit Atari comes from **Screens**. Beside providing all the windowing capabilities you could want, **Screens** lets you combine sizes and colors of text and graphics on-screen, in any graphics mode. Other features let you store, retrieve, scale and redisplay the contents of individual windows, and much more. All of these functions are accessed using straightforward XIO, NOTE and POINT commands from Atari BASIC. **Screens** is not for the beginning BASIC coder, but any moderately proficient programmer can quickly begin to use its diverse capabilities.

Screens comes on a single un-copy-protected disk and will run on any Atari 8-bit with at least 32K of RAM. Its excellent 40-page disk-sized manual contains an extensive tutorial, as well as a handy reference section that's organized alphabetically by function. Several pages of technical information—for the intensely curious or those wishing to use **Screens** from other languages—complete the manual. The disk includes several sample programs and an impressive demonstration of text and high-resolution, mode 8 windows.

Screens is supplied as a 33-sector AUTORUN.SYS machine language file, which plants itself in low RAM and remains resident during the session, immune to any presses of the RESET button. The presence of this routine costs you 3316 bytes of available RAM.

After loading **Screens** you have a new input/output device, called "W:" (for window, natch). Actually, you can use up to nine such devices at a time, "W1:" through "W9:". Like any other device ("K:", "S:", "D:", "P:", etc.), you tell "W:" what you want to do via the XIO command. You can open and close a "W:" device, print to it and read from it. Each window is just a subscreen ranging in size from 1-pixel square to the entire display screen. Several parameters independently define the characteristics of each window. I'll describe these parameters in a minute.

Each open (active) window requires one of the eight IOCBs available in the Atari OS, so not all nine "W:" devices can be open simultaneously. However, there is really no limit to the number of independent window displays you can have on-screen at once. Each window you open and use simply adds to whatever is already shown. You'll hardly ever want more than one or two windows open simultaneously for activity.

Fifteen parameters and functions can be used to tailor each window to your needs. You must first specify the desired graphics mode for the whole screen. **Screens** works with any standard Atari graphics mode, but you may have some difficulty using a custom display list. To set a parameter, execute an XIO call to indicate which of the eleven functions you want to perform, then use the POINT command to pass one or two parameters associated with that function. The NOTE command retrieves the values of the parameters.

Two important parameters for each window are the pixel coordinates for the upper left corner. Another pair of parameters specifies the width and height of the window in pixels. In the default case, the window occupies the whole display screen. You can also specify an offset within the window, where the next PRINT statement will take place (like POSITION). Windows can be framed and the entire window contents can be switched to reverse video using other XIO functions.

A very powerful option lets you specify the character cell size in any combination of width and height. Printed characters are scaled automatically to fit in the box size you request. You can also specify the base address for the character set to use, if you've loaded custom character sets into RAM. Other options let you select the cursor character to use in a particular window, and a color register for printing characters. All text can be displayed in normal or inverse, upper- and lowercase. Another option lets you lock a window so an attempt to write past the bottom of it won't cause the display to scroll upward.

Standard Atari characters are formed in an 8x8 grid. These start looking ragged when enlarged, as you can do so easily with **Screens**. The program comes with a 16x16 character set that looks much nicer than does a simple enlargement of the standard characters. An editor is also supplied for the 16x16 character set, which provides a nice illustration of how to use multiple windows in an applications program.

There are four character display modes: overwrite, AND, OR and exclusive-OR (XOR) logic. These affect what you see when text is printed in a window already containing something. XOR is perhaps the most interesting. Writing the same text string twice in XOR mode causes it to disappear, leaving anything originally present beneath that string unchanged. By combining these display modes with different colors of text and background, effective text displays can be produced.

Lest you think **Screens** is only good for text displays, remember that you can do all these things in *any* graphics mode. Hence, you can combine these sophisticated text displays with any graphics drawings, anywhere on the screen. This is a major departure from the usual vertical orientation of Atari screen displays. Using **Screens**, you have the freedom to show text with different character sets, sizes and colors anywhere on-screen, without needing display list interrupts.

One of the amazing features of **Screens** is the ability to save the contents of a particular window and redisplay this later in another window. The incredible part is that the second window need not be the same size or shape as the first, yet the image from the original will be scaled automatically to fit the second!

The manual also gives procedures for saving the contents of a window to disk, but I had some trouble getting this to work. Although **Screens** doesn't explicitly take advantage of the extra memory in the 130XE, using a RAMdisk to hold window images for later redisplay could be useful. The BASIC procedures for saving and retrieving window contents are described in the manual, but a little more detail and a complete sample program would be helpful.

A bit of nitpicking. . . If you need to get to DOS during a BASIC session, the MEM.SAV file is required to preserve the integrity of **Screens**. This is a nuisance, unless you're blessed with a 130XE and a RAMdisk. The very first thing I did with **Screens** was change the supplied DOS 2.0S to DOS 2.5 and add the RAMDISK.COM file, so that the MEM.SAV step became painless.

The sample programs could be improved with some comments, so we would know just what they were doing. I like to experiment with sample programs, and that's easier when they're documented. A better example for saving window contents to disk would also be helpful, although you can try to dig it out of the spectacular demo program on your own.

Screens is a fine product. It provides powerful display functions that let you easily create effective screen displays. The variably sized and colored text, and the ability to mix graphics and text in any graphics mode would be particularly valuable in educational programs. The multiple overlapping window capability could be coupled with an alternative input device (such as a mouse or touch tablet) to create a unique user interface for the 8-bits.

Screens can be used in commercial programs, but licensing arrangements must be made with the publisher. If you want to create terrific text and graphics displays in your own programs without having to learn a lot of complex programming tricks, **Screens** may be just what you need.

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New Technology Coloring Book

by Rita Aero and Howard Rheingold
SOFTWARE TOOLWORKS
9713 Santa Monica Blvd.
Beverly Hills, CA 90210
ST Disk $19.95

by Steve Panak

Toys have always been handed down from generation to generation. And, since the next generation will be the first not to know what a world without personal computers is like, it seems appropriate that some basic toys of the past be mated with the new technology. That is precisely what has happened in the **New Technology Coloring Book** (**NTCB** hereafter).

This coloring book, however, is unlike any we've seen before. Only through electronic media would one be able to choose from a palette of 512 colors, and adjust these colors once they're on the "paper." And only a computer could manage to teach while entertaining. **NTCB** is much more than a mere coloring book.

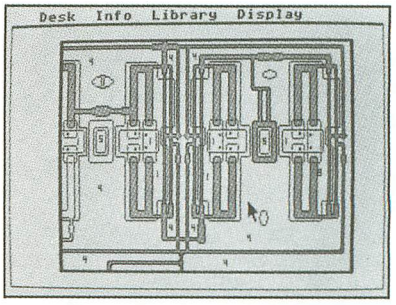
Each of the twenty-four images provided on the disk are electronic representations of various objects along the journey through the mysteries of the universe. Included are black holes, CAT scans, infrared sensing and the Voyager spacecraft. Each image is an accurate, although simplified, representation of the subject, ready to be colored according to the preplaced number scheme (basically, a color-by-numbers derivation), or any way the artist wishes.

From the central menu titled "Library," you choose an image to load. Using the mouse, you make your selection and then color areas of the image in flood fill fashion. One mouse selection allows you to color (or uncolor) the whole image immediately, according to the supplied color scheme. Unfortunately, there is no way to selectively remove unwanted colors, although the colors can be changed once they're in place. Finally, you can choose whether or not to display the colors' numbers in your picture.

But there is much more. Explanatory text accompanies each picture. This text explains what the image is, as well as why the various colors are being inserted and what they represent. For example, in the "Nuclear Reactor" image, the anatomy of a chain reaction is described, while the color key description notes the reactor's various structural components, such as the cooling water gap, control rods and fuel rods. These explanations can be accessed at any time, through the "Info" menu option. The menu also contains information that supplements the manual, including user instructions. Any of this text can be printed out to an attached printer. The pictures can also be printed with any Epson-compatible or—after you've installed the proper printer driver (a formidable task)—any other printer.

The program is nicely designed. All selections are made from GEM-based, pull-down menus. The various text files can be viewed at your leisure, either before, while or after a picture is painted. An especially nice feature is the desktop configuration after booting with the distribution disk—a small window opens up displaying only the NTCB.PRG file, and a simple click starts it. I do hate searching for the program file.

This versatile program also allows you to use pictures from other paint programs. An import/export facility will transfer your low-resolution images to and from **NEO-Chrome** and **DEGAS**. Although I was unable to fool **NTCB** into accepting images from other programs, such as **Paintworks**, images converted to **NEO-Chrome** or **DEGAS** format will work with this program. Also, by careful examination of and adherence to the program's file nomenclature system, and placement of files in the correct folders, you might be able to create text files for your new images with your favorite word processor. Unfortunately, I wasn't able to do so easily. I felt this to be a drawback. Another was the inability to add new images to those already in the library.



An old favorite moves to the new age.

There is a short manual which, together with the menu instructions, fully explains the operation of this complex program. If you're going to try importing and exporting images, be sure you read it. Otherwise, you'll probably be able to get along without it.

Overall, the **New Technology Coloring Book** is a nice computerized substitute for the old coloring book and crayons. It's a must-buy for youngsters wishing to color their way into the twenty-first century.

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THE #1 MAGAZINE FOR ATARI COMPUTER OWNERS
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Nite Lite

by Paul Swanson
NITE LITE SYSTEMS
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by Charles Bachand

Say, have you ever wanted to start up your own BBS system? I'm not suggesting anything fancy, with multiple phone lines and hard disk drives, that would cost you your firstborn child to finance. No, I'm talking bare bones hardware. All you'll need is an Atari 8-bit computer with at least one disk drive, a modem and a phone line. Oh, and yes, you will need some software to run your new toy. For that, I suggest the **Nite Lite** system written by Paul Swanson.

Some of you may remember Paul's name from way back in issue 16, when he presented an article on driving an Epson-compatible printer through the computer's joystick ports. Well, let me assure you he has *not* been sitting around watching old Star Trek movies. Paul has been very busy designing new hardware and software—some of which we hope to present in the near future. But, for now, let me tell you about **Nite Lite**.

Nite Lite is as much a programming language as it is a BBS program. It doesn't lock you into one-and-only-one configuration, but instead can be highly customized by the SYSOP. The board that Paul runs, where I first saw **Nite Lite**, had a large message base, eleven special-interest message areas, two on-line adventure games and a help section for the first-time **Nite Lite** user. There is an on-line survey, Xmodem upload and download sections, and even a "For Sale" area (where Paul pushes his products).

A **Nite Lite** BBS can be all of these things, or you can make it—as John Cleese is fond of saying—something completely different. You can customize **Nite Lite**, for a minimum system that will only handle messages, all the way up to a full-blown BBS that contains every bell and whistle you can think of. Many first-time SYSOPs, though, will want to start out with a minimum BBS, and add features to it as time goes by.

The 8-bit version of **Nite Lite** is available in several different modem configurations. You can use Atari 1030, 835 and XM301 direct connects, the MPP 1000C and E, any RS232 modem that connects through either an Atari 850 Interface Module or an ATR-8000 from Southwest Microcomputer.

The ST version will work with any RS232 auto-answer modem. Registered **Nite Lite** owners can obtain a software upgrade (a SYSOP wins the lottery and immediately runs out to buy a 1200-baud modem!) for only $15, direct from Paul.

The software disk itself is not copy protected, so, to reduce the risk of **Nite Lite** being bootlegged, it will accept outside phone calls only if it detects the electronic key device supplied to all registered owners. With some modems, this gizmo serves a second function: acting as a ring detector.

The 8-bit versions (for various modems) of **Nite Lite** are written in Atari BASIC, and you'll need the BASIC cartridge to run them. The ST version is written in OSS's Personal Pascal, and Paul has included the full Pascal source code on the program disk. The inclusion of the source code in all versions lets the owner "tweak" **Nite Lite** to his or her personal tastes. It is conceivable that you could add new file-transfer protocols (Kermit, Ymodem, etc.), or software that supports terminals with addressable cursors (VT-52, VT-100, etc.)

For the most part, SYSOPs tend to leave good code alone and, instead, concentrate on customizing their BBSs through the use of menus. Here is an area where **Nite Lite** shines. (I know it's a bad pun, but I can't help it!)

The manual needed to set these menus up is about 75 pages long and just jammed with information. Menus are, in fact, small text files which contain the menu text, plus valid key data and info on what commands to execute when a valid key is pressed. The entire BBS is run by these menus, and the SYSOP will spend a great deal of time setting them up.

Nite Lite is not a piece of software that can be put into operation within ten minutes. It's quite easy to imagine that a SYSOP will spend up to a week setting up menus, before he or she is satisfied with the results—a BBS people will call again and again.

Let me present an example of the menu system, so you'll see how easy it is to set up. Our menu example in Figure 1 will have selectable options to: (1) read a help file; (2) run a submenu to access a message base; (3) page the SYSOP for a chat; and (4) log the user off the system.

Sample Menu

```
<H>elp files
<M>essage base
<P>age the SYSOP
<Q>uit (log off)
HMPQ or RETURN?
```

Figure 1.

MOVING?

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When the system's user types one of the letters *H, M, P* or *Q*, or hits the RETURN key, something will happen. All but the five keys mentioned above and their derivatives—lowercase *h, m, p* or *q*, and the corresponding control characters—are locked out. The file containing this sample menu is simple, as shown in Figure 2.

Sample Menu

```
<H>elp files
<M>essage base
<P>age the SYSOP
<Q>uit (log off)
  END
  HMPQ
  J9D:HELP.TXT
  D2:MBASE
  J1
  J3
```

Figure 2.

The first lines of a menu file contain the text the user will see, followed by the word *END* and a blank line. The next line contains a list of characters that our sample menu will recognize. In our example, the letters are *H, M, P* and *Q*. **Nite Lite** will check this list against what the user types in at the keyboard and take the necessary action, as determined by the **Nite Lite** commands in the remainder of the menu file. If the user typed the letter *P* to page the SYSOP, **Nite Lite** would see that *P* is the third letter in our list, and execute the third line in the command list, the line containing the J1 command which handles paging of the SYSOP.

The manual explains the over forty **Nite Lite** commands that can be incorporated in user-written menus. These begin with a letter in the range of *J* to *M*, followed by a single-digit number and, optionally, a file specifier if the command needs one. For example, the command to print our demo help text from a file called D:HELP.TXT is shown in our example as J9D:HELP.TXT. If only a filename is specified, without being prefaced with a valid **Nite Lite** command—as in the second command line example D2:MBASE—the software will load and process this file as a submenu. This allows you to incorporate a treelike structure into the menu system.

The experienced BBS user will love the "hot keying" facility built into the menu system. If a particularly long menu is being output to the terminal and the user already knows what letter is going to be hit, he or she can do so immediately. The listing will stop printing where it is, and the command typed will be executed.

This feature is especially helpful on the slower 300-baud systems, where some menus can take almost forever to list.

Both the 8-bit and ST versions of **Nite Lite** keep track of who was on and what they did while on. This information can be very helpful in tracking down user problems, because it lets you see every command that the interpreter part of the BBS executed. This "DAYFILE" provides an excellent record of user activity.

Due to the slower execution speed of Atari 8-bit BASIC, the following feature is only available on the ST version of **Nite Lite**—but I'm going to tell you about it, anyway.

There is a file called WORDS on the ST disk, that contains word pairs. It can be used to point out common spelling mistakes to the user. If he or she has typed in a word in the WORDS file, like the word *ALOT*, it will print out the phrase *ALOT should be A LOT* on the screen—and not allow the message to be saved until the text is corrected. But this isn't its only application . . .

The WORDS file can also contain a list of "vulgar" words, with their correct spelling being the word *DELETED*. Then, if anyone tries to leave a message with four-letter-type words, it will pop up with the phrase—and this has been edited for the kids out there—*#$%&! should be DELETED*. The user cannot save his message until all the items in the WORDS file have been edited out. With this feature in operation, you shouldn't have to worry about the neighborhood PTA coming after you with a noose!

As an added service to his customers, Paul Swanson has a private "Owners Only" BBS running. This allows him to answer questions about the **Nite Lite** system—and to help those encountering problems in setting up their BBSs. It also gives the people who run **Nite Lite** BBSs a place to go, to exchange ideas or just to chat. Paul also runs a public board for those who want to see "what all the noise is about." You can log into this system by dialing (617) 663-4221.

Throughout this review, I've mentioned Paul Swanson's name several times—while not once mentioning his company, Nite Lite Systems. (All right, that's once!) This is because, when I think of **Nite Lite**, I don't think of a large company where one programmer doesn't know what the other programmers are doing. Instead, I think of Paul Swanson working out of his basement workshop, cranking out code, designing new hardware, and producing excellent products for the Atari user interested in telecommunications. Buy **Nite Lite**, he knows what he's doing!

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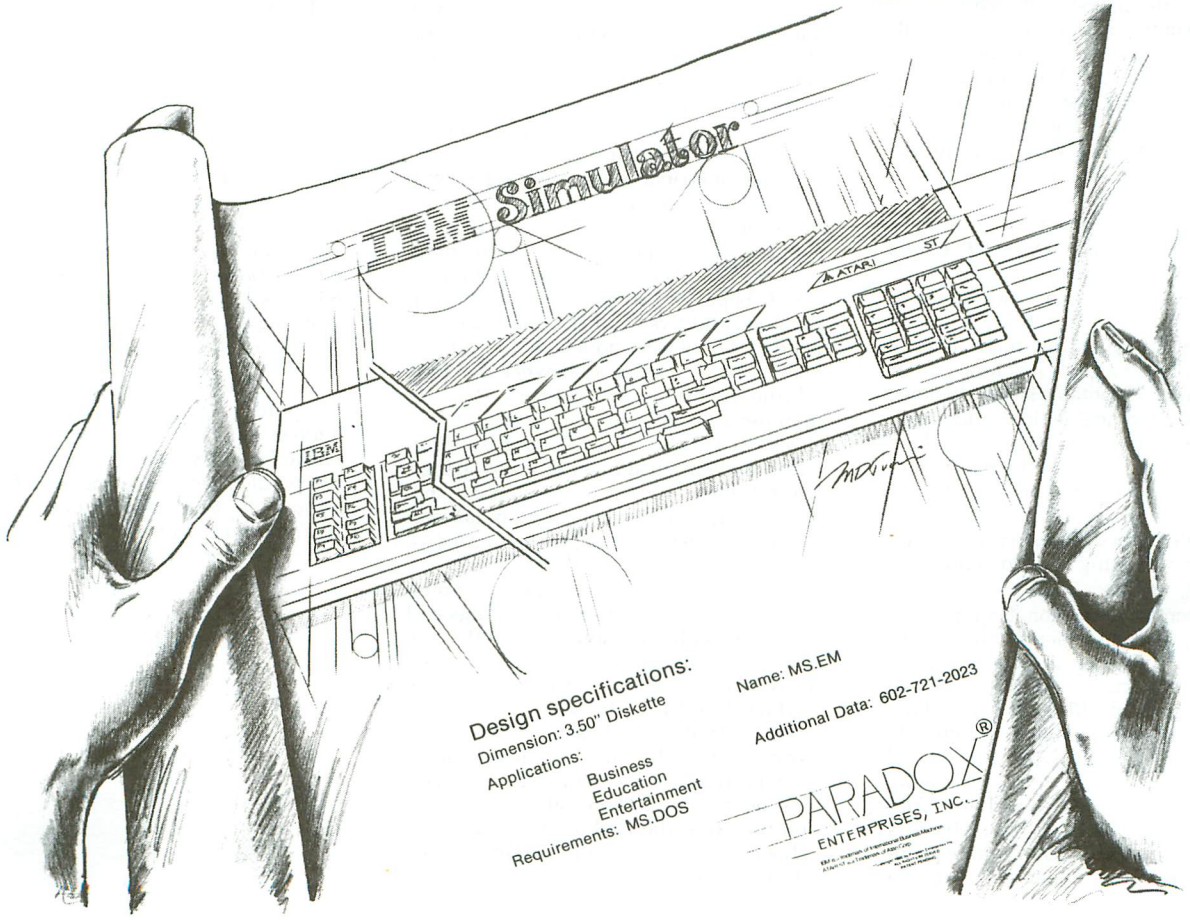

The Atari ST User's Guide

by John Heilborn
OSBORNE McGRAW-HILL
2600 Tenth Street
Berkeley, CA 94710
$15.95

by Nitin Badjatia

Logo and the Atari ST. . .Some people think this is *not* the perfect combo. After all, they say, the 520ST and 1040ST represent some of the most advanced computing equipment available on the market today, and Atari is bundling a kiddy language with them? If that's what you think of Logo, think again. The Logo provided with the ST series is a very powerful dialect of LISP, the artificial intelligence language.

So what does this have to do with John Heilborn's book? ***The Atari ST User's Guide*** (***ASUG***, from here on) is an excellent resource for anyone who wants to learn, brush up on or teach Logo on the ST. The book is organized much like its predecessor for the 8-bit machines, *Your Atari Computer*. It contains seven chapters, three handy reference sections and an excellent index. The seven chapters include subjects like setting up the ST, an introduction to the Logo language, advanced Logo uses, using the mouse and keyboard, and Logo graphics. Let's begin with the first two chapters, "Getting Started" and "The Desktop."

Often when a new personal computer is introduced, the documentation accompanying it is deficient in one way or another. This was true of the Atari ST. The first two chapters of ***ASUG*** fill many of the gaps. Chapter one explains graphically what equipment comes with the ST, and how it is set up. It continues by showing how the mouse should be used and briefly describing the function of all the ST's ports and special keys. One minor problem: the book was apparently written when TOS and GEM were still disk loaded, but the discrepancies can easily be overlooked, as they don't make too much of a difference. The desktop is introduced in the second chapter, which begins with a basic explanation of what a window is and what it does. Details are given on changing the desktop to suit your own needs.

For many years, the Logo language has been used in introducing young children to computers and helping them to understand geometrical shapes. Its simple commands and ease of use make it ideal for these purposes. But the version of Logo supplied with the ST has many more sophisticated features. Chapter three of ***ASUG*** begins by advising you to back up the Logo and System disks (the latter isn't needed on newer models with TOS in ROM). Next, Logo's somewhat complex editing functions are covered. The remainder of chapter three is devoted to basics such as Logo's reserved words, primitives, mathematical functions and strings. Everything is clearly presented so that even the inexperienced programmer can progress to the next chapter with relative ease.

Chapter four, "Advanced Logo Programming," begins with the use of strings and continues with input, output—all the way to a sample program. Next comes a relatively short chapter, "Programming the Keyboard and the Mouse."

The author describes how the mouse works (it's really just an upside-down track-ball) and shows how ST Logo handles mouse input. There's also a small section on using the keyboard for input.

Logo really shines in its graphics capabilities. ***ASUG***'s second-to-last chapter shows how to use the incredible graphics capabilities of both the Logo language and the Atari ST. It demonstrates how to use the turtle to create lines, circles and just about anything else you want.

The final chapter is probably one of the most important of all. Here, a brief description of each Logo primitive is given. Concluding the book are three reference sections, one on ASCII characters, another on Logo editing commands, and the third on interpreting errors.

The Atari ST User's Guide is a book that no ST user should be without. One rather minor complaint I do have is that I feel the author and the publishers should have included BASIC, since it is provided in the ST package. But perhaps McGraw-Hill is working on a book of this quality for BASIC also (hint, hint).

Nitin Badjatia has been interested in computers for six years, has owned a 1200XL for five years and recently purchased a 520ST. He plans to become an electrical or aerospace engineer. Fairly advanced in 8-bit BASIC and Logo, he's learning Pascal on the ST.

Blazing Paddles

by Joe Hellesen
BAUDVILLE
1001 Medical Park Drive SE
Grand Rapids, MI 49506
(616) 957-3036
48K Disk $34.95

by Clayton Walnum

The Atari 8-bit computer has now been around a long while, and over the course of its lifetime, many art programs have been released in an attempt to capture our imaginations—as well as our dollars. The minor leaguers have long since vanished (with some exceptions), leaving behind three products considered to be the Big Three: **MicroIllustrator, MicroPainter** and **Fun with Art**.

Any graphics program released these days must contend with an already biased audience; even a person in the market for his first art program is likely to be acquainted with the above familiar alternatives. And, unlike the cliche, familiarity doesn't always breed contempt, but rather offers the software user a safe choice, the security of knowing exactly what he's getting for his money.

Any art program that expects to survive the competition has to offer something the user can't get elsewhere, has to be a product exciting enough to tease hard-earned bucks from the wallets of fussy and knowledgeable consumers. **Blazing Paddles (BP)** may or may not be that product, depending on how you plan to put it to use.

One of **BP**'s claims to fame is its ability to accept many input devices, specifically: a joystick, a graphics tablet, paddles or a light pen. Sounds impressive, but you'll soon find that **BP** was designed with only one device in mind: the graphics tablet.

Paddles are useless. Imagine, if you will, driving a car with two steering wheels—one for left turns and one for right—and you'll get some idea of what it's like to manipulate **BP** with paddles. Rather than right or left turns, your "steering wheels" split up the tasks of horizontal and vertical movement, transforming the act of drawing into a feat so frustrating that only an individual who likes to spend Friday nights inserting bamboo shoots under his fingernails could possibly endure it.

The joystick works fairly well when drawing, but is hopelessly slow for use with the menu—a menu designed for a graphics tablet's rapid cursor control. To clear the screen, for instance, you must first move the cursor to the "clear" icon in the upper left of the screen (and the joystick handler does not allow for faster movement over long distances; you have to crawl every step of the way) and press the trigger. Then you must verify your choice, which means a hike back to the center of the screen where the "perform clear" box is displayed. Many of the other menu selections work the same way. Selecting colors, especially, requires an inordinate amount of patience.

Got a light pen? Since a light pen doesn't respond to dark colors (and usually ignores reds, too), it's only useful for simplistic drawing on a light background (you can't draw on the default black background, as you're used to). Because of the way **BP** handles the selection of your colors (from an on-screen menu, not unlike **MicroIllustrator**), half the palette is unavailable, since the pen won't respond to some of the color menu entries.

Obviously, if you're going to get the most out of **BP**, you'd better own a graphics tablet. And, if you *do* own a graphics tablet, it had better be a **KoalaPad**: no provision is made for the Atari **Touch Tablet**'s reverse vertical movement.

On the up side, **BP** offers all the functions you've grown used to in a graphics program, including automatic ovals and boxes (both the hollow and solid varieties), lines, K-lines (connected lines), fill, magnify, dots (lighting 1 pixel at a time), airbrush, sketch, plus the ability to save and load pictures.

A couple of extra features are the ability to type directly on a picture in various text sizes and fonts, and the supplied shape libraries that allow you to place ready-to-use objects on the screen. Three shape files are included on the **BP** disk (music symbols, buildings and miscellaneous), and others may be purchased from Baudville on a single disk for $20.00. This optional disk also includes ten extra fonts for the program's text feature. The **BP** program disk includes three fonts: standard, bold and italic.

Using **BP**'s window feature, you may select a portion of the screen for cutting and pasting. The cut segment may be saved to disk for use at a later date, which makes it possible to easily move picture segments from drawing to drawing.

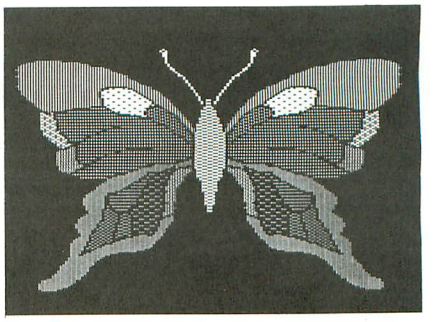

Figure 1.

Another extra many people will appreci-

ate is the ability to print a hard copy of the picture from within the program. Printers supported include Epson, Gemini, Panasonic and Okimate. Figure 1 is a sample printout printed on a QMS Kiss laser printer set to the Epson mode.

Since the graphics 7+ mode allows only four colors on-screen, you need to employ some tricks if you want variety. One of the tricks computer artists use is the blending of two colors to create an otherwise unavailable hue. For instance, a pattern made up of blue and red lines will look purple to the viewer. In order to facilitate this color blending, **BP** has a color mix option that allows you to blend any two colors in a variety of patterns.

BP's manual is complete and reasonably well written, but, as is frequently the case these days, is specifically for the Commodore version. In fact, all of the screen shots in the manual are from a Commodore and barely resemble their Atari counterparts. A manual insert stating the differences between the two versions is included in the package, and—if you can get past the insult this addendum represents—maybe you won't mind flipping back and forth between the manual and the insert, trying to figure out just what you can and can't do.

Sigh. At least they've released an Atari version, something of a rarity. And, as a sort of apology, the Atari version of **BP** includes some functions not available on the Commodore: scroll (which allows you to move the entire picture vertically or horizontally) and mirror (which lets you mark a block, then mirror it in any of four directions).

There are a couple of minor irritations that require mentioning. First, the program loads the appropriate device driver (joystick, graphics tablet, etc.) from disk, and the only way to switch to a different device is to reboot the program. Also, when selecting a drawing function from the menu, the program sometimes likes to tease you, by flipping to the picture (as it should) then jumping back to the menu before you get a chance to modify so much as a single pixel. Though **BP** has an airbrush function, it's barely usable. Rather than coloring random pixels, the airbrush function just repeats the same pattern (actually, there are two patterns, but since the second one is the inverse of the first, it doesn't really count).

The most serious lack, however, is the inability to access functions from the keyboard—the main reason for the difficulty in using the program with a joystick. Something as simple as changing colors requires the long process of returning to the main menu, choosing the color option, modifying the color menu when it comes up, *then* going back to the menu to reselect a drawing function. With the indolent joystick cursor, this can be agony.

In summary, for use with a **KoalaPad**, **Blazing Paddles** is a good value. If you plan on using a joystick, you may want to think twice. Paddles or light pen? Forget it.

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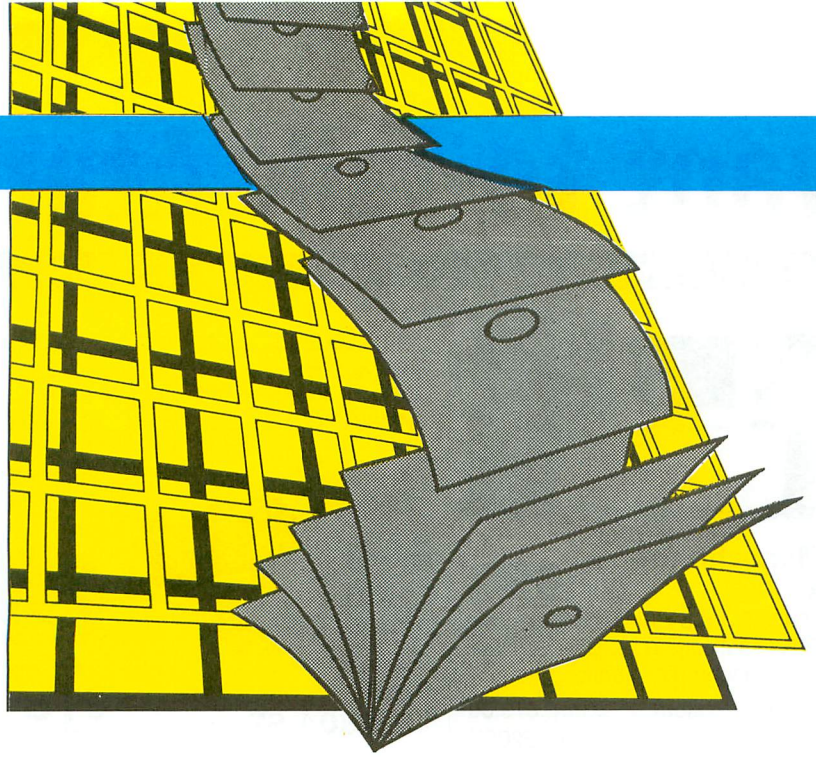

Multicopy

A joystick- or keyboard-controlled multiple file-copying utility for all Atari computers.

by Charles F. Johnson

I've always found copying files from one disk to another a tedious task, especially with only one disk drive. Even with two drives, the operation usually requires typing each filename to copy and waiting while the operation is performed, so you can get on to the next file. Out of my frustration came this program.

Multicopy allows you to see all sixty-four possible filenames on a disk, mark them for copying with either keyboard or joystick, then copy them automatically. Up to four drives are supported, in any combination of densities, but single-drive users will especially appreciate the program. Disk swapping is kept to a minimum, because **Multicopy** reads in as many files as memory allows before writing to the destination disk. An entire disk's worth of files can be copied this way in only three passes.

Multicopy will also let you see the directory of any drive (1 through 4), change the screen colors, or exit the program to DOS. This program can almost make copying files fun!

Using *Multicopy*.

Listing 1 is the BASIC data used to create your copy of **Multicopy**. Please refer to the **M/L Editor** on page 11 for typing instructions.

Multicopy can be used as an autorun file, or loaded from DOS with the binary load command. Remove any cartridges; owners of XL/XE computers should disable their built-in BASIC by holding the OPTION key down as they boot up with **Multicopy**. If you don't do this, **Multicopy** will still work fine, but you'll have 8K less memory for copying, and SYSTEM RESET will exit the program to BASIC.

When you first load **Multicopy**, you'll see a title screen. That number beneath my name is my CompuServe ID number, in case you wish to get in touch with me. Delphi users may reach me through the user name CFJ. Press START (or any other key, for that matter), and you'll see the "option screen."

The option screen.

Multicopy is protected against SYSTEM RESET; pressing RESET will always return you to the option screen. Here you can set source and destination drives for copying, look at the directory for drives 1 through 4, change the screen colors, and exit to DOS. The top line of the screen shows the source and destination drives, and also displays most prompt messages. Press RETURN or the joystick button when you've set up everything the way you want it, and you'll enter the "selection screen."

The selection screen.

Multicopy will read the directory of the source disk and list all the files on-screen in two columns. If the disk contains more than forty-eight files, another screen will show the remainder. When you enter the selection screen, you will see a pointer on the first filename at the upper left. This pointer can be moved through the filenames with either the arrow keys (without CTRL) or the joystick. To select a file for copying, press RETURN or the joystick button, and the name the pointer is on will be marked (in inverse video). If there are more than forty-eight files on the disk, press the SPACE BAR to page-flip between the two filename screens. If you decide to start over at this point, press ESC, and the program will return to the option screen. When you've marked everything you want to copy and you're ready to go, press START.

No-hands copying.

The program will now read in as many files as possible from the source disk. If using more than one drive, everything proceeds automatically. If the source and destina-

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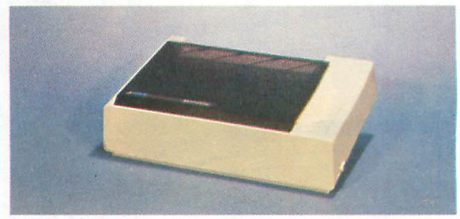

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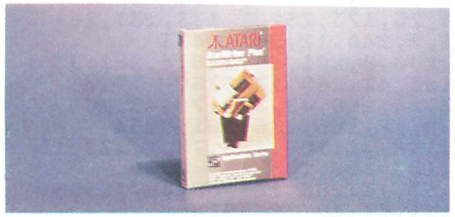

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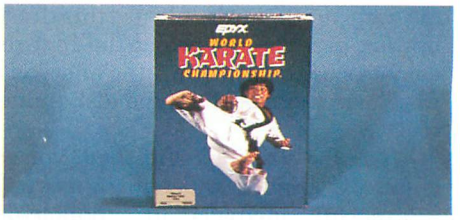

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tion are the same, **Multicopy** will prompt you when it's time to swap disks. As the files are copied, **Multicopy** will show the name of each file and whether it is being read or written. If you want to abort the copy operation once it has started, you can press SYSTEM RESET. But I would recommend that you only use this drastic step if the copy has not progressed beyond the first read pass. If **Multicopy** has begun to write a file and you press RESET, you may leave a file open on the disk (undesirable for several reasons).

When the copying is finished, you may rerun the program; the options will remain as you set them.

I recently upgraded to a double-density drive after amassing hundreds of disks in single density; **Multicopy** made the task of converting most of my files to double density a relatively painless one. However, depending on the DOS you're using, this may not work with just one drive.

Multicopy was written in assembly language using the OSS MAC/65 assembler. It is compatible with any Atari computer and should be compatible—since it uses only standard CIO calls—with just about any DOS.

Note that **Multicopy** does not do much error checking; it's up to you to ensure the integrity of the files you're copying. The "directory" options are there partly to help you gauge how much room is remaining on a disk you're copying to. Make sure you don't try to write too much data to a disk!

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*Charles F. Johnson is a musician by trade, drawn into Atari computers by **Star Raiders** about five years ago. When he got a BASIC cartridge, he was seriously hooked. He currently lives in Los Angeles with his wife and the most intelligent cat in the world.*

Listing 1.

```
1000 DATA 255,255,198,37,65,49,32,255,
255,169,210,133,10,169,37,133,8460
1010 DATA 11,96,169,0,162,63,157,2,53,
202,16,250,141,68,2,133,4639
1020 DATA 142,133,143,169,1,141,240,2,
133,9,32,117,43,32,189,43,2653
1030 DATA 32,214,43,169,14,133,85,169,
2,133,84,169,1,141,73,3,2540
1040 DATA 169,1,162,222,160,47,32,170,
43,142,73,3,169,255,141,252,9811
1050 DATA 2,173,132,2,208,3,76,207,38,
173,252,2,201,255,240,241,3555
1060 DATA 201,12,208,3,76,207,38,162,3
,221,46,49,208,5,189,50,4845
1070 DATA 49,208,5,202,16,243,48,8,32,
13,44,32,189,43,208,204,5025
1080 DATA 201,62,208,41,230,128,165,12
8,201,4,208,2,169,0,133,128,6691
1090 DATA 24,105,145,141,116,46,141,15
6,46,141,196,46,141,243,46,141,8127
1100 DATA 10,47,141,130,47,56,233,128,
141,184,47,208,95,201,58,208,9742
1110 DATA 40,230,129,165,129,201,4,208
,2,169,0,133,129,24,105,145,5412
1120 DATA 141,121,46,141,161,46,141,20
1,46,141,15,47,105,64,141,135,4970
1130 DATA 47,56,233,192,141,204,47,208
,51,201,156,208,18,169,255,141,2040
1140 DATA 252,2,162,3,189,62,49,149,10
,202,16,248,108,10,0,162,4144
1150 DATA 3,221,53,49,240,5,202,208,24
8,240,17,224,3,208,1,232,443
1160 DATA 254,196,2,254,196,2,254,57,4
9,254,57,49,76,12,38,173,4744
1170 DATA 132,2,240,251,173,15,210,201
,251,240,244,169,255,141,252,2,5535
1180 DATA 165,128,24,105,49,141,71,53,
169,0,133,136,133,135,32,117,4692
1190 DATA 43,169,2,133,85,169,0,133,84
,165,128,197,129,208,13,169,8278
1200 DATA 223,141,56,46,169,46,141,57,
46,32,236,44,169,66,133,152,6027
1210 DATA 169,49,133,153,32,236,43,162
,16,169,5,157,66,3,169,88,4277
1220 DATA 157,68,3,169,53,157,69,3,169
,17,157,72,3,32,86,228,3619
1230 DATA 160,2,185,88,53,217,75,53,20
8,7,200,192,13,208,243,240,1829
1240 DATA 214,162,15,189,88,53,201,83,
208,3,76,202,39,230,136,166,8993
1250 DATA 135,246,142,160,10,185,90,53
,145,152,136,16,248,24,165,152,8137
1260 DATA 105,11,133,152,144,2,230,153
,165,136,201,24,208,22,169,15,7091
1270 DATA 162,90,160,53,32,170,43,169,
23,133,82,133,85,169,0,133,4771
1280 DATA 84,76,23,39,201,48,208,38,16
9,15,162,90,160,53,32,170,5349
1290 DATA 43,230,135,169,192,133,88,14
1,60,46,169,67,133,89,141,61,6105
1300 DATA 46,169,2,133,82,133,85,169,0
,133,84,76,23,39,162,0,1818
1310 DATA 169,9,141,66,3,169,90,141,68
,3,169,53,141,69,3,169,3656
1320 DATA 15,141,72,3,32,86,228,76,23,
39,162,16,169,12,157,66,3072
1330 DATA 3,32,86,228,169,2,133,82,165
,136,201,49,144,6,169,7,5258
1340 DATA 162,47,208,4,169,143,162,46,
141,56,46,142,57,46,169,0,3400
1350 DATA 141,60,46,133,88,169,64,141,
61,46,133,89,169,0,133,135,5203
1360 DATA 133,137,162,0,134,84,232,134
,85,169,13,162,27,160,49,32,4503
1370 DATA 170,43,169,255,141,252,2,173
,132,2,240,7,173,252,2,201,9723
1380 DATA 12,208,18,173,132,2,240,251,
173,15,210,201,251,240,244,32,4138
1390 DATA 15,45,24,144,221,173,31,208,
201,6,208,3,76,43,41,173,5333
1400 DATA 252,2,201,28,208,3,76,210,37
,173,120,2,133,138,201,15,5964
1410 DATA 208,25,173,252,2,133,139,201
,6,240,16,201,7,240,12,201,8473
1420 DATA 14,240,8,201,15,240,4,201,33
,208,172,32,143,43,169,13,5750
1430 DATA 162,14,160,49,32,170,43,165,
139,201,33,208,37,165,136,201,9264
1440 DATA 49,144,31,165,135,73,1,133,1
35,169,0,133,137,166,135,189,8369
1450 DATA 66,53,133,88,141,60,46,189,6
8,53,133,89,141,61,46,76,3538
1460 DATA 2,40,165,138,201,13,240,6,16
5,139,201,15,208,2,230,137,9040
1470 DATA 165,138,201,14,240,6,165,139
,201,14,208,2,198,137,165,138,9509
1480 DATA 201,7,240,6,165,139,201,7,20
8,17,165,137,201,24,176,11,6827
1490 DATA 24,105,24,166,135,213,142,17
6,2,133,137,165,138,201,11,240,263
1500 DATA 6,165,139,201,6,208,15,165,1
37,201,24,144,9,56,233,24,5775
1510 DATA 201,0,144,2,133,137,166,135,
165,137,16,7,181,142,56,233,7904
1520 DATA 1,133,137,165,137,213,142,14
4,4,169,0,133,137,32,143,43,5351
1530 DATA 169,13,162,27,160,49,32,170,
43,165,138,201,15,240,9,169,7358
1540 DATA 5,24,101,20,197,20,208,252,7
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6,18,40,173,31,208,201,6,6359
1550 DATA 240,249,32,157,45,165,132,20
8,3,76,64,43,169,88,141,48,5134
1560 DATA 2,141,2,212,169,46,141,49,2,
141,3,212,162,4,189,196,7336
1570 DATA 2,157,57,49,189,41,49,157,19
6,2,157,22,208,202,16,238,8398
1580 DATA 169,0,133,130,133,131,133,13
3,133,134,133,144,165,106,56,233,39
1590 DATA 1,133,145,169,168,133,146,16
9,53,133,147,165,128,197,129,208,2069
1600 DATA 3,32,209,44,169,127,141,93,4
6,169,47,141,94,46,162,6,4513
1610 DATA 189,223,48,157,138,47,202,16
,247,169,214,141,199,2,141,25,8620
1620 DATA 208,169,13,141,198,2,141,24,
208,166,130,165,146,157,130,52,8770
1630 DATA 165,147,157,194,52,56,165,14
4,229,146,133,148,165,145,229,147,2961
1640 DATA 133,149,208,3,76,113,42,165,
133,240,17,162,14,189,138,53,6853
1650 DATA 56,233,32,157,147,47,202,16,
244,76,2,42,32,177,44,166,5147
1660 DATA 130,32,182,45,165,128,32,188
,44,162,16,169,3,157,66,3,3396
1670 DATA 169,106,157,68,3,169,53,157,
69,3,169,4,157,74,3,32,1642
1680 DATA 86,228,162,16,169,7,157,66,3
,165,146,157,68,3,165,147,6206
1690 DATA 157,69,3,165,148,157,72,3,16
5,149,157,73,3,32,86,228,5867
1700 DATA 164,130,189,72,3,153,2,52,18
9,73,3,153,66,52,189,67,4135
1710 DATA 3,201,136,240,18,169,1,133,1
33,160,14,185,106,53,153,138,7452
1720 DATA 53,136,16,247,76,113,42,162,
16,169,12,157,66,3,32,86,2335
1730 DATA 228,169,0,133,133,166,130,24
,165,146,125,2,52,133,146,165,7303
1740 DATA 147,125,66,52,133,147,230,13
0,165,130,197,132,176,3,76,169,9450
1750 DATA 41,165,128,197,129,208,3,32,
215,44,169,127,141,93,46,169,7750
1760 DATA 47,141,94,46,162,6,189,230,4
8,157,138,47,202,16,247,169,9907
1770 DATA 214,141,198,2,141,24,208,169
,13,141,199,2,141,25,208,165,8208
1780 DATA 134,240,17,162,14,189,153,53
,56,233,32,157,147,47,202,16,6717
1790 DATA 244,76,222,42,32,177,44,166,
131,32,182,45,165,129,32,188,7358
1800 DATA 44,162,32,169,3,157,66,3,169
,106,157,68,3,169,53,157,5219
1810 DATA 69,3,169,8,157,74,3,32,86,22
8,169,1,133,134,162,32,5402
1820 DATA 169,11,157,66,3,164,131,185,
130,52,157,68,3,185,194,52,6746
1830 DATA 157,69,3,185,2,52,157,72,3,1
85,66,52,157,73,3,32,1718
1840 DATA 86,228,165,131,197,130,208,1
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1850 DATA 53,153,153,53,136,16,247,76,
115,41,162,32,169,12,157,66,5380
1860 DATA 3,32,86,228,169,0,133,134,23
0,131,165,131,197,130,144,4,9317
1870 DATA 165,133,240,3,76,180,42,165,
131,197,132,176,3,76,115,41,6304
1880 DATA 32,117,43,169,0,141,60,46,13
3,88,169,64,141,61,46,133,4794
1890 DATA 89,169,183,141,56,46,169,46,
141,57,46,32,214,43,169,3,4233
1900 DATA 133,85,169,8,133,84,169,33,1
62,237,160,48,32,170,43,32,5475
1910 DATA 236,44,76,210,37,169,0,133,1
52,169,64,133,153,162,8,160,7860
1920 DATA 0,152,145,152,200,208,251,23
0,153,202,208,246,133,93,96,162,4812
1930 DATA 1,165,137,201,24,144,5,24,13
8,105,21,170,134,85,165,137,6849
1940 DATA 201,24,144,3,56,233,24,133,8
4,96,141,72,3,142,68,3,2769
1950 DATA 140,69,3,169,11,141,66,3,162
,0,76,86,228,169,103,141,6757
1960 DATA 56,46,169,46,141,57,46,169,0
,133,88,141,60,46,169,64,4493
1970 DATA 133,89,141,61,46,96,162,4,18
9,57,49,157,196,2,202,16,5476
1980 DATA 247,169,52,141,48,2,169,46,1
41,49,2,96,162,16,169,12,3078
1990 DATA 157,66,3,32,86,228,169,3,157
,66,3,169,70,157,68,3,3731
2000 DATA 169,53,157,69,3,169,6,157,74
,3,76,86,228,141,71,53,4764
2010 DATA 24,105,96,141,61,47,141,101,
47,165,150,133,88,141,60,46,5551
2020 DATA 165,151,133,89,141,61,46,169
,47,141,56,46,169,47,141,57,4870
2030 DATA 46,169,1,162,40,160,49,32,17
0,43,32,236,43,162,16,169,5739
2040 DATA 5,157,66,3,169,9,141,66,3,16
9,88,157,68,3,141,68,3681
2050 DATA 3,169,53,157,69,3,141,69,3,1
69,18,157,72,3,141,72,3124
2060 DATA 3,169,0,133,84,173,15,210,20
1,251,240,5,173,132,2,208,650
2070 DATA 3,32,164,44,162,16,32,86,228
,48,11,169,9,133,85,162,5150
2080 DATA 0,32,86,228,16,223,169,12,15
7,66,3,32,86,228,169,87,6738
2090 DATA 141,56,46,169,47,141,57,46,1
73,15,210,201,255,208,5,173,504
2100 DATA 132,2,208,244,173,15,210,201
,251,240,249,173,132,2,240,244,6591
2110 DATA 96,162,11,169,32,157,109,53,
202,16,250,96,24,105,49,141,6181
2120 DATA 107,53,162,14,189,106,53,56,
233,32,157,147,47,202,16,244,8766
2130 DATA 96,169,167,162,47,208,4,169,
187,162,47,141,93,46,142,94,7575
2140 DATA 46,162,14,189,207,47,157,147
,47,202,16,247,169,255,141,252,4397
2150 DATA 2,173,132,2,240,7,173,252,2,
201,12,208,244,173,132,2,9633
2160 DATA 240,251,173,15,210,201,251,2
40,244,169,255,141,252,2,96,165,5181
2170 DATA 137,201,24,144,2,233,24,133,
140,169,40,133,141,169,0,133,7310
2180 DATA 153,160,8,10,38,153,6,141,14
4,7,24,101,140,144,2,230,5383
2190 DATA 153,136,208,239,24,105,2,144
,2,230,153,133,152,165,137,201,1265
2200 DATA 24,144,11,24,165,152,105,21,
133,152,144,2,230,153,24,166,7754
2210 DATA 135,165,152,125,66,53,133,15
2,165,153,125,68,53,133,153,160,9038
2220 DATA 10,177,152,73,128,145,152,13
6,16,247,165,135,240,2,169,48,9494
2230 DATA 24,101,137,170,189,2,53,73,1
,157,2,53,169,120,133,140,5808
2240 DATA 169,168,141,1,210,165,140,14
1,0,210,56,233,20,133,140,48,7822
2250 DATA 11,169,1,24,101,20,197,20,20
8,252,240,233,96,162,0,134,350
2260 DATA 132,138,168,185,2,53,240,8,1
64,132,230,132,138,153,2,53,7708
2270 DATA 232,224,64,208,236,96,169,0,
133,140,189,2,53,24,10,38,3396
2280 DATA 140,10,38,140,24,125,2,53,14
4,2,230,140,24,10,38,140,3210
2290 DATA 24,125,2,53,144,2,230,140,24
,105,66,133,154,165,140,105,7924
2300 DATA 49,133,155,160,10,177,154,15
3,122,53,136,16,248,162,0,134,8086
2310 DATA 140,138,168,185,122,53,201,3
2,240,12,164,140,153,109,53,230,315
2320 DATA 140,232,224,8,208,235,164,14
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0,169,46,153,109,53,230,140,162,1919
2330 DATA 8,138,168,185,122,53,201,32,
240,12,164,140,153,109,53,230,203
2340 DATA 140,232,224,11,208,235,224,8
,208,9,198,140,164,140,169,32,701
2350 DATA 153,109,53,96,112,112,32,66,
103,46,16,66,0,64,2,2,8561
2360 DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,
2,2,2632
2370 DATA 2,2,2,2,2,65,52,46,112,112,1
12,112,71,127,47,112,3424
2380 DATA 48,71,147,47,65,88,46,173,18
1,172,180,169,163,175,176,185,3284
2390 DATA 252,179,157,164,145,252,164,
157,164,146,252,178,165,180,181,178,68
40
2400 DATA 174,143,226,245,244,244,239,
238,157,162,229,231,233,238,128,173,15
2
2410 DATA 181,172,180,169,163,175,176,
185,252,179,157,164,145,252,164,157,68
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2420 DATA 164,146,252,165,179,163,157,
165,248,233,244,128,179,180,161,178,74
76
2430 DATA 180,157,163,239,240,249,128,
173,181,172,180,169,163,175,176,185,68
69
2440 DATA 252,179,157,164,145,252,164,
157,164,146,252,128,128,128,166,169,47
12
2450 DATA 174,169,179,168,165,164,129,
128,128,128,128,128,128,128,128,176,14
75
2460 DATA 245,244,128,179,175,181,178,
163,165,128,228,233,243,235,128,233,89
70
2470 DATA 238,128,164,145,128,141,128,
176,242,229,243,243,128,178,165,180,73
94
2480 DATA 143,226,245,244,244,239,238,
179,157,164,145,252,164,157,164,146,73
36
2490 DATA 252,128,179,176,163,157,176,
225,231,229,128,165,179,163,157,165,63
89
2500 DATA 248,233,244,128,179,180,161,
178,180,157,163,239,240,249,128,128,74
09
2510 DATA 164,169,178,165,163,180,175,
178,185,128,252,128,164,145,128,252,61
17
2520 DATA 128,162,245,244,244,239,238,
143,225,238,249,128,235,229,249,157,13
35
2530 DATA 240,225,245,243,229,128,128,
128,164,169,178,165,163,180,175,178,59
76
2540 DATA 185,128,252,128,164,145,128,
252,128,162,245,244,244,239,238,143,96
22
2550 DATA 235,229,249,157,227,239,238,
244,233,238,245,229,128,128,128,179,89
65
2560 DATA 157,164,145,128,228,221,228,
210,0,0,114,101,97,100,105,110,8196
2570 DATA 103,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,2673
2580 DATA 0,0,0,0,0,0,0,48,53,52,0,51,
50,35,0,36,6289
2590 DATA 41,51,43,0,41,46,0,36,17,0,0
,48,53,52,0,36,6353
2600 DATA 51,52,0,36,41,51,43,0,41,46,
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2610 DATA 41,52,0,50,37,52,15,34,53,52
,52,47,46,0,150,207,2122
2620 DATA 208,212,201,207,206,211,130,
155,155,155,32,32,32,32,150,211,9300
2630 DATA 130,32,67,104,97,110,103,101
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2640 DATA 100,114,105,118,101,155,155,
32,32,32,32,150,196,130,32,67,5211
2650 DATA 104,97,110,103,101,32,68,69,
83,84,73,78,65,84,73,79,3121
2660 DATA 78,32,100,114,105,118,101,15
5,155,32,32,32,32,150,177,130,6440
2670 DATA 45,150,180,130,32,68,105,115
,107,32,68,105,114,101,99,116,5826
2680 DATA 111,114,121,155,155,32,32,32
,32,150,195,212,210,204,173,197,3259
2690 DATA 211,195,130,32,69,120,105,11
6,32,116,111,32,68,79,83,155,5305
2700 DATA 155,32,32,32,32,150,195,212,
210,204,173,212,130,32,84,101,655
2710 DATA 120,116,32,66,114,105,103,10
4,116,110,101,115,115,155,32,32,5467
2720 DATA 32,32,150,195,212,210,204,17
3,198,130,32,70,111,114,101,103,9654
2730 DATA 114,111,117,110,100,32,99,11
1,108,111,114,155,32,32,32,32,3182
2740 DATA 150,195,212,210,204,173,194,
130,32,66,97,99,107,103,114,111,8734
2750 DATA 117,110,100,32,99,111,108,11
1,114,155,155,155,32,150,208,242,1969
2760 DATA 229,243,243,160,210,197,212,
213,210,206,160,239,242,160,226,245,15
38
2770 DATA 244,244,239,238,160,244,239,
160,243,244,225,242,244,174,130,114,97
76
2780 DATA 101,97,100,105,110,103,119,1
14,105,116,105,110,103,80,114,101,7073
2790 DATA 115,115,32,82,69,84,85,82,78
,32,111,114,32,98,117,116,4669
2800 DATA 116,111,110,32,116,111,32,11
4,101,115,116,97,114,116,32,31,4559
2810 DATA 31,31,31,31,31,31,31,31,31,3
1,32,190,31,31,31,31,8945
2820 DATA 31,31,31,31,31,31,31,188,125
,72,138,214,88,0,31,30,3212
2830 DATA 26,24,49,50,51,52,173,184,14
9,0,0,250,0,246,0,0,4286
2840 DATA 0,0,66,53,167,53,0,192,64,67
,68,49,58,42,46,42,1225
2850 DATA 155,68,79,83,32,32,32,32,32,
83,89,83,32,32,32,32,9491
2860 DATA 32,32,32,32,32,32,32,32,32,3
2,32,32,32,32,68,49,8024
2870 DATA 58,32,32,32,32,32,32,32,32,3
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2880 DATA 32,32,32,32,32,32,32,32,32,3
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2890 DATA 32,32,32,32,32,32,32,32,32,3
2,32,32,32,32,32,32,7242
2900 DATA 32,32,32,32,32,32,32,32,32,3
2,32,32,0,64,247,64,1021
2910 DATA 165,10,141,62,49,165,11,141,
63,49,165,12,141,199,37,141,6652
2920 DATA 64,49,165,13,141,200,37,141,
65,49,169,198,133,12,169,37,7255
2930 DATA 133,13,165,88,133,150,165,89
,133,151,169,113,141,48,2,169,8529
2940 DATA 64,141,49,2,162,4,189,243,64
,157,196,2,202,16,247,173,1191
2950 DATA 31,208,201,7,208,14,173,15,2
10,201,255,208,7,173,132,2,209
2960 DATA 240,2,208,235,173,31,208,201
,7,208,249,173,15,210,201,255,6071
2970 DATA 208,242,173,132,2,240,237,16
2,0,134,128,232,134,129,76,210,2694
2980 DATA 37,112,112,112,71,143,64,112
,112,112,112,112,6,112,112,6,4708
2990 DATA 112,6,112,112,112,112,112,11
2,112,112,112,6,65,113,64,0,3629
3000 DATA 0,0,0,13,45,53,44,52,41,35,4
7,48,57,13,0,0,7054
```

```
3010 DATA 0,0,0,0,0,0,0,0,136,163,137,
128,145,153,152,149,7598
3020 DATA 0,0,0,0,0,0,0,0,0,227,232,22
5,242,236,229,243,4315
3030 DATA 128,234,239,232,238,243,239,
238,0,0,0,0,0,0,0,0,1496
3040 DATA 215,213,208,214,214,204,212,
208,212,0,0,0,0,0,0,0,2511
3050 DATA 0,0,0,112,114,101,115,115,0,
115,116,97,114,116,0,0,3095
3060 DATA 0,0,0,216,52,10,136,0,226,2,
227,2,0,64,0,0,667
```

Listing 2.
Assembly listing.

```
PAGE    =   $87
COUNT   =   $88
POS     =   $89
STHOLD  =   $8A
KBHOLD  =   $8B
TEMP    =   $8C
        .OPT NO EJECT
;
; ==========================
;
;       MULTICOPY 2.0
;
; (C) 1986
; by Charles F. Johnson and
; Little Green Footballs
;
; Last revision: 03/29/86
;
; ==========================
;
;
; -------------------------
; Operating system equates
; -------------------------
;
BOOT?   =   $09
DOSVEC  =   $0A
DOSINI  =   $0C
RTCLOK  =   $12
LMARGN  =   $52
ROWCRS  =   $54
COLCRS  =   $55
SAVMSC  =   $58
OLDCHR  =   $5D
RAMTOP  =   $6A
SDLSTL  =   $0230
SDLSTH  =   $0231
COLDST  =   $0244
STICK0  =   $0278
STRIG0  =   $0284
COLOR0  =   $02C4
COLOR1  =   $02C5
COLOR2  =   $02C6
COLOR3  =   $02C7
COLOR4  =   $02C8
CRSINH  =   $02F0
CH      =   $02FC
ICCOM   =   $0342
ICSTA   =   $0343
ICBAL   =   $0344
ICBAH   =   $0345
ICBLL   =   $0348
ICBLH   =   $0349
ICAX1   =   $034A
COLPF0  =   $D016
COLPF2  =   $D018
COLPF3  =   $D019
CONSOL  =   $D01F
AUDF1   =   $D200
AUDC1   =   $D201
SKCTL   =   $D20F
DLISTL  =   $D402
DLISTH  =   $D403
CIOV    =   $E456
;
; ---------------------
; IOCB command equates
; ---------------------
;
OPEN    =   $03
CLOSE   =   $0C
GETREC  =   $05
GETCHR  =   $07
PUTREC  =   $09
PUTCHR  =   $0B
;
; --------------------
; Page zero variables
; --------------------
;
SRC     =   $80
DST     =   $81
RCNT    =   $82
WCNT    =   $83
NUM     =   $84
FLAG    =   $85
OPN     =   $86
MULT    =   $8D
PCNT    =   $8E
TOP     =   $90
ADDR    =   $92
FLEN    =   $94
DIRSCR  =   $96
PNTR1   =   $98
PNTR2   =   $9A
;
; Screen memory
;
SCREEN1 =   BEGIN
SCREEN2 =   SCREEN1+$03C0
;
; -------------------------
; SYSTEM RESET will vector
; through here
; -------------------------
;
        *=  $25C6
;
RESET
        JSR $FFFF   ;DOS init
RESET2
        LDA # <OPTIONS ;Make OS run
        STA DOSVEC  ;MULTICOPY
        LDA # >OPTIONS ;instead of
        STA DOSVEC+1 ;DOS
        RTS
;
; -------------
; Option screen
; -------------
;
OPTIONS
        LDA #0      ;Clear choice
        LDX #63     ;array
CLCH
        STA CHOICE,X
        DEX
        BPL CLCH
;
        STA COLDST  ;No coldstart
        STA PCNT
        STA PCNT+1
        LDA #1      ;Turn off cursor
        STA CRSINH
        STA BOOT?
        JSR CLSCRN  ;Clear screen
        JSR SETSC1  ;Set page 1
        JSR SETDL   ;Colors & D.L.
;
PROPT
        LDA #14     ;Print options
        STA COLCRS
        LDA #2
        STA ROWCRS
        LDA # >OPTLEN
        STA ICBLH
        LDA # <OPTLEN
        LDX # <OPTMSG
        LDY # >OPTMSG
        JSR PRINT0
        STX ICBLH
;
GET1
        LDA #$FF    ;Clear keypress
        STA CH
GETOPT
        LDA STRIG0  ;Button pressed?
        BNE G1.2    ;No, skip
        JMP CONT2   ;Yes, continue
G1.2
        LDA CH
        CMP #$FF    ;Key pressed?
        BEQ GETOPT  ;No, go back
        CMP #$0C    ;Is it RETURN?
        BNE G1.3    ;No, skip
        JMP CONT2   ;Yes, continue
G1.3
        LDX #3
GET2
        CMP DIRKEY,X ;Is it 1,2,3,4?
        BNE G2.1    ;No, skip
        LDA DIRASC,X ;Get ASC value
        BNE G2.2    ;Skip
G2.1
        DEX         ;Count down
        BPL GET2    ;Do more
        BMI GET3    ;No match, skip
G2.2
        JSR DIREC   ;Show directory
        JSR SETSC1  ;Reset screen
        BNE GET1    ;Go back
GET3
        CMP #$3E    ;Is it ">"?
        BNE GET4    ;No, skip
        INC SRC     ;SRC=SRC+1
        LDA SRC     ;If SRC is >3,
        CMP #4      ;set to zero
        BNE G3.2
        LDA #0
G3.2
        STA SRC
        CLC         ;Add value for
        ADC #145    ;screen code
        STA SM1     ;Set all source
        STA SM2     ;numbers in
        STA SM3     ;message lines
        STA SM4
        STA SM5
        STA SM6
        SEC
        SBC #$80
        STA SM7
        BNE GOGET1  ;Skip to JMP
GET4
        CMP #$3A    ;Is it "D"?
        BNE GET5    ;No, skip
        INC DST     ;DST=DST+1
        LDA DST     ;If DST is >3,
        CMP #4      ;set to zero
        BNE G4.2
        LDA #0
G4.2
        STA DST
        CLC
        ADC #145
        STA DM1     ;Set all dest
        STA DM2     ;numbers in
        STA DM3     ;message lines
        STA DM5
        ADC #$40
        STA DM6
        SEC
        SBC #$C0
        STA DM7
        BNE GOGET1  ;Skip to JMP
GET5
        CMP #$9C    ;Is it CTRL-ESC?
        BNE GET6    ;No, skip
        LDA #$FF    ;Cancel key
        STA CH
        LDX #3
RESDOS
        LDA DVSAVE,X ;Restore DOS
        STA DOSVEC,X ;vectors
        DEX
        BPL RESDOS
        JMP (DOSVEC) ;Go to DOS
;
GET6
        LDX #3
G6.2
        CMP COLKEY-1,X ;Is it one of
        BEQ G6.3    ;the color
        DEX         ;changing keys?
        BNE G6.2
        BEQ GOGET1  ;No match, skip
G6.3
        CPX #3      ;If 3, make it 4
        BNE G6.4
        INX
G6.4
        INC COLOR0,X ;Change color
        INC COLOR0,X ;register
        INC COLSAV,X
        INC COLSAV,X
GOGET1
        JMP GET1    ;Back to the top
;
CONT2
        LDA STRIG0  ;Wait until key
        BEQ CONT2   ;or button is
        LDA SKCTL   ;released
        CMP #$FB
        BEQ CONT2
;
; ------------------
; Display filenames
; ------------------
;
        LDA #$FF    ;Cancel keypress
        STA CH
        LDA SRC     ;Set directory
        CLC         ;filename
        ADC #49
        STA DIRNAM+1
        LDA #0
        STA COUNT   ;Clear filecount
        STA PAGE    ;& page index
        JSR CLSCRN  ;Clear screen
        LDA #2      ;Set printing
        STA COLCRS  ;column & row
        LDA #0
        STA ROWCRS
        LDA SRC     ;SRC=DST?
        CMP DST
        BNE DISPLAY ;No, skip
        LDA # <SLINE4 ;Yes, prompt
        STA LINEAD
        LDA # >SLINE4
        STA LINEAD+1
        JSR BUTRET
DISPLAY
        LDA # <FNBUF ;Set pointer to
        STA PNTR1   ;filename buffer
        LDA # >FNBUF
        STA PNTR1+1
;
        JSR OPDIR   ;Open directory
;
```

```
READNAMES
        LDX #$10    ;Read names from
        LDA #GETREC ;the source disk
        STA ICCOM,X
        LDA # <FNAME
        STA ICBAL,X
        LDA # >FNAME
        STA ICBAH,X
        LDA #17
        STA ICBLL,X
        JSR CIOV
;
        LDY #2
CKDOS
        LDA FNAME,Y ;Is this file
        CMP DOSNAM-2,Y ;DOS.SYS?
        BNE CKFRE   ;No, skip
        INY
        CPY #13
        BNE CKDOS
        BEQ READNAMES ;Yes, ignore
;
CKFRE
        LDX #15
        LDA FNAME,X ;Is this "FREE
        CMP #'S     ;SECTORS"?
        BNE CKF2    ;No, skip
        JMP SELECT  ;Yes, continue
CKF2
        INC COUNT   ;Count files
        LDX PAGE    ;Also count the
        INC PCNT,X  ;# per page
        LDY #10
TRANSFER
        LDA FNAME+2,Y ;Move this
        STA (PNTR1),Y ;name to the
        DEY         ;filename buffer
        BPL TRANSFER
;
        CLC         ;Increment the
        LDA PNTR1   ;pointer to the
        ADC #11     ;filename buffer
        STA PNTR1
        BCC TR2
        INC PNTR1+1
TR2
        LDA COUNT
        CMP #24     ;Done 1 column?
        BNE TR3     ;No, skip
        LDA #15     ;Print name
        LDX # <FNAME+2
        LDY # >FNAME+2
        JSR PRINT0
;
        LDA #23     ;Set to top of
        STA LMARGN  ;second column
        STA COLCRS
        LDA #0
        STA ROWCRS
        JMP READNAMES ;Do the rest
;
TR3
        CMP #48     ;Done 2 columns?
        BNE TR4     ;No, skip
        LDA #15
        LDX # <FNAME+2 ;Print name
        LDY # >FNAME+2
        JSR PRINT0
;
        INC PAGE    ;Set page index
        LDA # <SCREEN2
        STA SAVMSC  ;Set screen to
        STA SCRNAD  ;2nd page
        LDA # >SCREEN2
        STA SAVMSC+1
        STA SCRNAD+1
        LDA #2      ;Set position to
        STA LMARGN  ;top left
        STA COLCRS
        LDA #0
        STA ROWCRS
        JMP READNAMES ;Do the rest
;
TR4
        LDX #0      ;Print filenames
        LDA #PUTREC
        STA ICCOM
        LDA # <FNAME+2
        STA ICBAL
        LDA # >FNAME+2
        STA ICBAH
        LDA #15
        STA ICBLL
        JSR CIOV
        JMP READNAMES ;Do the rest
;
; --------------------
; Select files to copy
; --------------------
;
SELECT
        LDX #$10    ;Close ch 1
        LDA #CLOSE
        STA ICCOM,X
        JSR CIOV
        LDA #2      ;Set margin
        STA LMARGN
        LDA COUNT   ;More than
        CMP #49     ;48 names?
        BCC SEL2    ;No, skip
        LDA # <PAGLIN ;Set page
        LDX # >PAGLIN ;message
        BNE SEL3
SEL2
        LDA # <SLINE2 ;No page
        LDX # >SLINE2 ;message
SEL3
        STA LINEAD
        STX LINEAD+1
        LDA # <SCREEN1
        STA SCRNAD  ;Set screen to
        STA SAVMSC  ;page 1
        LDA # >SCREEN1
        STA SCRNAD+1
        STA SAVMSC+1
        LDA #0
        STA PAGE    ;Set page index
        STA POS     ;& screen pos
PRNT1
        LDX #0
        STX ROWCRS  ;Print pointer
        INX         ;at top name
        STX COLCRS
        LDA #13
        LDX # <POINTR
        LDY # >POINTR
        JSR PRINT0
S1
        LDA #$FF    ;Clear keypress
        STA CH
;
SLOOP
        LDA STRIG0  ;Button pressed?
        BEQ CHOSEN  ;Yes, skip
        LDA CH
        CMP #$0C    ;RETURN pressed?
        BNE S2      ;No, skip
CHOSEN
        LDA STRIG0  ;Wait until key
        BEQ CHOSEN  ;or button is
        LDA SKCTL   ;released
        CMP #$FB
        BEQ CHOSEN
;
        JSR INVNAM  ;Register choice
        CLC         ;Force branch
        BCC S1      ;Go back
;
S2
        LDA CONSOL
        CMP #6      ;START pressed?
        BNE S3      ;No, skip
        JMP PRECOPY ;Yes, continue
S3
        LDA CH      ;Get key
        CMP #$1C    ;Is it ESC?
        BNE S4      ;No, skip
        JMP OPTIONS ;Restart
S4
        LDA STICK0  ;Get stick
        STA STHOLD  ;Save it
        CMP #15     ;Center?
        BNE INPUT   ;No, skip
        LDA CH      ;Get key
        STA KBHOLD  ;Save it
        CMP #6      ;If arrows or
        BEQ INPUT   ;space bar,
        CMP #7      ;go ahead
        BEQ INPUT
        CMP #14
        BEQ INPUT
        CMP #15
        BEQ INPUT
        CMP #33
        BNE SLOOP   ;Not legal key
;
INPUT
        JSR SETPOS
        LDA #13     ;Erase old
        LDX # <BLANK ;pointer
        LDY # >BLANK
        JSR PRINT0
;
        LDA KBHOLD  ;Get key
        CMP #33     ;Is it SPACE?
        BNE NOTSPC  ;No, skip
        LDA COUNT   ;Get file count
        CMP #49     ;More than 48?
        BCC NOTSPC  ;No, skip
        LDA PAGE    ;Toggle page
        EOR #$01    ;index
        STA PAGE
        LDA #0      ;Set position to
        STA POS     ;zero
        LDX PAGE
        LDA SCLO,X  ;Flip screen
        STA SAVMSC
        STA SCRNAD
        LDA SCHI,X
        STA SAVMSC+1
        STA SCRNAD+1
        JMP PRNT1   ;Back to the top
;
NOTSPC
        LDA STHOLD  ;Get stick
        CMP #13     ;Down?
        BEQ INPOS   ;Yes, skip
        LDA KBHOLD  ;Get key
        CMP #15     ;Down arrow?
        BNE CKUP    ;No, skip
INPOS
        INC POS     ;POS=POS+1
CKUP
        LDA STHOLD  ;Get stick
        CMP #14     ;Up?
        BEQ DEPOS   ;Yes, skip
        LDA KBHOLD  ;Get key
        CMP #14     ;Up arrow?
        BNE CKRT    ;No, skip
DEPOS
        DEC POS     ;POS=POS-1
CKRT
        LDA STHOLD  ;Get stick
        CMP #7      ;Right?
        BEQ ADD24   ;Yes, skip
        LDA KBHOLD  ;Get key
        CMP #7      ;Right arrow?
        BNE CKLT    ;No, skip
ADD24
        LDA POS     ;Is POS already
        CMP #24     ;)23?
        BCS CKLT    ;Yes, skip
        CLC
        ADC #24     ;Add 24
        LDX PAGE    ;More than the
        CMP PCNT,X  ;# of filenames?
        BCS CKLT    ;Yes, skip
        STA POS     ;Set position
CKLT
        LDA STHOLD  ;Get stick
        CMP #11     ;Left?
        BEQ SUB24   ;Yes, skip
        LDA KBHOLD  ;Get key
        CMP #6      ;Left arrow?
        BNE CKLIM   ;No, skip
SUB24
        LDA POS     ;Is POS already
        CMP #24     ;<24?
        BCC CKLIM   ;Yes, skip
        SEC
        SBC #24     ;Subtract 24
        CMP #0      ;Less than zero?
        BCC CKLIM   ;Yes, skip
        STA POS     ;Set position
CKLIM
        LDX PAGE
        LDA POS     ;Is POS <0?
        BPL CKL2    ;No, skip
        LDA PCNT,X  ;Set to last
        SEC         ;name on page
        SBC #1
        STA POS
CKL2
        LDA POS     ;Is POS > last
        CMP PCNT,X  ;name on page?
        BCC PRPNT   ;No, skip
        LDA #0      ;Set to zero
        STA POS
PRPNT
        JSR SETPOS  ;Set position
        LDA #13     ;Print pointer
        LDX # <POINTR
        LDY # >POINTR
        JSR PRINT0
        LDA STHOLD  ;Get stick
        CMP #15     ;Center?
        BEQ GOS1    ;Yes, skip
        LDA #5      ;Wait for 5/60
        CLC         ;second
        ADC RTCLOK+2
DELAY
        CMP RTCLOK+2
        BNE DELAY
GOS1
        JMP S1      ;Back to the top
;
; --------------
; Start copying
; --------------
;
PRECOPY
        LDA CONSOL  ;Wait til START
        CMP #6      ;is released
        BEQ PRECOPY
;
        JSR CNVCHC  ;Convert CHOICE
        LDA NUM     ;Files to copy?
        BNE PRE2    ;Yes, skip
        JMP FINISH  ;No, exit
PRE2
        LDA # <COPYDL ;Install copy
        STA SDLSTL  ;screen display
        STA DLISTL  ;list
        LDA # >COPYDL
        STA SDLSTH
        STA DLISTH
        LDX #4
PRE2.1
        LDA COLOR0,X ;Save colors
        STA COLSAV,X
        LDA CPYCOL,X ;Set message
        STA COLOR0,X ;colors
        STA COLPF0,X
        DEX
        BPL PRE2.1
        LDA #0      ;Clear read
        STA RCNT    ;counter & write
        STA WCNT    ;counter
        STA FLAG    ;Clear flags
        STA OPN
        STA TOP
        LDA RAMTOP  ;Find end of
        SEC         ;data buffer
        SBC #1
        STA TOP+1
CLOOP1
        LDA # <BUFFER ;Find start
        STA ADDR    ;of data buffer
        LDA # >BUFFER
        STA ADDR+1
        LDA SRC
        CMP DST     ;SRC=DST?
        BNE C2      ;No, skip
        JSR SPROMT  ;Show prompt
C2
        LDA # <CLIN ;Set top line
        STA TOPLIN
        LDA # >CLIN
        STA TOPLIN+1
        LDX #6
C2.1
        LDA RDMSG,X ;Print READING
        STA RWLINE,X
        DEX
        BPL C2.1
        LDA #$D6    ;Set character
        STA COLOR3  ;colors
        STA COLPF3  ;(also set
        LDA #$0D    ;hardware regs
        STA COLOR2  ;cuz I/O can
        STA COLPF2  ;delay change)
;
C3
        LDX RCNT    ;Save start addr
```

```
        LDA ADDR    ;of file
        STA ADLO,X
        LDA ADDR+1
        STA ADHI,X
        SEC
        LDA TOP     ;Calculate free
        SBC ADDR    ;memory & use
        STA FLEN    ;as file length
        LDA TOP+1
        SBC ADDR+1
        STA FLEN+1
        BNE C4      ;Not zero, skip
        JMP WRITE1  ;Go write
C4
        LDA FLAG    ;File open?
        BEQ C5      ;No, skip
        LDX #14
C4.1
        LDA N1HOLD,X ;Display open
        SEC         ;filename
        SBC #32
        STA NAMLIN,X
        DEX
        BPL C4.1
        JMP DOREAD
;
C5
        JSR CLN2    ;Clear name
        LDX RCNT    ;Find name &
        JSR FINDNM  ;convert it
        LDA SRC     ;Print name
        JSR PRNAME
;
        LDX #$10    ;Open file for
        LDA #OPEN   ;input
        STA ICCOM,X
        LDA # <DNUM
        STA ICBAL,X
        LDA # >DNUM
        STA ICBAH,X
        LDA #4
        STA ICAX1,X
        JSR CIOV
;
DOREAD
        LDX #$10    ;Read data into
        LDA #7      ;buffer
        STA ICCOM,X
        LDA ADDR
        STA ICBAL,X
        LDA ADDR+1
        STA ICBAH,X
        LDA FLEN
        STA ICBLL,X
        LDA FLEN+1
        STA ICBLH,X
        JSR CIOV
;
        LDY RCNT
        LDA ICBLL,X ;Save length of
        STA LLO,Y   ;data in table
        LDA ICBLH,X
        STA LHI,Y
        LDA ICSTA,X ;Get status
        CMP #136    ;End of file?
        BEQ RD2     ;Yes, skip
        LDA #1      ;No, set flag
        STA FLAG    ;and save name
        LDY #14
SVN1
        LDA DNUM,Y  ;Save filename
        STA N1HOLD,Y
        DEY
        BPL SVN1
        JMP WRITE1  ;Go write
;
RD2
        LDX #$10    ;Close file
        LDA #CLOSE
        STA ICCOM,X
        JSR CIOV
        LDA #0      ;Clear flag
        STA FLAG
        LDX RCNT
        CLC
        LDA ADDR    ;Calculate
        ADC LLO,X   ;buffer address
        STA ADDR    ;for next file
        LDA ADDR+1
        ADC LHI,X
        STA ADDR+1
        INC RCNT    ;RCNT=RCNT+1
        LDA RCNT
        CMP NUM     ;All files read?
        BCS WRITE1  ;Yes, skip
        JMP C3      ;Read more
;
WRITE1
        LDA SRC
        CMP DST     ;SRC=DST?
        BNE W2      ;No, skip
        JSR DPROMT  ;Show prompt
W2
        LDA # <CLIN ;Set top line
        STA TOPLIN
        LDA # >CLIN
        STA TOPLIN+1
        LDX #6
WRLP
        LDA WRMSG,X ;Print WRITING
        STA RWLINE,X
        DEX
        BPL WRLP
        LDA #$D6    ;Set character
        STA COLOR2  ;colors
        STA COLPF2
        LDA #$0D
        STA COLOR3
        STA COLPF3
;
        LDA OPN     ;File open?
        BEQ W3      ;No, skip
        LDX #14
W2.1
        LDA N2HOLD,X ;Display open
        SEC         ;filename
        SBC #32
        STA NAMLIN,X
        DEX
        BPL W2.1
        JMP DOWRIT  ;Skip ahead
;
W3
        JSR CLN2    ;Clear name
        LDX WCNT    ;Find name and
        JSR FINDNM  ;convert it
        LDA DST
        JSR PRNAME  ;Print name
;
        LDX #$20    ;Open file for
        LDA #OPEN   ;output
        STA ICCOM,X
        STA # <DNUM
        STA ICBAL,X
        LDA # >DNUM
        STA ICBAH,X
        LDA #8
        STA ICAX1,X
        JSR CIOV
        LDA #1      ;Set flag
        STA OPN
;
DOWRIT
        LDX #$20    ;Write data from
        LDA #PUTCHR ;buffer
        STA ICCOM,X
        LDY WCNT    ;Get write count
        LDA ADLO,Y  ;Get address of
        STA ICBAL,X ;data from table
        LDA ADHI,Y
        STA ICBAH,X
        LDA LLO,Y   ;Get length of
        STA ICBLL,X ;data from table
        LDA LHI,Y
        STA ICBLH,X
        JSR CIOV
;
        LDA WCNT    ;Written all
        CMP RCNT    ;that were read?
        BNE W7      ;No, skip
        LDA FLAG    ;Partial read?
        BEQ W7      ;No, skip
        LDY #14
SVN2
        LDA DNUM,Y  ;Save name
        STA N2HOLD,Y
        DEY
        BPL SVN2
        JMP CLOOP1  ;Back to the top
;
W7
        LDX #$20    ;Close file
        LDA #CLOSE
        STA ICCOM,X
        JSR CIOV
        LDA #0      ;Clear flag
        STA OPN
        INC WCNT    ;WCNT=WCNT+1
        LDA WCNT    ;Written all
        CMP RCNT    ;that were read?
        BCC JW3     ;No, skip
        LDA FLAG    ;Partial read?
        BEQ W8      ;No, skip
JW3
        JMP W3      ;Write more
W8
        LDA WCNT    ;Done copying?
        CMP NUM
        BCS FINISH  ;Yes, exit
        JMP CLOOP1  ;No, do the rest
;
FINISH
        JSR CLSCRN  ;Clear screen
        LDA # <SCREEN1 ;Reset screen
        STA SCRNAD  ;and display
        STA SAVMSC  ;FINISHED msg
        LDA # >SCREEN1
        STA SCRNAD+1
        STA SAVMSC+1
        LDA # <FINLIN
        STA LINEAD
        LDA # >FINLIN
        STA LINEAD+1
        JSR SETDL
;
        LDA #3
        STA COLCRS
        LDA #8
        STA ROWCRS
        LDA #33
        LDX # <RETMSG ;Print prompt
        LDY # >RETMSG
        JSR PRINT0
        JSR BUTRET  ;Wait
        JMP OPTIONS ;Restart
;
; ----------
; SUBROUTINES
; ----------
;
CLSCRN
        LDA # <SCREEN1
        STA PNTR1
        LDA # >SCREEN1
        STA PNTR1+1
        LDX #8
        LDY #0      ;Clear the
        TYA         ;screen area
CLS2
        STA (PNTR1),Y
        INY
        BNE CLS2
        INC PNTR1+1
        DEX
        BNE CLS2
        STA OLDCHR
        RTS
;
SETPOS
        LDX #1      ;Set the cursor
        LDA POS     ;position
        CMP #24     ;Less than 24?
        BCC SETP2   ;Yes, skip
        CLC
        TXA         ;21 + 1
        ADC #21     ;Set to 2nd col
        TAX         ;Set column
SETP2
        STX COLCRS
        LDA POS     ;Get position
        CMP #24     ;> 1st column?
        BCC SETP3   ;No, skip
        SEC
        SBC #24
SETP3
        STA ROWCRS  ;Set row
        RTS
;
PRINT0
        STA ICBLL   ;Print to E:
        STX ICBAL   ;A=String length
        STY ICBAH   ;X=Lo address
        LDA #PUTCHR ;Y=Hi address
        STA ICCOM
        LDX #0
        JMP CIOV
;
SETSC1
        LDA # <SLINE1 ;Set OPTIONS
        STA LINEAD  ;screen (top
        LDA # >SLINE1 ;line and main
        STA LINEAD+1 ;screen area)
        LDA # <SCREEN1
        STA SAVMSC
        STA SCRNAD
        LDA # >SCREEN1
        STA SAVMSC+1
        STA SCRNAD+1
        RTS
;
SETDL
        LDX #4
SDL2
        LDA COLSAV,X ;Set screen
        STA COLOR0,X ;colors
        DEX
        BPL SDL2
        LDA # <DLIST ;Install our
        STA SDLSTL  ;display list
        LDA # >DLIST
        STA SDLSTH
        RTS
;
OPDIR
        LDX #$10    ;Open IOCB #1
        LDA #CLOSE  ;for a directory
        STA ICCOM,X ;read
        JSR CIOV
        LDA #OPEN
        STA ICCOM,X
        LDA # <DIRNAM
        STA ICBAL,X
        LDA # >DIRNAM
        STA ICBAH,X
        LDA #6
        STA ICAX1,X
        JMP CIOV
;
DIREC
        STA DIRNAM+1 ;Store drv #
        CLC         ;Convert to
        ADC #$60    ;screen code
        STA DIRNUM1 ;Display drv #
        STA DIRNUM2
        LDA DIRSCR  ;Flip to
        STA SAVMSC  ;directory screen
        STA SCRNAD  ;(original E:
        LDA DIRSCR+1 ;screen address)
        STA SAVMSC+1
        STA SCRNAD+1
        LDA # <DIRLIN1 ;Set top line
        STA LINEAD
        LDA # >DIRLIN1
        STA LINEAD+1
        LDA #1      ;Clear the screen
        LDX # <CLEAR
        LDY # >CLEAR
        JSR PRINT0
        JSR OPDIR   ;Open directory
        LDX #$10    ;Set up to input
        LDA #GETREC ;filenames from
        STA ICCOM,X ;IOCB #1 and
        LDA #PUTREC ;print them to
        STA ICCOM   ;IOCB #0 (E:)
        LDA # <FNAME
        STA ICBAL,X
        STA ICBAL
        LDA # >FNAME
        STA ICBAH,X
        STA ICBAH
        LDA #18
        STA ICBLL,X
        STA ICBLL
        LDA #0      ;Set to top of
        STA ROWCRS  ;screen
NLOOP
        LDA SKCTL   ;Key pressed?
        CMP #$FB
        BEQ NL2     ;No, skip ahead
        LDA STRIG0  ;Trigger?
        BNE NL3     ;No, skip
NL2
        JSR DW2     ;Wait for release
```

```
NL3
        LDX #$10    ;IOCB #1
        JSR CIOV    ;Get filename
        BMI CDIR    ;End, skip
        LDA #9      ;Set position
        STA COLCRS
        LDX #$00    ;IOCB #0
        JSR CIOV    ;Print name
        BPL NLOOP   ;Always branch
CDIR
        LDA #CLOSE  ;Close dir
        STA ICCOM,X
        JSR CIOV
        LDA # <DIRLIN2 ;Print
        STA LINEAD  ;prompt message
        LDA # >DIRLIN2 ;on top line
        STA LINEAD+1
DWAIT
        LDA SKCTL   ;Wait for key
        CMP #$FF    ;or trigger
        BNE DW2     ;press
        LDA STRIG0
        BNE DWAIT
DW2
        LDA SKCTL   ;Wait for
        CMP #$FB    ;release
        BEQ DW2
        LDA STRIG0
        BEQ DW2
        RTS
;
CLN2
        LDX #11     ;Clear name
        LDA #$20    ;storage area to
CLN2.2
        STA N2,X    ;spaces
        DEX
        BPL CLN2.2
        RTS
;
PRNAME
        CLC         ;Store drive #
        ADC #49
        STA DNUM+1
        LDX #14
PRNAM2
        LDA DNUM,X  ;Print filename
        SEC         ;being copied
        SBC #32     ;directly to
        STA NAMLIN,X ;screen memory
        DEX
        BPL PRNAM2
        RTS
;
SPROMT
        LDA # <SRCLIN ;Set for
        LDX # >SRCLIN ;source prompt
        BNE PROMP2  ;Skip ahead
DPROMT
        LDA # <DSTLIN ;Set for
        LDX # >DSTLIN ;dest prompt
PROMP2
        STA TOPLIN  ;Show prompt
        STX TOPLIN+1
        LDX #14
PROMP3
        LDA RBMSG,X ;Now prompt
        STA NAMLIN,X ;for RETURN
        DEX         ;or button
        BPL PROMP3
BUTRET
        LDA #$FF    ;Clear key
        STA CH      ;buffer
BR2
        LDA STRIG0  ;Get trigger
        BEQ BR3     ;Pressed, skip
        LDA CH      ;Get key
        CMP #12     ;RETURN?
        BNE BR2     ;No, go back
BR3
        LDA STRIG0  ;Wait til
        BEQ BR3     ;trigger or key
        LDA SKCTL   ;is released
        CMP #$FB
        BEQ BR3
        LDA #$FF
        STA CH
        RTS
;
INVNAM
        LDA POS     ;Current position
        CMP #24     ;2nd column?
        BCC INV2    ;No, skip
        SBC #24
INV2
        STA TEMP    ;Multiply the
        LDA #40     ;current row
        STA MULT    ;by 40 to get
        LDA #0      ;the offset
        STA PNTR1+1 ;into screen
        LDY #8      ;memory
INV3
        ASL A
        ROL PNTR1+1
        ASL MULT
        BCC INV4
        CLC
        ADC TEMP
        BCC INV4
        INC PNTR1+1
INV4
        DEY
        BNE INV3
        CLC
        ADC #2
        BCC INV5
        INC PNTR1+1
INV5
        STA PNTR1   ;Set offset
        LDA POS     ;to screen area
        CMP #24     ;If in 2nd
        BCC INV6    ;column, adjust
        CLC         ;the pointer
        LDA PNTR1
        ADC #21
        STA PNTR1
        BCC INV6
        INC PNTR1+1
INV6
        CLC
        LDX PAGE    ;Get page index
        LDA PNTR1   ;Add the address
        ADC SCLO,X  ;of the start of
        STA PNTR1   ;the current
        LDA PNTR1+1 ;page to screen
        ADC SCHI,X  ;pointer
        STA PNTR1+1
        LDY #10     ;11 characters
INVLOOP
        LDA (PNTR1),Y ;Get char
        EOR #$80    ;Invert it
        STA (PNTR1),Y ;Put it back
        DEY         ;Count 'em
        BPL INVLOOP ;More to do
        LDA PAGE    ;Get current pg
        BEQ INV7    ;Skip if page 1
        LDA #48     ;Add 48
INV7
        CLC
        ADC POS
        TAX         ;Use for index
        LDA CHOICE,X ;Get choice flag
        EOR #$01    ;Toggle bit 0
        STA CHOICE,X ;Put it back
        LDA #120
        STA TEMP
        LDA #$A8
        STA AUDC1
SOUND
        LDA TEMP    ;Make a sound
        STA AUDF1   ;to register
        SEC         ;the choice
        SBC #20
        STA TEMP
        BMI SND2
        LDA #1
        CLC
        ADC RTCLOK+2
SNDWAIT
        CMP RTCLOK+2
        BNE SNDWAIT
        BEQ SOUND
SND2
        RTS
;
CNVCHC
        LDX #0
        STX NUM
CNV2
        TXA         ;This section
        TAY         ;converts the
        LDA CHOICE,Y ;choice array
        BEQ CNV3    ;to sequential
        LDY NUM     ;form, and also
        INC NUM     ;counts the
        TXA         ;chosen files
        STA CHOICE,Y
CNV3
        INX
        CPX #64
        BNE CNV2
        RTS
;
; This routine finds the
; name of the file being
; operated on, and converts
; it to DOS filename format.
; (Dn:FILENAME.EXT)
; Enter with X set to
; current file index.
;
FINDNM
        LDA #0      ;Clear TEMP
        STA TEMP
        LDA CHOICE,X ;Multiply by 11
        CLC
        ASL A       ;*2
        ROL TEMP
        ASL A       ;*4
        ROL TEMP
        CLC
        ADC CHOICE,X ;*5
        BCC FIND2
        INC TEMP
FIND2
        CLC
        ASL A       ;*10
        ROL TEMP
        CLC
        ADC CHOICE,X ;*11
        BCC FIND3
        INC TEMP
FIND3
        CLC         ;Add start of
        ADC # <FNBUF ;filename array
        STA PNTR2   ;and set pointer
        LDA TEMP
        ADC # >FNBUF
        STA PNTR2+1
        LDY #10     ;11 characters
FIND4
        LDA (PNTR2),Y ;Move name
        STA N1,Y    ;to buffer
        DEY
        BPL FIND4
NAME
        LDX #0
        STX TEMP
NM2
        TXA         ;Search name
        TAY         ;field for
        LDA N1,Y    ;space character
        CMP #32
        BEQ PERIOD  ;Got space, skip
        LDY TEMP    ;Store char in
        STA N2,Y    ;name area
        INC TEMP    ;Count up
        INX
        CPX #8      ;Done 8?
        BNE NM2     ;No, more to do
PERIOD
        LDY TEMP    ;Get index and
        LDA #'.     ;store period
        STA N2,Y
        INC TEMP    ;Inc index
        LDX #8
NM3
        TXA         ;Search
        TAY         ;extension field
        LDA N1,Y    ;for space char
        CMP #32
        BEQ NM4     ;Got space, skip
        LDY TEMP
        STA N2,Y    ;Store chars
        INC TEMP
        INX
        CPX #11     ;At end of name?
        BNE NM3     ;No, go back
NM4
        CPX #8      ;If no extension
        BNE NM5     ;erase the
        DEC TEMP    ;period
        LDY TEMP
        LDA #32
        STA N2,Y
NM5
        RTS
;
; Data, tables, messages, etc.
;
DLIST
        .BYTE $70,$70,$20
        .BYTE $42
LINEAD
        .WORD SLINE1
        .BYTE $10
        .BYTE $42
SCRNAD
        .WORD SCREEN1
        .BYTE $02,$02,$02,$02
        .BYTE $02,$02,$02,$02
        .BYTE $02,$02,$02,$02
        .BYTE $02,$02,$02,$02
        .BYTE $02,$02,$02,$02
        .BYTE $02,$02,$02
        .BYTE $41
        .WORD DLIST
;
COPYDL
        .BYTE $70,$70,$70,$70
        .BYTE $47
TOPLIN
        .WORD CLIN
        .BYTE $70,$30,$47
        .WORD NAMLIN
        .BYTE $41
        .WORD COPYDL
;
SLINE1
        .SBYTE "MULTICOPY S=D"
SM1
        .SBYTE "1 D=D"
DM1
        .SBYTE "2 RETURN/button=Begin "
SLINE2
        .SBYTE "MULTICOPY S=D"
SM2
        .SBYTE "1 D=D"
DM2
        .SBYTE "2 ESC=Exit START=Copy "
FINLIN
        .SBYTE "MULTICOPY S=D"
SM3
        .SBYTE "1 D=D"
DM3
        .SBYTE "2 "
CPYLIN
        .SBYTE " FINISHED! "
SLINE4
        .SBYTE "Put SOURCE disk in D"
SM4
        .SBYTE "1 - Press RET/button"
PAGLIN
        .SBYTE "S=D"
SM5
        .SBYTE "1 D=D"
DM5
        .SBYTE "2 SPC=Page ESC=Exit"
        .SBYTE " START=Copy "
;
DIRLIN1
        .SBYTE " DIRECTORY D"
DIRNUM1
        .SBYTE "1 Button/any key="
        .SBYTE "pause "
DIRLIN2
        .SBYTE " DIRECTORY D"
DIRNUM2
        .SBYTE "1 Button/key="
        .SBYTE "continue "
;
CLIN
        .SBYTE "S=D"
SM6
        .SBYTE "1 did"
DM6
        .SBYTE "= "
RWLINE
        .SBYTE "reading "
;
NAMLIN
        .BYTE 0,0,0,0,0,0,0,0,0,0
```

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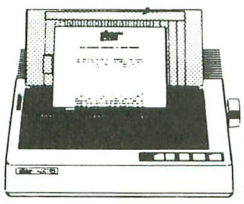

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```
        .BYTE 0,0,0,0,0,0,0,0,0,0
;
SRCLIN
        .SBYTE "PUT SRC DISK IN D"
SM7
        .SBYTE "1  "
DSTLIN
        .SBYTE "PUT DST DISK IN D"
DM7
        .SBYTE "2  "
;
RBMSG
        .SBYTE "HIT RET/BUTTON "
;
OPTMSG
        .BYTE " OPTIONS ",$9B,$9B,$9B
        .BYTE "     S  Change SOURCE"
        .BYTE " drive",$9B,$9B
        .BYTE "     D  Change DESTIN"
        .BYTE "ATION drive",$9B,$9B
        .BYTE "     1 - 4  Disk Dire"
        .BYTE "ctory",$9B,$9B
        .BYTE "     CTRL-ESC  Exit "
        .BYTE "to DOS",$9B,$9B
        .BYTE "     CTRL-T  Text Bri"
        .BYTE "ghtness",$9B
        .BYTE "     CTRL-F  Foregrou"
        .BYTE "nd color",$9B
        .BYTE "     CTRL-B  Backgrou"
        .BYTE "nd color",$9B,$9B,$9B
        .BYTE "  Press RETURN or but"
        .BYTE "ton to start. "
OPTLEN  =   *-OPTMSG
;
RDMSG
        .SBYTE "reading"
WRMSG
        .SBYTE "writing"
;
RETMSG
        .BYTE "Press RETURN or "
        .BYTE "button to restart"
;
BLANK
        .BYTE " ++++++++++++ "
POINTR
        .BYTE "Z++++++++++++K"
;
CLEAR
        .BYTE $7D
;
CPYCOL
        .BYTE $48,$8A,$D6,$58,$00
;
DIRKEY
        .BYTE $1F,$1E,$1A,$18
DIRASC
        .BYTE "1234"
;
COLKEY
        .BYTE $AD,$B8,$95
;
COLSAV
        .BYTE $00,$00,$FA,$00,$F6
;
DVSAVE
        .BYTE 0,0,0,0
;
FNBUF
        .DS 64*11
LLO     .DS 64
LHI     .DS 64
ADLO    .DS 64
ADHI    .DS 64
CHOICE  .DS 64
SCLO    .BYTE  <SCREEN1, <SCREEN2
SCHI    .BYTE  >SCREEN1, >SCREEN2
DIRNAM  .BYTE "D1:*.*",$9B
DOSNAM  .BYTE "DOS     SYS"
FNAME   .BYTE "                "
DNUM    .BYTE "D1:"
N2      .BYTE "              "
N1      .BYTE "              "
N1HOLD  .BYTE "              "
N2HOLD  .BYTE "              "
;
BUFFER  =   *
;
; -------------
; Program start
; -------------
;
        *=  *+$1000&$F000
;
BEGIN
        LDA DOSVEC  ;Save the DOS
        STA DUSAVE  ;vectors
        LDA DOSVEC+1
        STA DUSAVE+1
        LDA DOSINI  ;Put DOSINI
        STA RESET+1 ;vector after
        STA DUSAVE+2 ;the JSR in our
        LDA DOSINI+1 ;code - also
        STA RESET+2 ;save it...
        STA DUSAVE+3
        LDA # <RESET ;Put our code
        STA DOSINI  ;address in
        LDA # >RESET ;DOSINI to
        STA DOSINI+1 ;trap RESET
;
        LDA SAVMSC  ;Save OS screen
        STA DIRSCR  ;address for
        LDA SAVMSC+1 ;directory
        STA DIRSCR+1 ;screen
        LDA # <TITLDL ;Install title
        STA SDLSTL  ;display list
        LDA # >TITLDL
        STA SDLSTH
        LDX #4
SETCOL
        LDA COLORS,X ;Set screen
        STA COLOR0,X ;colors
        DEX
        BPL SETCOL
STRTWT
        LDA CONSOL  ;Get console reg
        CMP #7      ;Any key?
        BNE CONTIN  ;Yes, go ahead
        LDA SKCTL   ;Check keyboard
        CMP #$FF    ;Key pressed?
        BNE CONTIN  ;Yes, continue
        LDA STRIG0  ;Get trigger
        BEQ CONTIN  ;If pressed, skip
        BNE STRTWT  ;No input...
CONTIN
        LDA CONSOL  ;Wait for key,
        CMP #7      ;button, or
        BNE CONTIN  ;console to be
        LDA SKCTL   ;released
        CMP #$FF
        BNE CONTIN
        LDA STRIG0
        BEQ CONTIN
;
        LDX #0      ;Init source
        STX SRC     ;and destination
        INX         ;drives
        STX DST
        JMP OPTIONS ;Jump to start
;
TITLDL
        .BYTE $70,$70,$70
        .BYTE $47
        .WORD TDATA
        .BYTE $70,$70,$70,$70,$70
        .BYTE $06,$70,$70
        .BYTE $06,$70,$06
        .BYTE $70,$70,$70
        .BYTE $70,$70,$70
        .BYTE $70,$70,$70
        .BYTE $06
        .BYTE $41
        .WORD TITLDL
;
TDATA
        .SBYTE "     -MULTICOPY-     "
        .SBYTE "      (c) 1985       "
        .SBYTE "   Charles Johnson   "
        .SBYTE "     ANALOG          "
        .SBYTE "     press start     "
;
COLORS
        .BYTE $D8,$34,$0A,$88,$00
;
;
        *=  $02E0
        .WORD BEGIN
;
        .OPT NO LIST
```


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ST notes

by D.F. Scott

Newsworthy happenings in the ST world.

Postponements.

A representative for a southwestern U.S. ST hardware and software distributor tells us the original March and April release dates for many Atari-manufactured items will be delayed for several months. He claims his information was received from Atari's Gerry Tramiel.

According to this distributor, only **1st Word Plus** and **Crystal Castles** will be delivered on time, no later than the end of March. However, such items as Microsoft's **AtariWrite** and **Moon Patrol** games for the ST will be delayed indefinitely. Also slated for delay will be an educational software series the corporation was to be distributing exclusively for Arrakis, as well as **Psion Chess**, a third-party product.

The long-awaited **SX212** modem and **XEP80** video adapter, says the distributor, will also be delayed indefinitely. Not mentioned was the progress of Atari's own **ST Project** integrated software package, a product of the corporation's Software Division under Gershon Blumstein.

The distributor has admitted to a drop in ST unit sales, as a result of buyer anticipation for the **Mega ST**, now expected to be released in the fall under a new title.

Atari was scheduled to be distributing some programs on a non-exclusive basis, among them: OSS's **Personal Pascal**; Quickview's **Zoomracks I** and **II**, and **LDW BASIC Compiler**; MiGraph's **EasyDraw** and **VIP Professional**; Soft Logik's **Publishing Partner**; Royal Software's **EZ-Calc**; Pecan's **Fortran 77** and other programming language utilities; Foresight's **Drafix I** CAD system; and much of MichTron's product line. //

Der Deutsch Angriff.

One of the advantages of moving the **ANALOG Computing** TCS to Delphi: we can now receive international feedback and product news. Michael Klug (username MKLUG) is an Atari enthusiast in West Germany, who has provided news of the important new products being manufactured there.

Omikron BASIC is a cartridge-based interpreter, packaged with some demos and its own resource construction set. Klug says this implementation includes Pascal-like procedure declaration, 19-digit standard precision and a software-based blit routine for block memory moves. A compiler is due for West German release this spring. The price, 230 DM (deutschemarks), Klug translates to $115.

Aladin is a Mac-emulation package (*achtung*, David Small!)—a cartridge without Mac ROM and two accessory disks for presetting of memory configuration and keyboard type (IBM standard or German). Later versions are reported to support Epson-type parallel printer ports. Disk save formats are at nine sectors per track, and the contraption reportedly runs the Aldus **PageMaker** with little or no hassle. The cost is 300 DM/$150.

Signum! is a pixel-oriented, multiple-font word processor with editable fonts and point-positionable cursor. Printing is accomplished by double striking with a 24-pin printer like an NEC P6, or *sextuple* striking with a standard 9-pin. It is priced at 445 DM/$223. **Colorstar** is an artistic graphics program which features picture bending, distortion, zoom and diminish, color-mixing, and picture rotation along a curve. Its cost is 100 DM/$50. //

Quantum Microsystems.

Quantum Microsystems, Inc.'s John S. DeMar reports that the bulletin-board control program **BBST** is currently in the works. DeMar says the program will, in effect, be a high-level programming language, specially developed to run a BBS. This language is so sophisticated, he says, its author has written a full-scale adventure game with it.

DeMar also stated **BBST** will be able to "take existing TOS programs and run them under **BBST** from a menu selection—and it'll go off and execute the program. While it's running, it takes all screen and keyboard input and output, and redirects it to the modem, without the program knowing it."

The graphic design team of Xanth Park—developers of the **Shiny Bubbles** demo featured in January's **ST-Log**—is reported to be developing modem-based conferencing games under the **BBST** system. Projected retail is $49.95. //

Regent Software.

Regent Software's Frank Cohen tells us the **Inventory Manager** program by Walt LaForet is now available. Features include customizable reports, maximum record-keeping of 40,000 parts, sales projections based upon previous records and purchasing projections based on up to seven user-definable parameters.

LaForet is a twenty-year veteran of the automotive inventory control industry, thus the program's advertising slogan, "the inventory control system with twenty years' experience." Works on monochrome and color monitors on all STs. Price is $79.95. Regent Software, 7131

Owensmouth, Suite 45A, Canoga Park, CA 91303 — (818) 882-2800. //

Odds and ends.

Dac-Easy Payroll is Dac's latest ST entry, the company having formerly been a PC-only software manufacturer. The program boasts built-in 1986 tax tables, as well as features for automatic tallying of federal and state withholdings, FICA, FUTA, SUTA and such acronyms. It can also handle seven individualized deductions per employee.

Also included are a choice of salary types, with individualized vacation and sick time. Management reports and payroll registers are in standardized format. It is retailing for $49.95.

Infocom's latest entry is **Hollywood Hijinx**, by Dave Anderson. You take a tour of movie producer Buddy Burbank's estate, in search of the money he left you in his will. You're awarded the money if you find it in one night, and—as you might have guessed—this house is haunted. Let's hope the ghosts turn out to be those of Ingrid Bergman and Grace Kelly—I'd be quite satisfied, at least. In Infocom tradition, the package comes with an autographed glossy of Buddy and a palm-tree swizzle stick, for $34.95.

10th Frame is a bowling program in the manner of Nintendo's "vs." coin-operated game series. The bowler, as well as his sights, are mouse positioned, and the amount of force, swing and hook applied are all mouse controlled.

Perhaps the most head-turning feature of this program is its sound, which was digitized from recordings of an *actual bowling alley*. Every pin sound—the ball rolling down the aisle, the pin resetting, the ball return and even the applause—is taken from recordings. The only thing I miss is Chris Schenkel criticizing the flaws in my stance. Since it's an Access Software item, the package has the famous hardware-based protection key. But it promises unlimited backups. . .somehow. By Roger and Bruce Carver, ST translation by Brent Erickson. The package's retail price is $39.95.

Finally, MichTron is distributing the **Atari ST Realtizer** digitizer for Print-Technik, another trail-blazing German manufacturer. It's a ROM cartridge, with an RCA-type plug that connects to a video camera or VCR. Digitizing can be *in color*, or sixteen shades of grey. Images may be scanned in 2/100ths of a second, and saved in **DEGAS, NEO-Chrome** or **Art Director** format. *Printer drivers for* Epsons and compatibles, *C.Itoh 8510A*, Canon PJ-1080A and Canon *LPA2*.

The included program features video spectroscopy functions with intensity graphs, and electronic color-filtering for red, green and blue electron guns. The cartridge requires no external power source. This is a product for which you're sure to see some in-depth reviews. From PrintTechnik, 8000 Munich 40, Nikolaistr.2. //

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Bits & Pieces

Hooking up a BSR X-10 controller to your Atari.

by Lee S. Brilliant, M.D.

Okay, I have to admit it: I'm a catalogaholic: I love to peruse catalogs, any catalog. I am so bonkers about catalogs that I send in reader service cards for *anything* free. I mean, I have catalogs for everything from abalone shells to zebra wood.

One of my favorite catalogs, of course, is from Radio Shack. In fact, I go there so often that they know me by name in three separate stores. One of their products which intrigued me is the "PLUG'N POWER" Remote Control System (#61-2680). This device, with its associated plug-in slave modules, allows you to control many different appliances throughout your house from the central control unit. The central unit has sixteen device selection buttons and six function buttons, that allow you to choose which remote module(s) you want to work with, then select which function you want the device to perform. You have a choice of ON, OFF, BRIGHT, DIM, ALL LIGHTS ON, and SYSTEM OFF. Each slave module has a selector switch that assigns which of the sixteen buttons it will respond to, so groups of modules can be assigned to the same button.

For example, you can replace all of your light switches with special control modules, some of which substitute for wall switches while others plug in between the wall and your lamps. The lights will work normally, but can also be under control of the central unit—so, if you push *1,ON*, the living room lights come on. Hitting *2,ON* is the family room; *3,ON* controls the kitchen, and so forth. Appliance controllers can be plugged into your outlets for things like radios, TVs, coffee pots and fans. Some light controllers can also vary brightness from bright to dim and, in an emergency or suspected break-in, all lamp modules can turn on at the same time, using the ALL LIGHTS ON button. Wouldn't it be great if your lowly Atari could control all this power? Well, it can; read on.

Simple or complex?

There have been several articles in different electronics and computer magazines covering the use of the BSR X-10 control system. I do not intend to get too technical about the electronics in the system here. BSR manufactures this system and markets it under several names, including Radio Shack and Sears. If you peel off the label plate, it says *BSR X-10* underneath.

Basically, the central control unit has a 24-key keyboard arranged into three columns and eight rows, but only implementing twenty-two functions (see Figure 1). Pressing a key connects one column and one row together, to give the controller an input much like the keyboard in your Atari. Once a number key and then a function key are pressed, the controller's custom integrated circuit generates the proper sequence of digital codes, and sends them out as precisely timed bursts of radio waves coupled to the power lines in your house.

The control modules all receive and decode the signals and, if called, perform their requested functions. In order to prevent next-door neighbors from interfering with one another, each entire system can use one of sixteen possible ID codes labeled *A* to *P*.

Both the central unit and all slaves must use the same ID code to work together.

IC PIN #		1	28	25
		COL 0	COL 1	COL 2
17	ROW 0	1	2	
20	ROW 1	3	4	ON
18	ROW 2	5	6	ALL ON
19	ROW 3	7	8	BRIGHT
16	ROW 4	9	10	
22	ROW 5	11	12	OFF
21	ROW 6	13	14	SYS OFF
23	ROW 7	15	16	DIM

Figure 1. — Keyboard to IC connections.

Other approaches I've seen involve having the computer generate the precisely timed digital code sequences. You have to either build your own transmitter or use parts of the X-10—literally cut out of the circuit board. I decided to take a somewhat different approach. A second electronic "keyboard" is connected in parallel with the existing keyboard. To those readers who are electronic sophisticates, I apologize for my simplistic approach. While not very elegant, it is much simpler to build and program from BASIC.

How it works.

The X-10 Atari interface is simple in its operation, but requires a few tricks in construction. The interface consists of eleven low-power relays with two controller IC's. Why eleven relays? The keyboard is arranged into three columns and eight rows, so we use a bank of eight relays to switch the row, and a bank of three to select a column. They are connected together in such a way that energizing one column relay and one row relay is functionally the same as pushing one button on the central control unit.

The bank of eight relays is controlled by a 74LS138 decoder IC which has three input lines and eight outputs (see Figure 2). A binary number *0* through *7* is entered on the three inputs, and one of the eight output lines numbered *0* through *7* is selected by going to a logic 0 from logic 1 (but only if the Chip Select pin is low). This energizes the relay attached to that line.

Meanwhile, the rest of the output pins continue at logic 1. Similarly, the 74LS139 chip is a 2-bit binary to four-line decoder, and is used to choose the three column select relays. All of this uses 5 bits of binary, but another is needed to turn the interface on and off. This last bit controls the Chip Select lines to the ICs. When set to *1*, the two ICs are disabled and no relays will work, but when set to *0*, the binary inputs are decoded and an output is

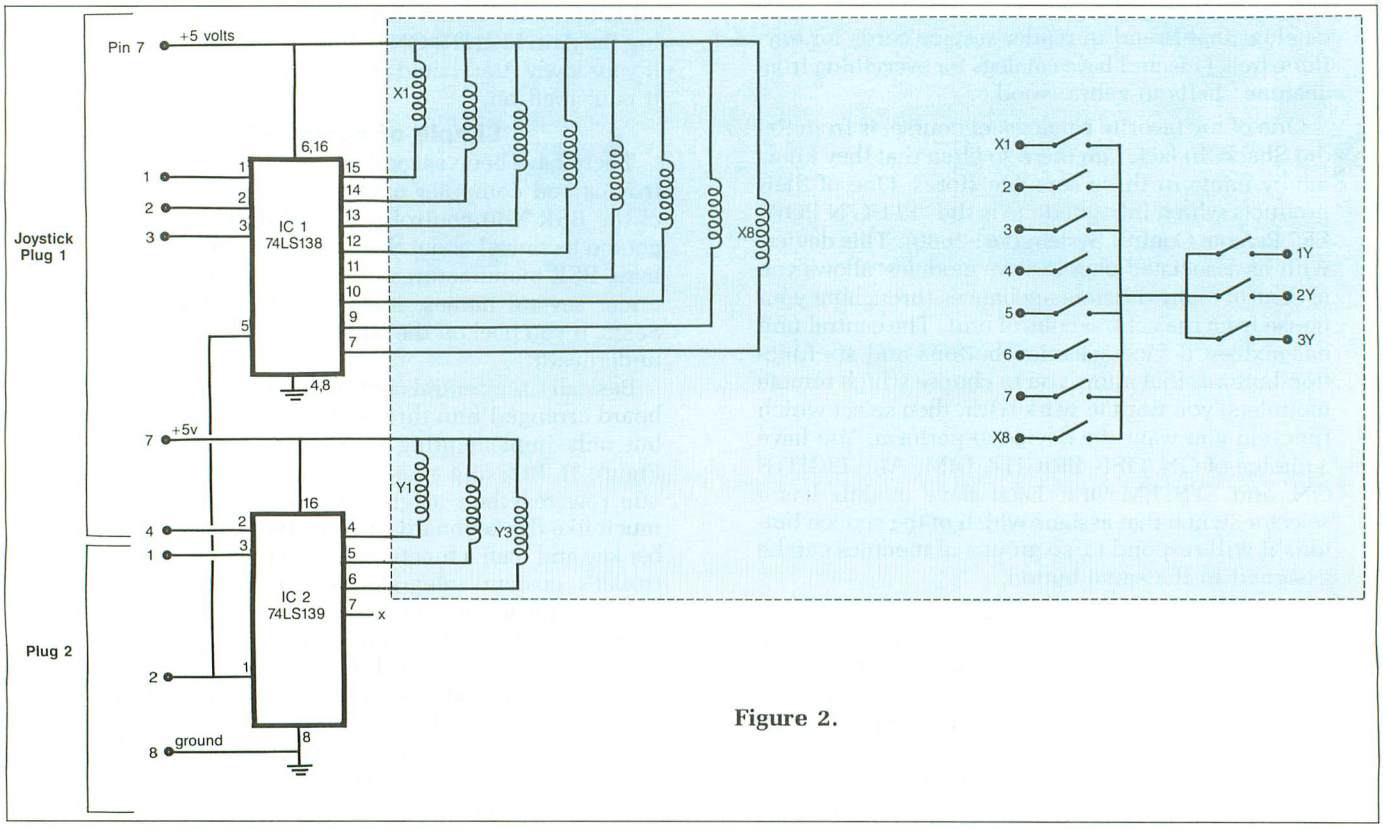


Figure 2.

sent to the relays. This ensures a "no button pressed" state when the interface is idle. Otherwise, even a *0* sent to the decoders would select the 0 column and 0 row relays. Placing the X-10 interface in parallel with the Control Unit allows manual use of the system, as well as computer control —and is also not destructive to the function of the original unit.

Still, installation of the X-10 interface will require some disassembly of the controller and modification of the insides, and so will void any warranty.

The six input lines for the X-10 interface come from the two joystick ports. Falling back on previous articles, we see that the joystick ports can be reprogrammed for outputs by changing the control registers in the 6520 PIA (at 54016).

Building the X-10 Atari.

There are two stages to building the interface. First, the X-10 controller needs to be modified, then the interface itself built. The interface can be constructed on perf board with point-to-point wiring, or the printed circuit board shown in Figure 3 can be used.

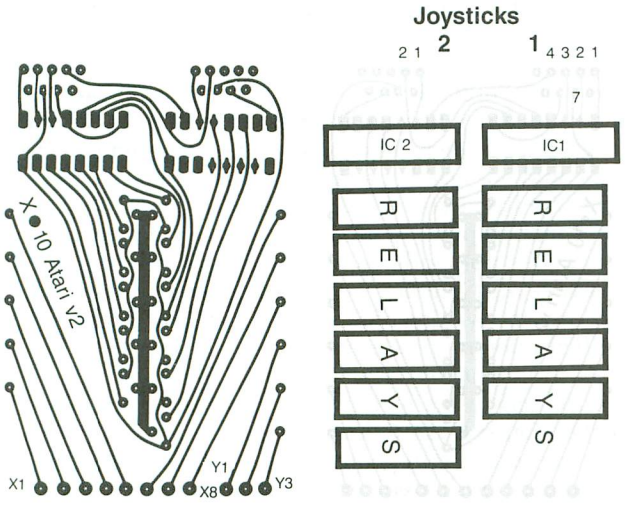
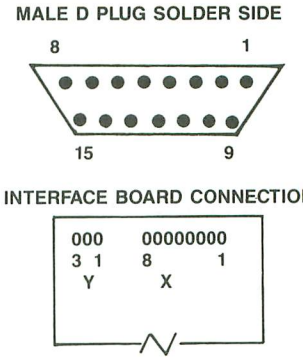


Figure 3. — Printed circuit layout (not to size).

I used a 15-pin D plug to connect the interface and the controller together. The interface board is wired to the pins of the male plug, while the female is mounted on the case of the controller and is connected to the controller's board. This will require that a hole be cut in the case with a sharp knife or small saw. When mounting the relays, you must be careful of the central contact pins, since pulling on them can break the glass envelope inside and destroy the relay.

The interface connects to the computer with two 9-pin D plugs. Note that the layout of pads on the PC board matches the pin layout on the plugs. I used 9 conductor ribbon cable and IDC plugs which will accept the ribbon cable without any cutting, stripping or soldering. Although these plugs are more expensive and available only through electronics parts houses, they do not require hoods (or modification of the plug to take a hood), as do the standard solder-type of D plug. Joystick extension cords will work well, too, but only if they have wires for all nine pins.

Wire the outputs to the male 15-pin plug according to the table in Figure 4.



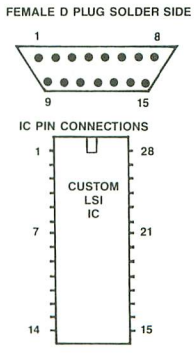
Board Pin		D Plug Pin
X	1	1
	2	2
	3	3
	4	4
	5	5
	6	6
	7	7
	8	8
Y	1	9
	2	10
	3	11

Figure 4. — D plug connections, male.

Because relays are used, there is no direct connection between the controller and the computer, so there's over 1000 volts isolation and it's safe to use the plug-in controller with the computer. Your circuit board can be housed in any box large enough to hold it. I used a small recycled plastic case, but Radio Shack carries a line of plastic boxes that will do the trick.

Connections inside the controller are made according to Figure 5. To accomplish this, you'll need to solder wires directly to the pins of the IC on the X-10 board. Use small-gauge wire and pre-tin the wire. Be sure to unplug the control unit before disassembling it. To open the case, you'll need to remove a Phillips screw hidden under the electrical info label on the bottom, just to the left of center. The IC is located on the keyboard half of the case.

Carefully cut out the hole for the D socket and mount it to the case. Wire the plug to the IC using a low-wattage soldering iron and avoid applying too much heat. Also, be sure to dissipate any static by touching a ground before starting.



IC Pin #	D Plug Pin
17	1
20	2
18	3
19	4
16	5
22	6
21	7
23	8
1	9
28	10
25	11

Figure 5. — D plug connections, female.

Using the X-10 Atari.

If everything has been wired properly, then it's time to connect the parts and test them. Close up the controller unit, plug the X-10 interface into the control unit and the computer, then plug the control unit into the wall outlet. If the

red light on the front panel lights, you have a wiring problem. Type in the program in Listing 1 and save it to disk before running it. Now, connect a slave module to a load (such as a lamp), to observe the operation of the system, and turn on the load. Both the controller and the slave device must have the same system ID code, like *A*. Also, set the slave device number to *1*.

Now, run the program and select device *#1*, and then *OFF*. Now try *#1,ON*. The lamp on the front of the controller will light briefly, and the device plugged into the slave unit should cycle off, then on. If not, then recheck all wiring and use an ohmmeter to check the function of all relays.

The program function is really simple. The device number and function number are translated from decimal into binary, necessary to select the column and row relays in order to electronically press the buttons on the controller. When these numbers are passed on to the joystick plugs and pin #6 (the strobe) drops to *0*, the interface is activated for about 1 second, during which the controller's commands are carried out. When the strobe is reset, the interface is disconnected. The BRIGHT and DIM commands last longer, as determined by how much change you want—but will only work if the device has first been turned on by the ON command.

Two final notes on operation. First is that there is no feedback from the device controlled, so there's no way to verify that the desired command has been carried out. Second, if sixteen devices aren't enough for you, then there is a way to quadruple the number of devices that can be controlled, by adding two relays directly to the two remaining pins on the joystick lines and tapping them into the system ID code switch (see Figure 6). Break the yellow and orange wires and run the ends from the keyboard to free pins on the D plug. Tap in but don't cut the brown wire, and bring it, also, to the D plug. Now, add the two additional relays inside the interface box. The relay contacts are connected between the brown and the orange or brown and yellow wires. The coils connect between pins 3 or 4 and pin #7 of plug #2.

Note: colors may vary from unit to unit. If the unit does not work as it should you may need to change the wiring to conform to this different color code.

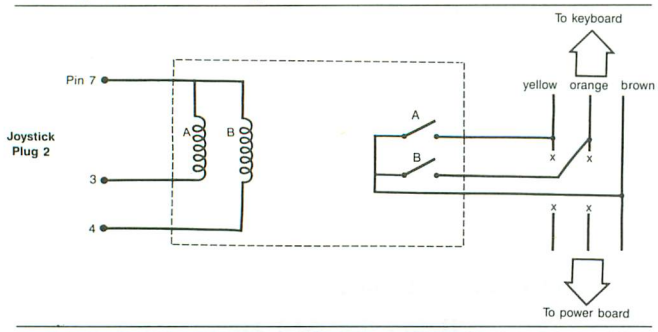


Figure 6. — House code select.

Now, instead of running one of sixteen separate system ID codes, you have four which are controlled by the computer only, according to the table in Figure 7.

	Relay Settings (1=on, 0=off)			
GROUP	Pin 3=1 Pin 4=1	Pin 3=0 Pin 4=1	Pin 3=1 Pin 4=0	Pin 3=0 Pin 4=0
#1 (ABCD)	C	A	D	B
#2 (EFGH)	E	G	F	H
#3 (IJKL)	K	I	L	J
#4 (MNOP)	M	O	N	P

There are four groups of four codes. If you set your control unit for any one ID code in that group, you can computer select any of the four codes within that group. Without computer control, you will default to the first code in each group, thus allowing only four system codes to work without the computer. Now, instead of having sixteen separate system ID codes to choose from, you can computer-select one of four groups. Thus, you can have four banks of devices on four system IDs and choose which group you want. This effectively quadruples your choices, but also limits your ability to avoid contamination by your neighbors.

Final notes.

Radio Shack and Sears only carry some of the possible devices available to you. Recently, I received a catalog (what else) from Dick Smith Electronics and saw a whole selection of other devices, including a furnace thermostat controller and a burglar alarm interface. Using the entire range of controllers along with some intrusion detectors, you could put together a rather sophisticated security and home-control system. Now all you need is a clock to allow your computer to keep track of what time to turn on your coffee pot, and you're in business. But that's another article and another story about another catalog.

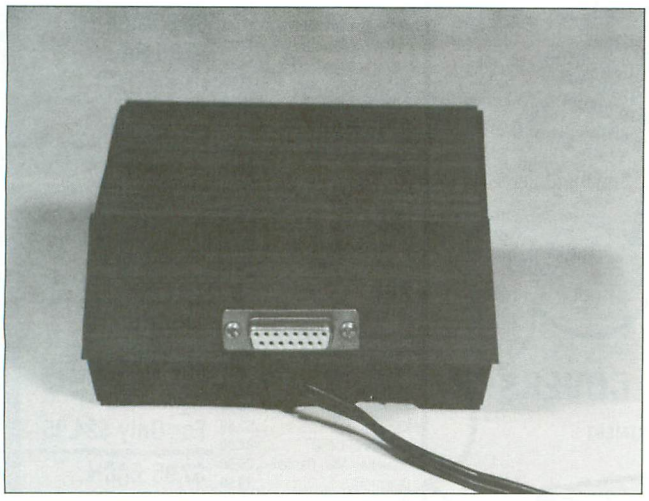
[Since the writing of this article, BSR has changed the configuration of the case and circuit board. It will be difficult to mount the 15-pin plug, but it can be done. The connections to the IC pins are exactly the same. Access to the House Code Selector switch is only possible by removing the circuit board and cutting traces, so I do not recommend this modification to the new units. Otherwise, the article is correct.]

An Obstetrician-Gynecologist by day, Lee Brilliant, M.D. turns into a bug-eyed computer monster by night. He started in 1983 with a TI 99/4A and rapidly moved to Atari. He's programmed on Apple, TI, Commodore and IBM, but prefers his old 800. He loves to tear computers apart to see how they tick—using a scalpel!

PARTS LIST

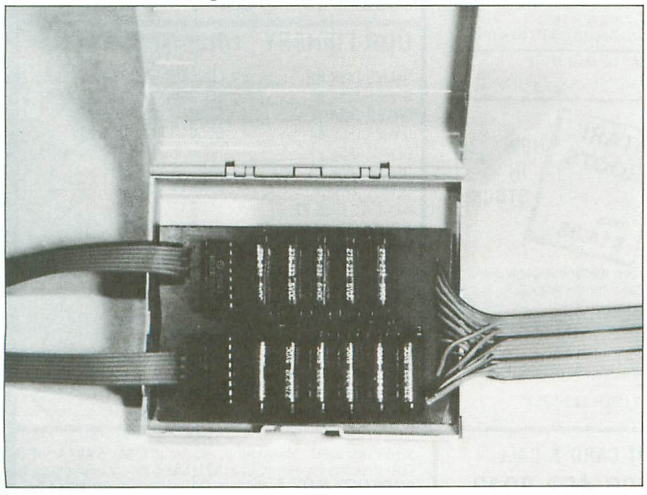
IC1	74LS138 3 TO 8 DECODER IC
IC2	74LS139 2 TO 4 DECODER IC
P1,P2	9 PIN "D" FEMALE CONNECTORS IDC TYPE OR RADIO SHACK 276-1538 WITH HOOD 276-1539, OR USE JOYSTICK EXTENSION CABLES RADIO SHACK 276-1978
P3	15 PIN FEMALE "D" CONNECTOR IDC TYPE OR SOLDER TYPE WITH HOOD
P4	15 PIN MALE PANEL MOUNT "D" PLUG SOLDER TYPE
RELAYS	5 VOLT RELAYS RADIO SHACK 275-232 11 NEEDED
MISC.	1 PLASTIC BOX WIRE AND CABLE 2 16 PIN DIP SOCKETS

Dick Smith Electronics, P.O. Box 8021, Redwood City, CA 94063



The 15-pin D connector
mounted on the back of the X-10 controller.

The X-10 interface connecting 800XL and X-10 controller.
The lamp controller module is on the left.



The inside of the interface.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.
BASIC listing.

```
XC 10 PORTA=54016:PACTL=54018:STROBE=32
TB 20 P=PEEK(PACTL):POKE PACTL,P-4:POKE P
   ORTA,255:POKE PACTL,P
BV 30 DIM FUNC(6):FUNC(1)=1:FUNC(2)=3:FUN
   C(3)=2:FUNC(4)=5:FUNC(5)=7:FUNC(6)=6
VP 40 DELAY=30:GOSUB 1000:GOTO 100
DI 50 POSITION PEEK(82),PEEK(84)-1:? "■";
   :RETURN
WF 60 GOSUB 50:GOTO LINE
WL 70 SOUND 0,100,10,10:A=1^1^1:SOUND 0,0
   ,0,0:LINE=80:TRAP 60
PH 80 ? "ENTER VALUE 1=10:   ←←←";:INPUT
   DELAY
PY 90 IF DELAY<1 OR DELAY>10 THEN POSITIO
   N PEEK(82),PEEK(84)-1:? "■";:GOTO 80
FY 95 DELAY=DELAY*20:RETURN
ZL 100 SOUND 0,100,10,10:A=1^1^1:SOUND 0,
   0,0,0:LINE=110:TRAP 60
KN 110 ? "ENTER FUNCTION:   ←←←";:INPUT F
BP 120 IF F<1 OR F>6 THEN POSITION PEEK(8
   2),PEEK(84)-1:? "■";:GOTO 110
LJ 125 F=FUNC(F):IF F=2 OR F=6 THEN N=0:Y
   =0:GOTO 170
FO 130 SOUND 0,100,10,10:A=1^1^1:SOUND 0,
   0,0,0:LINE=140:TRAP 60
NK 140 ? "ENTER DEVICE #:   ←←←";:INPUT N
SF 150 IF N<1 OR N>16 THEN POSITION PEEK(
   82),PEEK(84)-1:? "■";:GOTO 140
XS 160 Y=8*( NOT (N/2-INT(N/2))):N=INT((N
   -1)/2)
ZM 165 IF F=3 OR F=7 THEN GOSUB 70
WM 170 P=N+Y:POKE PORTA,P:A=1^1:POKE PORT
   A,STROBE:A=1^1^1:POKE PORTA,F+16:GOSUB
    2000:POKE PORTA,STROBE
QW 180 GOTO 40
VI 999 STOP
MQ 1000 ? "■":? "     *** X-10 CONTROLER M
   ENU ***      ":? :? "          SELECT F
   UNCTION"
TF 1010 ? "1. ON                4. OFF
   "
PK 1020 ? "2. BRIGHT            5. DIM
   "
GT 1030 ? "3. ALL LIGHTS ON     6. SYSTEM OF
   F"
BR 1040 ? :? "          LOCATION"
BX 1050 ? "1.KITCHEN LIGHTS     9.COFFEE POT
   "
LK 1060 ? "2.LIV RM  LIGHTS     10.COMPUTER
   "
CB 1070 ? "3.OUTSIDE LIGHTS     11.STEREO
    "
CW 1080 ? "4.                   12.
   "
EK 1090 ? "5.                   13.
   "
EW 1100 ? "6.                   14.
   "
GK 1110 ? "7.                   15.
   "
HY 1120 ? "8.                   16.
   "
CV 1130 ? :? :RETURN
GW 2000 POKE 20,0
DL 2010 IF PEEK(20)<DELAY THEN 2010
AG 2020 RETURN
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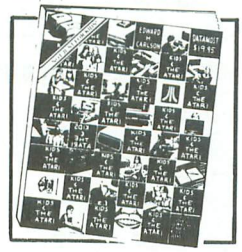

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CIRCLE #125 ON READER SERVICE CARD

The End User

THIS MONTH:

One of the writes of spring.

by Arthur Leyenberger

How many times have you seen a new game at a computer store—or at a friend's house—that really blew you away, made you want to go out and buy it *immediately*? Okay, put your hands down. Now, how many times has the same game—that originally knocked your socks off—failed to elicit a response greater than a yawn after only a few hours of play? Right, I thought so. I've had the same problem.

Sure, there are some classic games for the Atari 8-bits, like **Space Invaders**, **Star Raiders**, **Pinball Construction Set** and **Rescue on Fractalus**, that have a timeless quality about them. But the majority of computer games become *boring* after just a few hours.

About a year ago, I reviewed a game called **Planet Missionary** in a local Atari users' group newsletter. This unbelievable game came from a company called Magical Software. Elsewhere, the game had been referred to as the "sleeper" of 1985. That's a pretty good description, because the game was never released. This has led some people to think that I'd made the whole thing up as a kind of April Fool's joke.

I've spoken to people close to the game, and they tell me it will be released in 1987 under a slightly different title. I promised the folks at Magical Software that I would only show the title screen when I reviewed it in **ANALOG Computing**, since they don't want anyone to see it before it's ready to be released. I can understand this, given the totally new approach the game represents.

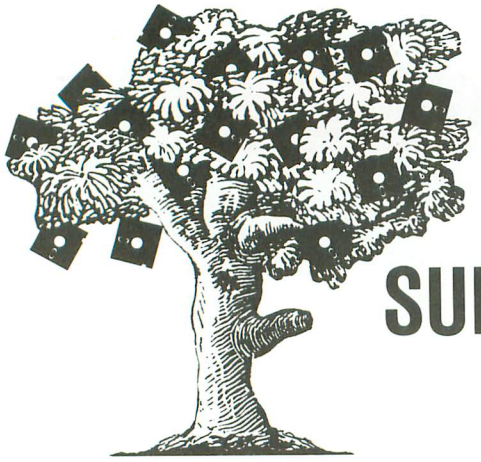
The Magical Software game is called **Planet Missionary: 3-D** (not to be confused with **Mercenary** from DataSoft), and it's simply amazing. There has never been anything like it, and I hope it's an example of things to come.

According to the 320-page manual accompanying it, the program ". . .uses a dynamic time-warping algorithm, which results in an incredible increase in game speed and the ability of the software to allocate more of its processing time to generating the graphic displays. This accounts for the amazing realism that the game projects."

Written by Richard Kushner, the well-known underground programmer, **Missionary** starts out with a **Star-Raiders**-type view out of the front of your ship, with the lower portion of the screen given over to a display of ship's controls. The 3-D perspective makes the various levers and buttons appear to be in your lap. Each command you enter from the joystick or keyboard is reflected both in the movement of the ship and on the control display panel. The excitement begins as the very real-looking planets and asteroids pass by you. These graphics are of the same caliber as those used in the ST game **The Pawn** from Firebird. The 3-D effect has you turning around in your seat to see if the objects are right behind you.

You have orders from the Intergalactic Council of Churches to proceed to a specified star system, approach a particular planet and reform the inhabitants. The population of the planet may be hostile, deranged, civilized or friendly. Once you approach the designated planet and establish communications, there are three alternatives: you may be given permission to land; you may have to negotiate for landing privileges; or you could be attacked while still in orbit. If you happen to be at-

Arthur Leyenberger is a human factors psychologist and free-lance writer living in New Jersey. He's been writing about computers for four years and continues to be an Atari enthusiast. When not computing, he enjoys playing with robotic toys.



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CIRCLE #102 ON READER SERVICE CARD

tacked, one view of the raging battle from above is similar to that of the star fights between the *U.S.S. Enterprise* and the *U.S.S. Reliant* seen in *Star Trek II: The Wrath of Khan*.

Should you be able to land on the planet, you'll see the most stunning landing sequence ever depicted on a video screen. Once you've safely put down, the game becomes a text adventure. You must find where the major population centers are, who the decision-makers of the planet are and what religion(s) currently exist. You must also decide on a strategy for best accomplishing your goal: converting the entire planet to the religion of Universal Truth.

Several alternatives are available for your use in the conversion process. Education, medical care, farming and the missionary position are just a few of the techniques at your disposal. A description of these techniques would be too lengthy to include here. A special surprise awaits if you succeed in converting at least 60 percent of the population.

To summarize, **Planet Missionary: 3-D** is an exhilarating game whose successful completion is as illusory as is its play. The game requires 23.75K memory, an expensive joystick and maybe a disk drive. High-quality cardboard 3-D glasses are included in the package to enhance the fictional experience.

Supermarket software.

It seems everyone is getting into the software business these days. One of the latest entrants into this lucrative field is a supermarket chain called General Giant.

You may be unfamiliar with their corporate name, but you're probably familiar with their trend-setting line of products under the No Frills brand. You may have already guessed it, GG (as we affectionately call it in New Jersey) has introduced a new line of software and hardware, "No Frillsware." Their first two software products are a game called **Shopping Mall** and an application product called **Simple Calc**. They also have a novel input device for the Atari computer.

The biggest buzzword in computers this last year has been the mouse. There are mice for the Mac, the IBM PC, the Atari ST and many professional business computers. But until now, 8-bit Atari users have been essentially mouseless.

General Giant, realizing this sorry state of affairs, has remedied the problem. GG engineers reasoned that, since Atari owners were used to joysticks as input devices, they might have difficulty with the fine hand manipulation required by a mouse. Therefore, the product had to be large enough to be used with two hands. The new Moose "Entry And Retrieval System" (EARS), combines function with fashion, and is about five times the size of a conventional mouse. Since it was too big to be called a mouse, the name Moose came about. The only minor problem with using the Moose is finding a clear area on your desk that's large enough to move it around in.

I've been told future hardware products may include a light paintbrush (larger than a light pen, of course), a graphics skillet that allows your computer to monitor the state of your eggs and bacon with an eight-color display, and a Mickey Mouse joystick —where Mickey's hands are the stick, and any of his oversized mouse buttons are the trigger.

One of the two initial General Giant software products is **Simple Calc**. This inexpensive spreadsheet system is totally compatible with any 16-bit, 8-bit or 2-bit system. It comes with a universal input device that uses state-of-the-art technology and a novel error-correction system so easy even a child could do it.

Also included in this package are generalized masks, to be configured for any spreadsheet application, or for Halloween. The system is not copy protected; in fact, the manufacturer encourages the user to make a copy for back-up or distribution purposes. I've been using **Simple Calc** for a long time now and haven't found any bugs or glitches in the product. If the input device ever fails to work, replacements may be purchased locally at very reasonable prices. If you've been having trouble trying to figure out how to make those fancy spreadsheets and integrated software packages do anything besides display arcane error messages, then **Simple Calc** is for you. Highly recommended.

The other software product introduced by General Giant is a game called **Bloomie's: The Mall Game**. Packaged in the distinctive No Frills white box (see photo), this game has a lot going for it.

You begin **The Mall Game** by selecting one of three different shopping-center scenarios. The first choice is a strip or convenience mall. This includes a dry cleaner, bakery, drug store, bagel shop, ethnic restaurant and supermarket anchor store. The second option is a small regional shopping mall. There are two anchor stores here, Sears and J.C. Penney, and maybe another thirty varied stores. Included in this type of mall are at least three of the following kinds of shops: jeans, books, records, gifts and jewelry. There is also an area of ethnic fast-food stands.

The other mall option—and the most challenging—is the triple decker, mega-store super mall, which has four anchor stores and over one hundred individual shops. There are even twelve movie theatres, six at one end and six at the other. It was this mall scenario I selected to evaluate the game.

The game begins as you try to find a parking place. Extra points are awarded if you can cut in front of another car. However, if there's a collision, points are deducted from your total score. Next, you're presented with a randomly generated shopping list. My list included a pair of brown Levis, a birthday card for my mother-in-law, the most recent issue of **ST-Log**, a Tangerine Dream compact disc, some boxer shorts and a pound of fudge. This particular random list was incredibly realistic, at least for me. The object of the game is to obtain required items in the shortest possible amount of time.

I entered the mall through Sears. My first task, therefore, was to navigate the appliance section without any salespeople approaching me. Extra points are awarded if you can manage a fake in one direction or another, enough to lure a salesman toward you while you continue walking. This is some trick; it requires much practice. Many times I attempted a fake, only to be approached with an offer on a Lady Kenmore freezer. If this happens, you must select from a menu of responses—which include, "just looking," "why yes, please give me a demo," and "sure, that will be a charge." Regardless of your response, you lose valuable time.

Smooth scrolling is used very effectively as you move through the stores. Since your entire shopping trip is timed, more points are awarded for acquiring items quickly. Once you get out of Sears (and I thought I never would), you come upon the main arcade. The first task is to find a directory and locate the stores selling the items you require. The various store locations are randomly generated for each game. I played one game in which (much as in real life) I could not find a store directory. I ended up having to flatfoot it around the entire mall.

Occasionally, the restroom icon appears at the top left of the screen, meaning you have two minutes to find the ladies' or men's room. Needless to say, an uncomfortable number of points are lost if you fail to reach your goal. For every 500 points, you get to visit the ethnic fast-food area, and can choose from among Gyros, pizza, sno-cones, tacos, stuffed potatoes and wonton. The different foods are presented quite graphically. If you select something, you must find a place to sit and eat your treat in one minute. Once again, taking somebody else's seat grants you extra points—unless of course, the person wants to fight. In that case, you'll have to get out of there as fast as possible, after losing precious time arguing.

There are other obstacles that must be avoided. One is a stroller attack. This can take several forms, from having to simply go around three side-by-side baby strollers to being surrounded by strollers of screaming babies—and no escape. One hint: stay away from Penney's. It seems everyone in there is pushing a stroller.

Another obstacle to avoid are teen-age

"mallies." You know the type: plug-compatible, chewing-gum-snapping adolescent females and dumb-looking, shoelaceless, sneakered males. These are probably the most frequent hazard. The kids are just hanging out in the mall and are to be found *everywhere*.

Once you've picked up all the items on your list, you must go out the way you came in and find your car. Again, it's just like real life—I always seemed to have trouble finding my car. The game ends as you enter your car. You then get a "shopper rating." Some of these are Clearance Sale Clod, Grand Opening Shopper, Summer Sale Specialist and the coveted Professional Christmas Shopper. My highest rating was Summer Sale Specialist.

The Mall Game, written by Jean Backes, is a clever game. I find it most appealing because I can relate to it so well. Many common shopping experiences have been built into the game, making it almost as much fun as actually going to a mall. Not a bad job as the first entry for No Frills game software.

Atari's ad campaign that wasn't.

It was a sad day last year when Orson Welles died, especially for Atari. The new Atari had plans to use Mr. Welles as their advertising spokesperson. Wishing a larger presence in the low-end home computer market, Atari believed that a new face would have helped round out their image.

Mr. Welles was to appear in TV, radio and print advertisements. Consistent with the introduction of Atari's new line of PC-compatible hardware, the advertising campaign would have been centered around the theme: "We will sell no computer before its time." When asked to respond, Atari would not make a witty comment on their future ad plans.

New CMOS 6502 chip.

It has just been announced that a new low-power version of the venerable 6502 microprocessor will be included in all new Atari XE computers. The 65C02 chip is completely bug compatible with the existing 6502 and offers a few additional opcodes for use by serious programmers. These opcodes should finally allow serious business software to be written for the 8-bit Atari, helping to change the unfounded "game" image the computer currently enjoys. Listed below are just a few of these new opcodes:

BNR . . . . . Branch for No Reason
CMD . . . . . Create Meaningless Data
DRA . . . . . Decrement Random Address
EDR . . . . . Emit Deadly Radiation
ICR . . . . . Incur Costly Repair
JIL . . . . . Jump to Inaccessible Location
LLI . . . . . Lose Last Instruction
PRS . . . . . Push Results off Stack
RIS . . . . . Remain In Subroutine
SHB . . . . . Scramble High-order Bit
TEC . . . . . Take Extra time for Calculation

Patent Medicine and Elixir Dept.

One of the problems associated with being an Atari computer user is that feeling of paranoia. You know, the whole world thinks the Atari computer is a simple game machine, no matter how much you tell them about the next-generation visual metaphor you're currently developing using a real-time, Pascal-based operating system environment.

Why, just the other day, Lee Pappas, one of the publishers of **ANALOG Computing** and **ST-Log**, told me I'm always making excuses for the Atari. He says that I start each of my **End User** columns with something like, "Most people think that the Atari is a game machine, but it really isn't," or "You know, we've got the best little home computer on the market." Lee reports that I pen phrases like these so often that it sounds as if I'm really trying to convince *myself* of their truth.

Well, if you've got those Atari-paranoia blues, there may be help for you. Gimmee-a-Break Software of Silicone Valley, California has a new self-help program that will have you playing a symphony on the keyboard in no time. Called **InVisiBlues**, the first in a series of Self-improvement Optimized Software (SOS), this program uses Transaction Algorithms (or TA) to help you recover from byting off more than you can queue. This stand-alone product stands out as a serious attempt to help Atari users stand up and overcome their feeling of inferiority incurred by having to stand aside when other computers are mentioned.

But seriously, folks. . .

Okay, okay. I confess. None of it is true; I made it all up. Go ahead, put the handcuffs on and let's go. But can I make a phone call first?

At least we had some fun. I think it's good for us Atari folk to laugh at ourselves once in a while, especially since we *do* have the best 8- and 16-bit graphics machines available. (There, I said it and I meant it!)

I hope the rest of your April goes well. Next month, things will be back to normal around here. We'll talk about some of the new Atari products, now that I've finished unpacking a large box of software. Until then, if someone offers to sell you a copy of **Planet Missionary**, buy it. It may be a one-of-a-kind collector's item.

Database Delphi

News and updates from the *ANALOG Computing* Atari Users' Group on Delphi

by Matthew J.W. Ratcliff

This month, we'll take a look at connecting a Commodore 1702 monitor to the Atari XL and XE computers. There's also a major new product announcement from Atari Corp.

We recently had an on-line conference with Optimized Systems Software (OSS), whose Bill Wilkinson, Mike Fitch, Mike Curry and Mark Rose were in attendance. Among the 8-bit topics covered, Action! was discussed at length. There are some new support packages in development for it, but no specifics were given. OSS is introducing its affordable BareWare product line, which is where you'll see most of their continued support for the 8-bit Atari computers. A complete transcript (edited for readability) is available in the reviews and news database for downloading.

The 1702 connection.

From: MAYOR (Christopher Daily)
To: ALL

Does anybody out there know how I can connect a 1702 Commodore monitor to my 800XL computer?

From: ATARIFLASH (Stephen Roquemore)
To: MAYOR

Try using a 5-pin DIN to 4 RCA cable, available at most electronics stores or mail-order houses.

From: MATRAT (Matthew J.W. Ratcliff)
To: MAYOR

Buy a 5-pin DIN male connector from your local Radio Shack, probably for less than $1.50. Take your 1702 cable and cut off the 6-pin connector that was made for the Commodore 64/128 computers. Strip back the BLACK outer insulation about 1 to 1½ inches. You'll see three wires: one RED, one YELLOW, one WHITE. RED is the CHROMA input for the 1702 (at the rear, red female RCA jack).

Now, the 800XL doesn't have CHROMA output (normally at PIN 5 of the 5-pin DIN on the Atari). However, the 1702 monitor can pull the CHROMA signal out of the composite video signal. Strip back the RED insulation about ½ inch. Peel back the outer copper shielding and twist it. This will later be soldered to ground (PIN 2 of the 5-pin DIN). Strip the translucent insulation back about ¼ inch from the center copper wire. This should be soldered to PIN 4 of the DIN, composite video. Similarly for the YELLOW wire (luminance), soldering the center wire to PIN 1, leaving the outer braid for later. Finally, solder the center of the WHITE wire to PIN 3 of the DIN, AUDIO output. Now, twist the three short braids together, solder them to a short strip of wire, and that to PIN 2 of the DIN. If you're good with a soldering iron, this shouldn't be too tough.

If not, shop around. You may find Atari cables for Commodore 1702 monitors. It's the most popular monitor for 8-bit Ataris. If you get a ready-made cable and hook it up (to the *rear* of the 1702, according to the color codes above), but you only get a black-and-white picture, you'll have to move the RED wire from PIN 5 to PIN 4 inside the 5-pin DIN connector.

From: DLM (Daniel L. Moore)
To: MATRAT

About half the 800XLs do have a chroma output. Atari had four factories (two in Hong Kong and two in Taiwan). Two of them lost a circuit change order restoring the chroma line to the monitor port. It was removed to give left channel sound (yes, there *was* going to be a stereo XL). I don't remember if it was the factories in Taiwan or Hong Kong that manufactured the machines without a chroma line, though.

From: JOEPIERCE (Joseph P. Gateley)
To: MAYOR

Well, before hooking any Commodore equipment to your 800XL, you must tell the computer that it's nothing personal.

SX212 Modem press release.

From: NEILHARRIS (Neil Harris)
To: ALL

November 10: Atari Corporation has unveiled a major new entry in the peripheral marketplace—a fully Hayes compatible, 300/1200-baud external modem, to retail for below $100.00. The SX212 includes an industry-standard RS232 interface port, so it's plug compatible with virtually every computer available. According to Atari's Sam Tramiel, "Atari is now bringing our philosophy of 'Power Without the Price' to the peripheral market. We expect to offer the SX212 modem to a wider range of computer users than has ever before been associated with Atari products."

The Atari SX212 modem includes an internal speaker, auto-dial via pulse or tone, auto-answer and full Bell 212A compatibility. The expected shipping date for this modem is the first quarter of '87.

Wrap up.

The modem name *SX212*, by the way, indicates its ST and XL/XE compatibility while meeting the Bell 212A standard. It has not only a standard RS232 port, but also an SIO port to connect directly to the 8-bit Atari's SIO bus. It can be used with or without an 850 interface.

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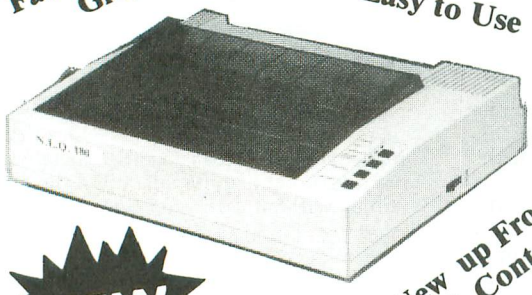

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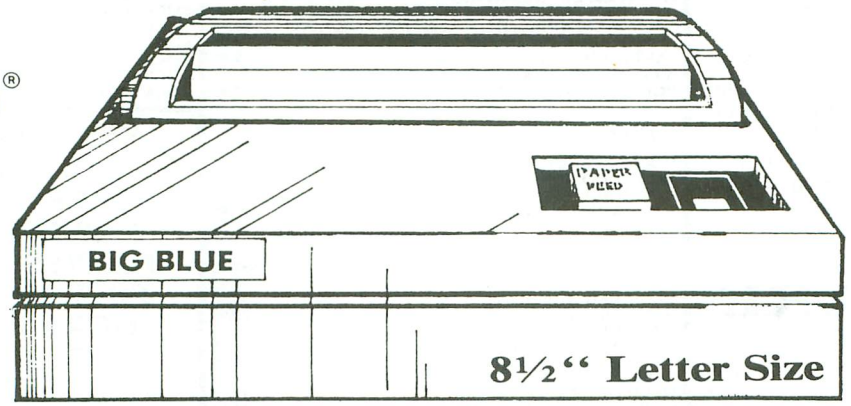

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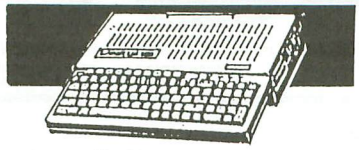

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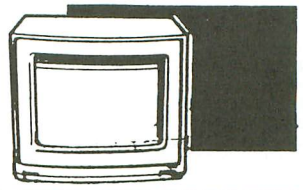

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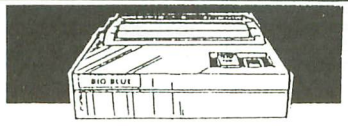

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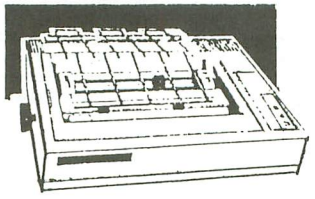

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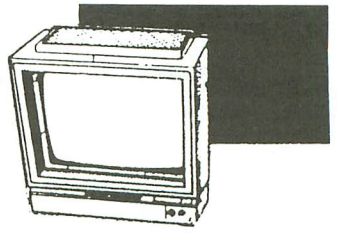

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by Blake Arnold

The **Carina BBS** is different from most bulletin board programs for the Atari 8-bits. The most obvious difference: the BBS created does not accept single-letter commands. Instead, it takes full words as commands (similar to the way Delphi operates). The program itself also differs from most BBS programs in that it's composed of several "modules" which, when used together, form the bulletin board system.

The **Carina**'s documentation is more than adequate. It takes you step-by-step through creating your own system. It also has special instructions for the use of SpartaDOS, which I found to be helpful. The documentation explains the BBS's commands and its related system editors, in full. And, for those who want to modify the program, full technical information is given on the BBS modules and the Modem Operating Environment. The only thing I found lacking here was an index; if I wanted information on a function, I had to search the manual for it.

The **Carina BBS** is made to be modified (although it doesn't have to be). Its modules are written in Atari BASIC and can be easily modified by the SYStem OPerator (SYSOP). The modules perform such functions as file transferring, message base functions, and other BBS-related tasks.

There is one disadvantage to separate modules: the program must load a module before it can perform a function from that module. As an example, if you want to download a file, **Carina** must first load the file transfer module. If you then want to read messages, the program must load the message module. All this loading of modules takes time, especially if you're using a floppy drive. Even with a U.S. Doubler upgraded 1050, the load times are still substantial (and noticeable to the user). However, if the modules are stored in a RAMdisk, the load time is kept to a minimum. (And there's a special module included that will automatically copy files into a RAMdisk.)

The board is easily configured and simple to set up. As with most BBS programs for the Atari 8-bits, the **Carina BBS** supports ATASCII mode for Atari users. It is also possible to configure the board to accept only ASCII calls, or both ATASCII and ASCII types.

The system editors are also easy to use, but there are a few things annoyingly absent. There's no way to extend the userlog; if it fills up, you'll have to either delete some users or reinitialize the entire userlog (which requires all users to re-apply for passwords). The userlog editor *is* easy to use, though. One feature that caught my eye was a "call" function. This dials the phone number given by the user when applying for a password (useful for voice-validating). The userlog editor also allows you to edit a user's security level, time allowed, etc.

Most (if not all) system editing and configuration is done from within the SYSOP Commands module. It's possible to create new message bases, do userlog maintenance, print a disk file to the screen and access most DOS functions. I did find the SYSOP Commands module rather powerful; it's one of the most comprehensive online editors I've seen for an 8-bit BBS.

The system may also be configured to automatically validate users and control access levels. If the system is set up to automatically control access levels, a user's level will be dependent upon his activity on the BBS; the more messages posted and files uploaded, the higher access level he'll receive. There's a limit to how high a user's access level may rise with this function, though. Obviously, you wouldn't want users elevated to SYSOP level by this method, so the program won't raise their access over a 7 (8 and 9 are SYSOP levels).

The BBS also has a status window that displays a user's statistics—access level, time allowed on-line, the user's password, etc. The window is handy when you need information on a user. You can erase the status window by pressing OPTION. In this way, it's possible to use the full screen for reading messages and for other text-related tasks.

The BBS is also capable of sending a list of callers to a printer. This list will contain the users' names, levels, how long they were on, and a few other pieces of information. If you don't have a printer, the information is sent to a special disk file; pressing SELECT displays the file to the screen and gives you the option to restart the list (which erases all the current information and starts the list over again).

From a user's point of view, the **Carina** takes a lot of getting used to. One of the major differences between this program and other BBS programs is that it doesn't take single-letter command input. Instead, the program accepts full words (or their first three letters) as command input. As an example, typing *LOGOFF* or *LOG* would log you off the system.

Macros can be defined for certain com-

mands; hitting CTRL-L would have the same effect as typing *LOGOFF*. It is also possible to chain commands together for certain functions, such as posting messages. Typing in *POST GENERAL TO ALL* would have the same effect as typing *POST*, then following the prompts that ask which message base and to whom you'd like the message sent. The program will also search the userlog for the name the message is being sent to (unless it's to "all"). If it doesn't find the name, the user is informed and the message cancelled.

The message editor is interesting and contains some powerful commands. One of its features that I particularly like is the ability to edit a message even after it has been saved; it's also possible to change the title of a previously saved message. The message editor contains the usual commands to allow editing, deleting and inserting lines. Message bases self-compact, so there's very little message-base maintenance for the SYSOP. The BBS comes with an on-line trivia game, and it's possible to configure a never-ending story.

The file transfer section of the **Carina BBS** program allows two types of transfers. Most files will be transferred with Xmodem. But, if a file is in text format, it may be "printed" to the screen. Extenders are used to show the file's type (game, utility, etc.), and language (BASIC, object, etc.), and also to set the file's security level. As with message bases, if a file is above a user's security level, it will be completely invisible to him. All this combines into an easy-to-use file system.

The actual bulletin board modules are run under the Modem Operating Environment (MOE). The easiest way to understand the MOE's function is to think of it as an operating system overlay that links all input/output devices (the MOE itself is run in BASIC).

The MOE allows most BASIC programs to be modified to work over the modem, as long as they display text in a standard way, and don't use graphics or sound commands. By using the MOE, a BASIC program can be modified for use as an on-line game. The manual describes the MOE completely, even giving technical information for advanced programmers. Although a thorough knowledge of BASIC isn't required to modify programs for the BBS, the more you know, the easier it's going to be. With the MOE, you can also write more modules for the BBS.

The **Carina BBS** also has a built-in terminal, so the SYSOP can call out without having to take the BBS down. And it's possible to jump into BASIC or DOS (if you use a RAM-based DOS, like SpartaDOS) from the program, then back to the BBS program.

Although the **Carina** program has some nice features, it does have some disadvantages. As I said earlier, there's no way to extend the userlog; the addition of a small extender utility would be welcomed. It's quite disk dependent, too, and slow if run off of a floppy drive; a RAMdisk will speed things up considerably.

The screen also flashes annoyingly during some disk I/O, especially with a RAMdisk. Finally, there's no easy way to edit your system configuration; if you need to change even one item, you must go through the entire configuration process again.

If you're already a good BASIC programmer, searching for an easily-expandable BBS setup, the **Carina BBS** with its Modem Operating Environment might be worth looking into. Although the **Carina** program is relatively powerful, it just isn't as flexible or as easy to use as other BBS programs I've tried (to put it bluntly, it just wasn't *fun* to use). I found it inconvenient to have to type in entire words instead of single-letter commands, too. For someone who can't type very well, this BBS would be particularly frustrating. Even the macros (such as CTRL-L) aren't as easy to use as a single-letter command. The **Carina BBS** is unique, though, and does deserve some consideration if you're in the market for a BBS program.

The **Carina BBS** has handlers available for most modems, including the XM301. If you'd like to take a look at a **Carina BBS** on-line, call Carina Software Systems BBS at (305) 793-2975.

Blake Arnold has lived in Dover, Delaware for the past nine years and is currently a college senior. His interests (besides computers) include flying (he's been a licensed pilot for five years), water-skiing and playing guitar.

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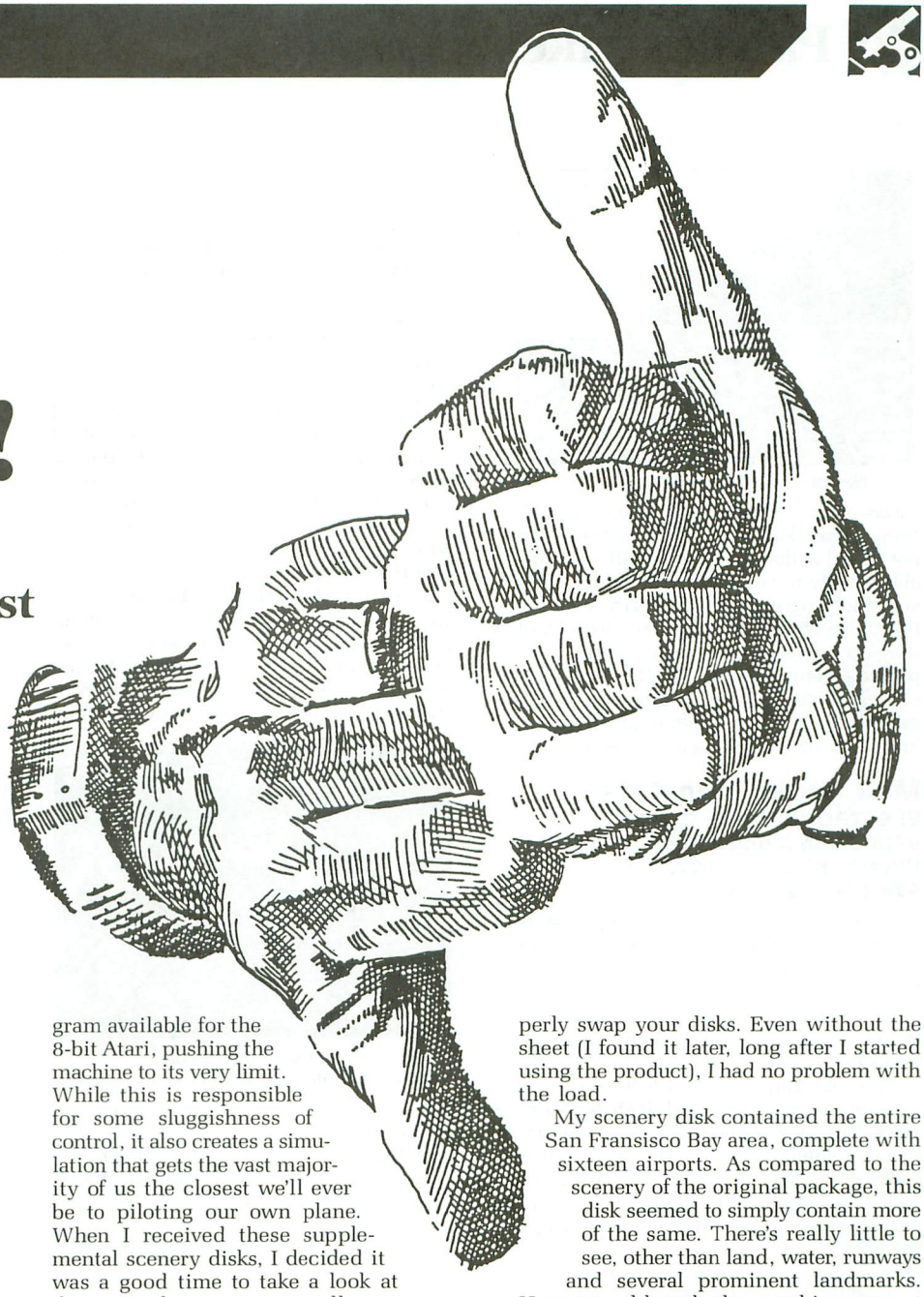

by Steve Panak

Recently I received a package that really got me thinking. Don't cringe; this isn't going to become some sort of metaphysical, psychological essay meant to provide you with some sort of revelation, but one which will provide you with information of no use whatsoever. Read on; what do you have to lose?

Many games I've reviewed over the years have simply disappeared. And these were the good ones. The bad ones don't seem to have ever really existed. One reason for this phenomenon is the nature of the software industry (or, rather, it's the nature of any mass-merchandising industry). A lot of mediocre products have to be created before we stumble onto that single great one. However, one very good simulation got past me on its first trip around, two years ago. Now, upon the receipt of an accessory to the original, I get a chance to look at an entertainment package which, like chess, checkers and Monopoly, is destined to last, in some form. I'm glad this one stuck around. So fasten your seat belts and remember: your life jackets are under your seat cushion.

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SUBLOGIC CORPORATION
713 Edgebrook Drive
Champaign, IL 61820
48K Disk $19.95
Requires *Flight Simulator II*

Flight Simulator II (**FSII**) is perhaps the most challenging graphics oriented program available for the 8-bit Atari, pushing the machine to its very limit. While this is responsible for some sluggishness of control, it also creates a simulation that gets the vast majority of us the closest we'll ever be to piloting our own plane. When I received these supplemental scenery disks, I decided it was a good time to take a look at the original program, as well.

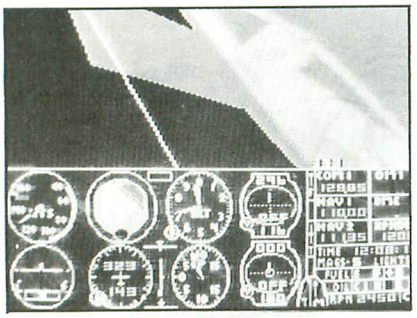
I should add at this point that a complete review of **FSII** appeared in **ANALOG Computing**'s issue 27. Thus I'll not address the "game" itself, except to say it is difficult to learn and to play. I pick up most games within a few hours of their arrival. After a month, I *still* haven't mastered all the intricacies of **FSII**. This is not due to poor documentation or haphazard design, but to the immense complexity of piloting a plane. Fortunately, I was able to get off the ground and keep it airborne long enough to look over this scenery disk. I even landed successfully—once.

Loading the supplemental scenery disk is easy and straightforward. A CTRL-E at any time prompts you to insert your disk; a RETURN loads it into the computer. A supplemental information sheet warns of imminent disaster should you fail to properly swap your disks. Even without the sheet (I found it later, long after I started using the product), I had no problem with the load.

My scenery disk contained the entire San Fransisco Bay area, complete with sixteen airports. As compared to the scenery of the original package, this disk seemed to simply contain more of the same. There's really little to see, other than land, water, runways and several prominent landmarks. However, although the graphics are not spectacular (what can you expect from 48K, especially when it's trying to keep such a complex simulation going at the same time?), they do provide additional places to travel. These are visually interesting, even if they don't contain every landmark in the area. The scenery disk I tested also added a feature that simulates landing in fog—as if the basic program were not hard enough.

The product is packaged nicely and it would be a bargain at twice the price. Especially impressive is the vinyl disk holder and reference sheets, all prepunched for easy insertion into a notebook (purchased separately, by mail). I love little extras like these. Maps of each of the runways, as well as a complete map of the entire area, complete the package.

The number of scenery disks available



New scenes for *Flight Simulator II.*

shows good support for this program, both from the vendors and the buyers. While I'm not sure that the purchase of **FSII** is justifiable simply to see these new lands, I am sure the program itself is worth the cost. If you like **FSII**, you'll like these disks. And they do provide an accurate—albeit simplified—representation of the area concerned. If you run out of airspace on the game disk, these supplemental disks are just what the flight doctor ordered.

Mail Order Monsters

ELECTRONIC ARTS
9713 Santa Monica Blvd., Suite 204
Beverly Hills, CA 90210
48K Disk $39.95

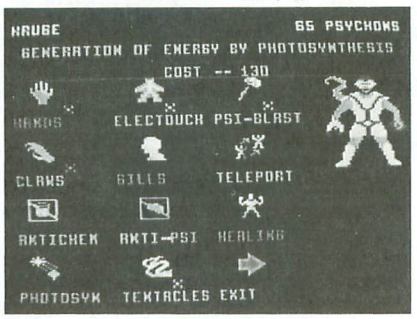
Once again, I am proven wrong. Just as I begin to be lulled into a false sense of security, I'm abruptly shaken and shown the error of my ways. Just when I think a particular software genre has run out of steam, a new and original game is thrust upon me.

This new game is from Electronic Arts. This new game is called **Mail Order Monsters**. This new game is the most original piece of entertainment software I've seen so far this year. Opening with the worn idea of having electronic creatures fight against one another, **M.O. Monsters** ups the ante by adding a powerful editor and an overall concept which is both alluring and addictive. Reduced to the simplest common denominator: you build monsters, then fight them against one another, eventually strengthening your creature until it's the most powerful of all time.

Phase one in this process is the creation of your own MORPH (Mail ORder Psychon Hero). Using a rather sophisticated editor, you pick a body type (such as: humanoid, amoeba or tyro). Onto this body, you add various appendages and powers. Hands, tentacles, fire breath and ray gun are all possibilities. Food and ammunition might make nice (as well as helpful) accessories. Finally, you set the creature's personal attributes, like strength and intelligence.

But none of these is gained free of cost. Each item, extra or improvement costs you psychons, the official Mail Order currency (no credit is available). Each variable you purchase reduces your account, so buy wisely. You can also return any unwanted item—and receive only one-half the purchase price back. This shopping center has all the ethics of Honest Abe's used car lot. Once you've finished your shopping spree, you transport your MORPH to one of a number of battlefields.

There are three battle options. The Free Trial, for beginners, allows you to create and fight monsters while learning control of the game. In the Rental (Intermediate) level, you're given 1000 psychons to build your creature, then you fight in one of three contests: Destruction (works pretty much the way it sounds—destroy your enemy); Capture the Flag, in which the winner is the first to collect eight flags; and The Horde, in which you and player two must cooperate to destroy The Horde. In all play variations, one or two may compete. You can fight in a number of environments, from desert to arctic waste. Which one you battle in is dependent upon your opponent's choice and your body type. You



Monsters for the making in *Mail Order Monsters* from Electronic Arts.

can depend on your opponent to choose an environment unsuitable for your creature. But don't worry; you'll get to choose one of the three above-mentioned battle options. Just remember to make the contest as difficult for his creature as possible.

The advanced game is Tournament level, in which each player starts with 500 psychons. As you win battles, your bank account grows and, with it, your monster's strength. In this battle option, each player can set an additional rule, such as "No Chemical Attacks," to hinder the enemy. The ultimate goal is to make your creature invincible. Every time you gain points, you may exchange them for more, greater powers and/or new MORPHs. You can move creatures to the corral, creating a vast army of monsters. It's possible for any number of players to strengthen and save monsters to disk simultaneously.

But not all is roses in **M.O. Monsters**. Although the graphics are state of the art and the editor superb, control in the battle segment is clumsy. Actually, it's simply hard to get used to; it's not always apparent in what direction your creature is attacking. **M.O. Monsters** lacks the instantaneous control I like in arcade games.

This is because, after each attack (be it firing a gun or hand-to-hand), your creature must wait, and rest or reload before it can attack again. And, while an indicator lights when you're able to fire again, I'm a rapid-fire nut and hate to wait. Fortunately, the wait will decrease as your creature becomes more powerful. There are also various submenus you can open up, that let you change weapons and activate other devices, like healing kits and food dispensers. After a bit of practice, these menus are easily accessed, even during ferocious battle.

The manual is a humorous and well-written ten pages. It covers play and control in such a way that you actually find yourself believing this mail-order house exists. All the products available for purchase are explained, though a little play will be necessary to get acquainted with the MORPHs—their powers, accessories and devices.

The return of the warranty card entitles the owner to a one-year subscription to *Farther*, EA's new quarterly newsletter. This is a nice bonus. The initial issue, although it contains all the self-serving propaganda one would expect of such a publication, was well written and interesting. In a similar way, this game's graphics are very nice and highly detailed. I loved the way the various appendages appeared on MORPHs as their owners progressed through shopping sprees.

Overall, **Mail Order Monsters** more than pulled its weight. Although I felt the battle portion of the game was flawed, its other favorable traits certainly make up for that. It's an entertaining game, one which allows enough creativity and adventure to earn itself a passing grade.

Moonmist

by Stu Galley and Jim Lawrence
INFOCOM
125 CambridgePark Drive
Cambridge, MA 02140
48K Disk $34.95

Moonmist is the newest volume in the mystery wing of the Infocom Public Library. This introductory-level game is also the perfect work for patrons interested in checking out a good mystery. Co-authored by Jim Lawrence, a contributor to the popular Hardy Boys and Nancy Drew series, this piece might also be the perfect entry point for younger adventurers.

In the story, you find yourself portraying a famous American detective. An old friend of yours, Tamara, has become engaged to a British lord. However, her storybook life at Tresyllian Castle, a popular tourist attraction owned by the lord, has been turned into a nightmare by the appearance of a white, ghostly woman. According to Tamara's letters, this specter is rumored to be the ghost of Dierdre, a jilted lover of Tamara's fiancée, Lord Jack. It

Gothic mystery aplenty in *Moonmist*.

seems she drowned just after Jack broke off their romance, although the body was never found. Could it be that she never drowned at all? Perhaps, but the mystery of the ghost is only one puzzle which will challenge you in **Moonmist**.

Hidden somewhere in the castle is a valuable treasure, and you're not the only one aware of this fact. Clues, in the form of riddles, are known by yourself and by most of the other colorful characters living in the castle. Part of the adventure is a treasure hunt through its halls, in search of the booty. Clues range from a simple skeleton image in a Chinese mandarin costume to complex riddles, such as "Forbidden fruit tempted the very first lass; 'Twas once in a garden, but now in a glass."

As if this isn't tough enough, you'll also have to keep an eye on each of the cunning characters in this game—and remember, as in reality, given the possibility of great financial gain, people occasionally act a little differently than they might want you to think they would. This is one of my favorite aspects of interactive mysteries—the development of and interaction with memorable characters. And, though **Moonmist** is full of them, I found the butler especially noteworthy. . .and, like all butlers, suspicious.

Included in the vast, superb documentation are: a manual, two letters from Tamara, a brochure containing a map of the castle, and an iron-on **Moonmist** decal for your soon-to-be favorite shirt. The manual includes a book borrowed from the Festeron Town Library, entitled *The Legendary Ghosts of Cornwall*. This contains enough stories to horrify even the strongest ghostbuster. You'll want to read through them to get yourself in the mood. The remainder of the manual completely explains operation of the program. Although the shirt decal was my favorite accessory, the map and brochure were quite helpful. However, like the tourist brochure it imitates, this pamphlet doesn't disclose the numerous private portions of the castle. Of course, as you might expect in any self-respecting castle, there are plenty of secret passages for you to explore.

The program operates much like other Infocom titles. The only modification to the standard Infocom parser is the ability to use *X* as an abbreviation for "Examine." This was a relief to me, as I'm curious and tend to examine everything I can get my hands on—and some things that I can't. **Moonmist** derives your gender from your name, to correspondingly modify the game parameters: what you wear, and how the other characters treat you. This, along with the Gothic setting, should appeal to many women. Finally, any of four versions can be played, each with different riddles, clues and treasures. The version you play is dependent on what you choose as your favorite color at the start. And even this variable influences the story: choose red and you drive up in a red car, while a red bedroom awaits you.

On the down side, I don't have to tell you that each new response requires a time-costly disk access. Fortunately, "Superbrief mode" speeds you through familiar territory. Also, while the four variations offer different puzzles, they occur in a déjà-vu-like pattern framework. While the variations extend the playing time of the game, they're a poor substitute for the next new Infocom product.

I would recommend **Moonmist** for all Infocom newcomers, especially those who like a good mystery. Veterans—who may find the introductory level too facile for their powerful minds—probably ought to wait for Infocom to bring forth their next offering. But this very aspect makes **Moonmist** the perfect entry for new adventurers. For them, **Moonmist** is a must.

Rommel Battles for Tobruk

by Frank Chadwick, Steven Hokanson and Bernard K. Dehmelt, Jr.
GAME DESIGNER'S WORKSHOP
P.O. Box 1646
Bloomington, IL 61702
48K Disk $39.95

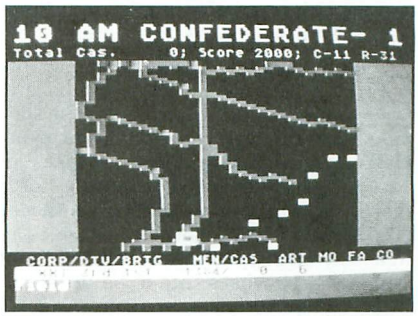
This is my first look at a collection of simulation games produced by Game Designer's Workshop and distributed by Electronic Arts. I quickly found out that these offer a number of unique features, as well as high quality. Whether you'll prefer them to your current simulation is going to be a close call, dependent on personal prejudices. The title I'll examine this month is **Rommel Battles for Tobruk**.

This program recreates battles fought during World War II between the German Panzerarmee Afrika and the British 8th Army, for control of the strategic North African port of Tobruk. There are four battle scenarios available: Brevity, Battleaxe, Crusader and Gazala. Each recreates a different, increasingly complex and difficult battle, in the long struggle for control of Tobruk.

Game play is divided into a series of turns (the number dependent on which scenario is played), each representing a day in the battle. Turns are further divided into twelve impulses, which last 1½ hours in the day, 4½ hours at night. Each of your various actions takes one or more of these impulses.

To issue orders, you "pick up" the unit you wish to command. This means you move the cursor over it, via either the keyboard or joystick (the latter being the preferred method), and press *j*, *f* or the joystick button. You then issue any of the five basic commands: advance, march, assault, defend or regroup. The first three move your unit, either quickly or cautiously, possibly engaging the enemy in combat. The other two modes allow a unit to rest and rebuild health and morale.

After each side has issued its orders, the computer determines the result, by means of the resolution phase. A turn is completed by reviewing outcomes for the players, impulse by impulse. Basically, this allows players to see what happened during the resolution phase. Since this is a source of feedback on a commander's tactics, advanced players will want to study it. Various keys allow you to step through the review, impulse by impulse, unit by unit, in any direction and at any speed, till you've seen all you want. Then, the next Axis turn will begin. This sequence is repeated for the number of turns in a particular scenario. A running tally of victory points is kept, allowing you to see exactly how you have fared.



Tough tactics for the port of Tobruk.

Control of this complex game is handled nicely. You can issue most commands with your joystick, although even in the two-player version only one stick can be used. A number of pregame options are available, to increase complexity of play. Some examples are: the addition of planes, fatigue and supply factors, and modification of the computer-controlled opponent's intelligence. You can start out with the units in their historical positions, or you can edit them into you own configurations. Enemy units can be visible or invisible to you. This vast number of options creates a game that will grow with you.

Documentation is vast and complete. A manual contains the rules and full instructions on use, including a very nice tutorial-style start-up portion. A separate booklet provides historical notes and strategies on

the scenarios. They really give you a feel for the place these battles had in history—if you're not careful, you might even learn something. A reference card gives an abbreviated list of all command keys, as well as diagrams of the joystick control. Other slips of paper give machine-specific loading instructions. Finally, hex maps allow players to plan strategies on paper before execution. My only complaint on the documentation is with its organization—it's hard to find just what you need in a handful of loose papers. I was also slightly disappointed with the screen display. While it presents all of the information, it isn't as sharp and detailed as those I've seen elsewhere.

But these are minor difficulties; they should not deter the buyer from experiencing this fine game. As with all simulations, not as easily learned and played as arcade wristbusters, the program requires a commitment from its players. However, once learned, this simulation will provide its owners with hours of entertainment. **Rommel Battles for Tobruk** is a winner.

There's little to apologize about this month. Of our slew of fine programs, any would make a fine addition to your software library, though I felt our arcade game, **Mail Order Monsters**, was the weakest of the lot. Next month, we'll be pitting North against South, brother against brother—**The Battle of Chickamauga** from Game Designer's Workshop and **The Turning Point** from SSI—in what's sure to be the simulation square-off of the decade. And, as we've seen this month, the challenger is strong indeed.

The author wishes to thank the Magic One Computer Shop of Barberton, Ohio for their invaluable assistance in the creation of this chronicle.

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Video Vegas

BAUDVILLE
1001 Medical Park Dr. S.E.
Grand Rapids, MI 49506
XL/XE computers $29.95

by Tom Garzelloni

My wife and I take our spring vacation in Las Vegas just about every year, and when we're not there we wish we were. As soon as I heard about **Video Vegas,** I had to get a copy. It comes with four different gambling games: Slots, Blackjack, Draw Poker and Keno (a game similar to bingo).

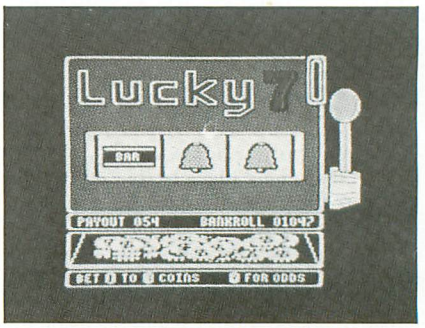
The program boots with a picture of a winking Hacker Jack, then loads a picture of a bustling gambling town. This is great, but unfortunately, there's no way to jump directly into the program until this opening scenario has run its course.

The first program, Slots, is a simple one-row slot machine. The payoff is a higher one than at most casinos in Las Vegas—which makes it more fun to play. The graphics are good, and the sound comes close to that of the electronic games in Vegas. You can't say much about a slot-machine program, but this is the best one I've seen. The coin animation is impressive.

The Blackjack segment of **Video Vegas** is true to Las Vegas rules, and allows you to choose the number of decks you'll use. The card graphics are very good and the game play fast. The instruction pamphlet includes standard betting rules, which will help to even the odds some. They also give you methods of card counting, but not in the detail found in Ken Uston's **Blackjack**.

Draw Poker is the traditional five-card draw game. It almost matches—in graphics, sound and speed—the poker video machines in Las Vegas. The computer deals you five cards face up, and you pick which to hold and draw. It's almost like being there.

The final **Video Vegas** game is Keno. In all the years I've owned a computer, this is the only program—game, utility or application—my wife has used for more than five minutes at a time. Keno is a numbered board game, (1 to 80), resembling bingo. You place a bet and select one to fifteen numbers on the board. The amount you bet and the number of squares chosen will determine the payoff size. The computer then picks twenty numbers, displays them on the screen in inverse and looks for all matches.



Gambling without the glitz—*Video Vegas.*

Overall, this is a good package. My only complaint is the inability to use a joystick. All comands are entered at the keyboard. If this program is typical of Baudville releases, Atari owners can look forward to some excellent products.

Video Vegas is also available for the ST line. Now all I need is a good craps and roulette program. I could save all that money I spend in Vegas.

Thomas Garzelloni has worked for the past eleven years as a machine designer, checker for Rapid Design Service. He has his B.S. in Education, with a major in Drafting. He's been president of the Muskegon A.U.G. for four years, and has owned an Atari for five years. He enjoys programs in Action!, games and educational software.

Modems and the Atari 8-Bits

Here's what you'll need to know to enter the world of telecommunications.

by Andre Molyneux

One of the most enjoyable aspects of owning a personal computer is the ability to communicate with other computer owners. You can have a conversation with another user, or you can find out about the latest products, receive programs and connect with a variety of information services. To accomplish these tasks, your computer must be able to connect to other machines. This is accomplished over standard telephone lines through the use of a modem, a device to convert signals from the computer into signals that can be sent over these lines.

Using a modem isn't that difficult, but trying to figure out *how* to use one—from the information provided with it—often is. Deciding what hardware and software to use is hard, too, if you aren't familiar with the products. This article attempts to remedy such problems in several ways. First, we'll get our terminology straight, by defining some of the words normally used when discussing modems. Next, we'll look at some of the different modems available and the software needed to operate them. Finally, we'll discuss what you can connect to and what you can do with that modem once you have it up and running.

Technical terms.

Let's look at some of the more common terms used in telecommunications.

ATASCII — A special Atari-only character set (includes special graphics characters).

Auto Answer — A feature which allows a modem to answer the phone when it rings.

Auto Dial — A feature which allows a modem to dial phone numbers.

Baud rate — The speed at which data is transferred by the modem and computer. Common baud rates are 300, 1200 and 2400.

BBS — The acronym for a Bulletin Board System.

Download — To receive a file from another computer or from a BBS.

Full-Duplex — The transmission of data in both directions at the same time.

Half-Duplex — The transmission of data in only one direction at a time.

On-line — To be connected with another system.

Parity Bit — A bit used for error-checking. Set parity to *none*, unless otherwise stated.

SYSOP — Short for SYStem OPerator, the person who runs a BBS.

Upload — To send a file to another computer or BBS.

If some of these are still confusing, don't worry. More explanations will be provided as the terms are used.

Decisions, decisions. . .

If you haven't purchased a modem yet, you have a lot to choose from. Auto-dialing and auto-answering are two features you'll want to look for. Baud rate is another important factor; 300 is kind of slow, 1200 or above is much better.

A number of manufacturers (including Atari) build modems that will connect to Atari 8-bit machines. These can be divided into two categories: modems that need an interface to connect to the computer and modems that can connect directly.

For modems that don't connect directly, you need an Atari 850 (or similar) interface which provides an *RS232* port. Most modems that connect to an RS232 port are *Hayes* (Hayes Microcomputer Products) *compatible*. These modems are the industry standard and can be connected to almost any computer. Baud rates of 300 or 1200 are available with most of them. There's a wide selection to choose from, and you may have some trouble deciding on one—it

should have the features you want *and* should fit into your budget.

At one time, Atari manufactured a modem that connected through the 850 interface. It was called the *835* and was an *acoustic modem* (meaning you had to set a telephone handset on the modem for it to work). The 835 was for 300 baud and had neither auto-dial nor auto-answer capability.

The selection of *direct-connect modems* for the Atari 8-bits is more limited. The most common ones are the Atari *1030* and its replacement, the Atari *XM301*. The 1030 has been out of production for some time, but you'll still see a few advertised from mail-order houses—and often at users' group swap-meets. The 1030 works at 300 baud and can auto-dial, but it cannot auto-answer without modifications.

The XM301 has a number of attractive features. It has the capability to auto-answer and to auto-dial. It also requires fewer connections than any other modem, because it draws power directly from the computer. Like the 1030, the XM301 operates at 300 baud. One word of warning, however. Some XM301s have a defect which causes them to interfere with disk-drive transfers. If you get an XM301 with this problem, it can be cured with the addition of a few resistors—although this voids the warranty.

A number of third-party manufacturers also make direct-connect modems. One of the most popular is the *Supra 300-At* (formerly the *MPP 1000-E*). This modem gives you auto-dial and auto-answer, and comes with its own software. Other direct-connect modems are available, but none has reached the popularity of the three listed above.

Once you've decided on a modem, you need to obtain the software to make it work. When choosing software, make sure it will work at all the baud rates available on your modem. Also, be certain the software supports any special features built into your modem. It won't do you any good to have a 2400-baud, auto-dial, auto-answer modem if your software works at 300 baud and can't tell a dial-tone from a touch-tone.

One disadvantage to buying a modem that doesn't hook directly up to an Atari is that most of them don't include software. If you find one of the rare models that does, the program is likely to be for IBM compatibles and won't do you any good (aside from providing you with a disk to reformat). This leaves you with two alternatives: go out and buy a program, or find a public domain program.

When buying modem software, follow the same rules you would in buying anything else. Find a store that will let you try out the program before purchasing it. Computer specialty shops are usually preferable to normal retail stores when you're doing comparison shopping. In comparing programs, look for one with the features you want that lets you exercise its options easily, but keeps a low profile while you're on-line.

If you're looking for a public domain program, Keith Ledbetter's *850 Express!* is tough to beat. It's a full-featured terminal progam, one that rivals most commercial software. It is by no means the only public domain software available, but has certainly become many people's favorite.

If you have a direct-connect modem, chances are it came with some software. In most cases, a disk with DOS and a terminal program are included. In others, the software is physically built into the modem. The provided software is usually enough to get you started, but often leaves a lot to be desired.

The terminal program built into the Atari 1030 is a good example of poor software. The best part about this software is that you don't even need a disk drive in order to use it. Unfortunately, it doesn't let you do file transfers—so you're out of luck if you want to up- or download any files. The 1030 is a perfect example of a good modem being held back by mediocre software.

Some of the disk-based programs are also less than great. When I received an XM301 for Christmas in 1985, I ended up sending it back—the darn thing wouldn't answer when the phone rang. I obtained another one a few months later and got the same results. It wasn't until I tried *1030 Express!* (the direct-connect version of 850 Express!) that I found the trouble was in the software.

Due to problems like these, you probably won't be satisfied with the software provided with most direct-connect modems. Public domain programs are your best bet, as quite a few of them have been written. One popular program has been *AMODEM 7.2*, although it's sometimes a little slow because it was written mostly in BASIC. My personal favorite is 1030 Express!, which was written in Action! Both these programs have a few rough edges, but will be well worth your effort in obtaining them. The best place to locate either is through a users' group library. (You can download them from some BBSs and from our Atari Users' Group on Delphi, if your current terminal program can do file transfers.)

How and *what* to do with it, once you've got it.

Once you've decided on a modem and software, you have to determine how to use it and what to use it for. There are a few parameters you'll have to set, depending on whom you're going to connect to. These can be set either through the software or by switches on the modem. Using the wrong settings can make intelligent communication difficult or impossible.

The first factor to consider is baud rate. You need to make sure that your computer and modem are both set to the same baud rate; otherwise, nothing will happen. You also have to make sure the computer you're connecting to can operate at your baud rate. A 1200- or 2400-baud modem can slow down in order to communicate with 300-baud systems.

Your duplex setting is also important. When your software is running half-duplex, it displays what you type and what is sent to you by the other system. Some systems (including BBSs) will echo everything you type. This would result in having every character shown twice (like this: *AAttaarrii*). To avoid this, your computer can be set to full-duplex, in which case it will display only what it gets from the other system.

A third setting you need to consider is parity. Parity refers to a bit which is used to help detect errors in transmission. As a general rule, set parity to *none* when con-

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necting to a system you don't know. Once you've determined the parity setting of a new system, you can adjust yours accordingly. Parity can usually be set to *even, odd, none* or *clear.*

One final parameter you should be aware of: whether your computer is using ASCII or ATASCII. ASCII is the standard character set used by most computers. ATASCII is an Atari-only character set. If your terminal program allows you to toggle between them, choose ASCII for the time being. The only time you'll want to use ATASCII is when you've connected to another Atari and want to be able to send graphics characters.

Now that your hardware and software is ready to go, who should you call? You can dial a BBS, a financial service, a pay service, another user, or a host of other services. Be warned, however, that you can't simply dial up a number and go.

To start with, if you're going to call a friend with a modem, let him know that the call is coming. It can be pretty annoying to answer the phone and get an earful of computerese! Arrange a time, so your friend can have his or her equipment ready to go when you call.

If you decide to start with a BBS, check the listing where you found the number. If there are operating hours listed, call only during those hours. Some people run BBSs out of their houses using their only phone line. If you call at the wrong time, you're likely to get a person, rather than a computer, on the other end.

When calling any type of BBS or information service, be aware that there are several different kinds. Some are open services, meaning that anyone can call and access the board. Others are open only to members of various organizations (users' groups, for example), and you must join in order to use the system. Finally, some BBSs—and most information services—are pay services. The system will keep track of how much time you spend on it each month and bill you accordingly.

When you *log on* (sign in) to a system for the first time, you probably won't be able to access many of its functions. You will usually be asked for your name and phone number, and will be issued—or allowed to choose—your own password. The purpose of the password is to make sure no one else can access the system with your name. If someone should use unacceptable language or upload pirated software, the SYSOP needs to know who's responsible.

Some BBSs have adult-only sections which are *not* for the faint of heart. They often contain strong language, so avoid these boards if you're easily offended. The SYSOP will usually confirm that you're a legal adult before issuing you a password for these sections.

Once you've received a password, you'll usually have to wait a day or more before the SYSOP has a chance to enter you as a valid user. SYSOPs check on people who've applied to their BBSs, to make sure the applicant isn't an undesirable with a record of system abuse. Once you've been validated, you can really start to make use of the system.

On some boards, you'll have full access the moment you're validated. On others, you have to build up points—by posting messages and uploading programs—to keep your access level up. If you don't have much time to spend composing messages, or don't have much public domain software to upload, avoid the boards that make these requirements for full access.

Most BBSs have menus to make finding your way around fairly easy. If you have trouble with the board, you can always leave a message for the SYSOP and explain the problem. Most of them are very friendly and will be glad to help you.

You'll find most people who access BBSs friendly, and you can often make new friends. Many are very knowledgeable and can help you with a lot of the problems you encounter in using your computer. My users' group BBS was instrumental in helping me correct a problem with my XM301—and probably kept me from destroying the thing out of sheer frustration.

A few hints.

In closing, I'd like to give you a few tips on how to use a BBS. Some are common courtesy, while others can save you time—and money! Above all, keep in mind: *you aren't the only person using a particular BBS—others will be affected by your actions.*

First off, *don't curse* on a BBS, unless it's a board that specifically permits it. If you must make strong feelings known, say something like @$%&#*#$&%! It'll get the point across.

Second, *avoid battles* with other users of a board. There's nothing more annoying than to be reading through the messages left on a BBS and find that half of them are "war" messages left by one party or another. If another user tries to drag you into one of these petty arguments, simply ignore any postings by that individual. More often than not, the SYSOP will force them to clean up their act or lose their access privileges.

Finally, use the fastest setting that both your equipment and the BBS can handle. This pays off in a number of ways. First, you can get more accomplished in a shorter amount of time. Most BBS's have a maximum time per user, so going faster will let you do more during your allotted time. Second, if you're calling a board long-distance, you can keep Ma Bell's charges to a minimum. Third, and last, if you're accessing a pay service, you can cut down on charges from them in most cases (though some do charge higher access fees for higher baud rates).

I hope I've given you who are new to telecommunications some idea of what to look for in the way of equipment, while also giving a few pointers on how to use it. If this article lets anyone avoid some of the problems I had when getting started with a modem, it was well worth the effort.

André Molyneux is pursuing a Bachelor's Degree in Electronic Engineering Technology, in Phoenix, Arizona. He's been working with various computers since 1981, and currently uses a 130XE. His other hobbies include amateur radio operation.

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Modem Max—
The Baud Warrior

Survivalism in the telecommunications arena, for those who already know their modems.

by Maurice Molyneaux

Sorry! Terrible pun, I know. Now, if you'll forgive my baud jokes (go ahead, hit me; I deserve it), we'll get down the business at hand. "And what," I hear you cry, "is that?" Why, as if the poor humor of the title and opening lines didn't give it away, a survival guide to telecommunications, of course!

It's one thing to know how to use your modem and software; it's quite another matter to keep yourself from getting seriously bogged down on a BBS or network. It's harder still to keep your telephone and/or network service charge bills lower than the national trade deficit.

Know thy systems.

If you're a modem user, chances are you routinely deal with bulletin boards or telecommunications networks like Delphi or GEnie. When you first start using a BBS or system, be sure not to toggle on any "expert user" features which will eliminate helpful menus. It takes a while to get accustomed to the specific commands of any system, and you'll waste time if you try to adopt an expert mode before you're ready.

Furthermore, many a BBS has a text file which can be downloaded, to explain exactly how to use the system. If you're new to a particular BBS running in a fashion you're not accustomed to, and that BBS offers one of these "guides," it might well help you to download it, hang up, print out a copy, and keep it ready for reference when you log onto the BBS again. Whenever I do this, I use my word processor and create a "quick reference" sheet listing the most common commands and their functions.

If you log onto a number of systems, it's sometimes difficult to keep all your passwords and access code numbers straight. Again, it's a good idea to make a list of such items. You would include the system, telephone number, handle (if you used one), password and/or access number. Some might scoff at keeping such written records floating around, worrying that someone might find them and use the information. Well, unless you have very obnoxious friends and neighbors—or the KGB suspects you're transmitting items of strategic interest—I don't think you have much to worry about.

Back to reference guides. Some on-line networks will include detailed users' guides with the membership materials they send when you join. Some ask you to pay a fee to obtain such manuals. If you plan to use a particular service a great deal, and their manual isn't included with the membership fee, then it's probably a good idea to pop the extra bucks to get it. That way, you have something to refer to when things go wrong (and, as I've always said, sooner or later they *will* go wrong).

Common sense.

Admittedly, the spouses, friends and parents of many of us users feel we don't have *any* of this. After all, how much sense can a person possess, who plunges hundreds or thousands of dollars into a glorified typewriter that can play video games, then treats the thing as if its arrival signified the Second Coming? Well, witty arguments (like "Oh yeah?!") aside, they have to admit that at least we had enough sense not to buy a Commodore.

Back to the subject. The first thing you should consider, when dealing with bulletin boards and on-line services, is what bps (or baud) rate to use. It's sensible to use the maximum rate possible. If the system can run at 2400 bps and so can your modem, you should use it. Some services do charge higher rates to those who use the faster bps, but, usually, the time you save more than makes up the difference.

When reading messages or downloading, one of the most sensible things you can do (if you don't have a hard

disk) is keep a couple of blank, or near empty, floppies on-hand. One of the worst things that can happen while you're on-line is finding a file you *really* want—and discovering you can't locate a disk you're sure it will fit on!

If you have sufficient RAM, it's always a good idea to set up a RAMdisk before running your terminal software. Since the RAMdisk access is faster than a hard disk *or* a floppy disk, it's a great place to put programs you plan to upload—and it's good for downloading, too. For example, I downloaded a large file from a BBS at 1200 baud twice, the first time to floppy, the second time to a RAMdisk. Using the floppy took 12 minutes, but the the RAMdisk took just over 10 seconds.

Make sure to transfer any files you want to keep from the RAMdisk to a floppy before you turn off the computer, call another service, or run some other software. Failure to do this is like *asking* for a system crash.

While perusing various boards or on-line services, it's a good idea to collect the most common file decompression utilities (if you don't already have them). The two ST-oriented decompressors I've seen most often are UNSQUEEZ.TTP and ARCX.TTP. (There are several ARC utilities, but ARCX.TTP was designed *solely* to de-ARC files.) UNSQUEEZ.TTP is used to expand individual files that have been squeezed with SQUEEZE.TTP. As I just said, ARCX.TTP is designed to decompress files (multiple files can be compressed into one .ARC file) that have been previously ARChived. These two should do the job most of the time.

You might also want to consider getting the compression utilities themselves. If you want to upload files to a service, BBS or friend (just make sure your friend has the proper decompression utility first), you'll save time if the data's been compressed. This is of particular importance when calling long-distance or dealing with a system that charges you for time used.

Important thoughts.

If you have in mind a particular message to leave on a system, it's a good idea to compose it before you actually get on-line. Nothing is worse than not *quite* knowing how to phrase something when the clock is ticking away—and you're staring at a blank message screen. ("Writer's snowblindness" is a phrase whose meaning is made frighteningly clear when you're staring at a glowing computer display).

If nothing else, write the text with your word processor, print a copy and use that as your guide when entering the message. I would suggest uploading the text file, but you usually can't do this when a system is expecting you to type a message (lots of characters may be lost). Nor is uploading your text to the file section a good idea, particularly if it was intended as a private note.

I think a nice idea would be for more designers of BBS software to provide options allowing users to upload ASCII text files as the body of their messages, rather than having to spend time typing them on-line. Any takers?

If you need to talk (chat) with a SYSOP directly, try paging him or her as soon as you can. It sometimes takes the operator a while to answer (if he or she does at all). So the sooner you call for attention, the better your chances that the SYSOP will break in and talk to you before you hang up.

Time is *your* money.

As if I haven't pounded this point into your head already, I want to stress it: you should do whatever you can to minimize your time on-line. Use of RAMdisks, download lists, pre-prepared message texts and compressed files will keep your overall connect time down. This saves your checkbook from disaster, by keeping service charges from networks and phone companies to a minimum. On single-line BBSs, it lets you make the most of your (usually limited) connect time—and helps you finish more quickly, thus freeing the system for access by another user.

If you're paying either the phone company or a service (or both), it's important to keep an eye on your on-line time. It's easy to spend hours on a service like Delphi or GEnie, so you should set definite time limits for yourself. Keep a clock in prominent view—how about a timer, set to go "ping" when the allotted time expires? And have the willpower to hang up when you'd planned.

If you're having trouble getting through to a busy BBS, you might try a time when less people will be vying for access. Most people think late night is good, but even as late as 1:00 a.m., it can be difficult to get through. In my experience, one of the best times to call a 24-hour BBS is early in the morning, say between 6:00 and 7:00 a.m. In many cases, such early morning hours are the times for super-cheap long-distance rates. So you may not only find it easier to log onto a BBS then, but calling one out of your local area may be less expensive at that time.

Another time (and money) saving device, when you're considering what files to download, is to switch your capture buffer on, scan the download lists, hang up, save and then print the capture—so that you can scan the download list carefully. Make note of the files you want to download, then log onto the BBS or system again, and just download the ones you decided upon. Wham, wham, wham; you're done—and so is this article.

Allergic to all things Commodore and never bitten by Apples, Maurice Molyneaux first bought an Atari 800XL for animation work, but upgraded to an ST as soon as they became available. Currently slaving to complete the fifteenth draft of a science-fiction novel, he also masochistically churns out free-lance articles, artwork and animation on his ST, and hopes to dig out of a mountain of pending projects by the year 2000.

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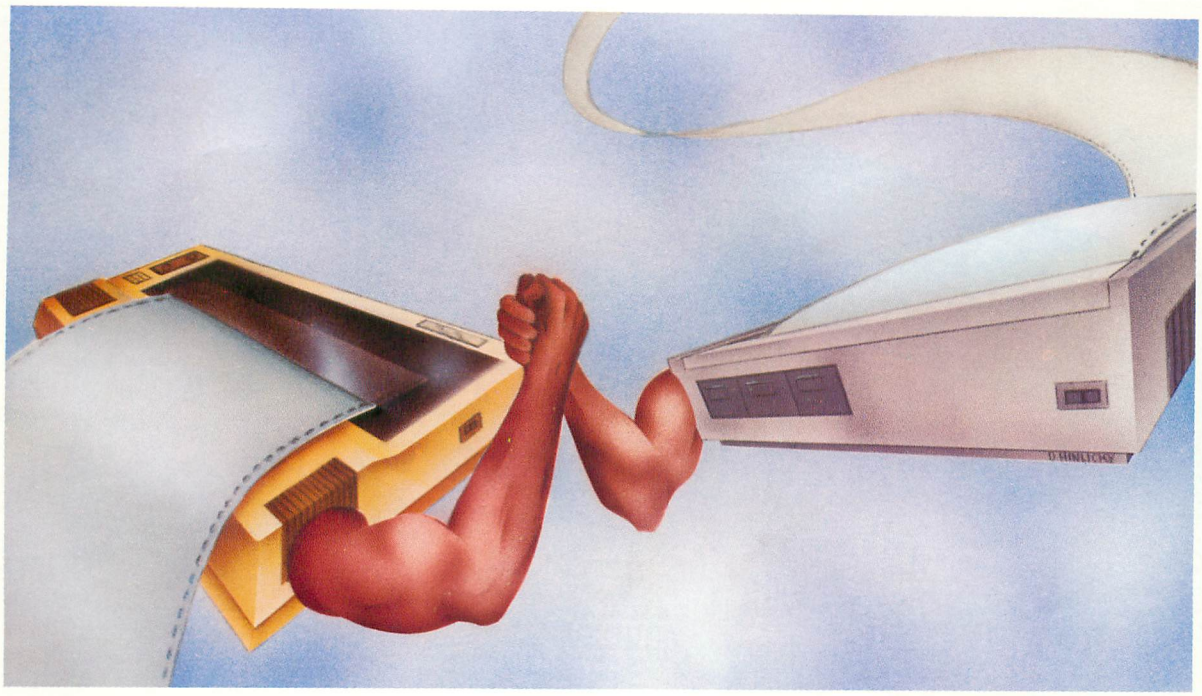

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