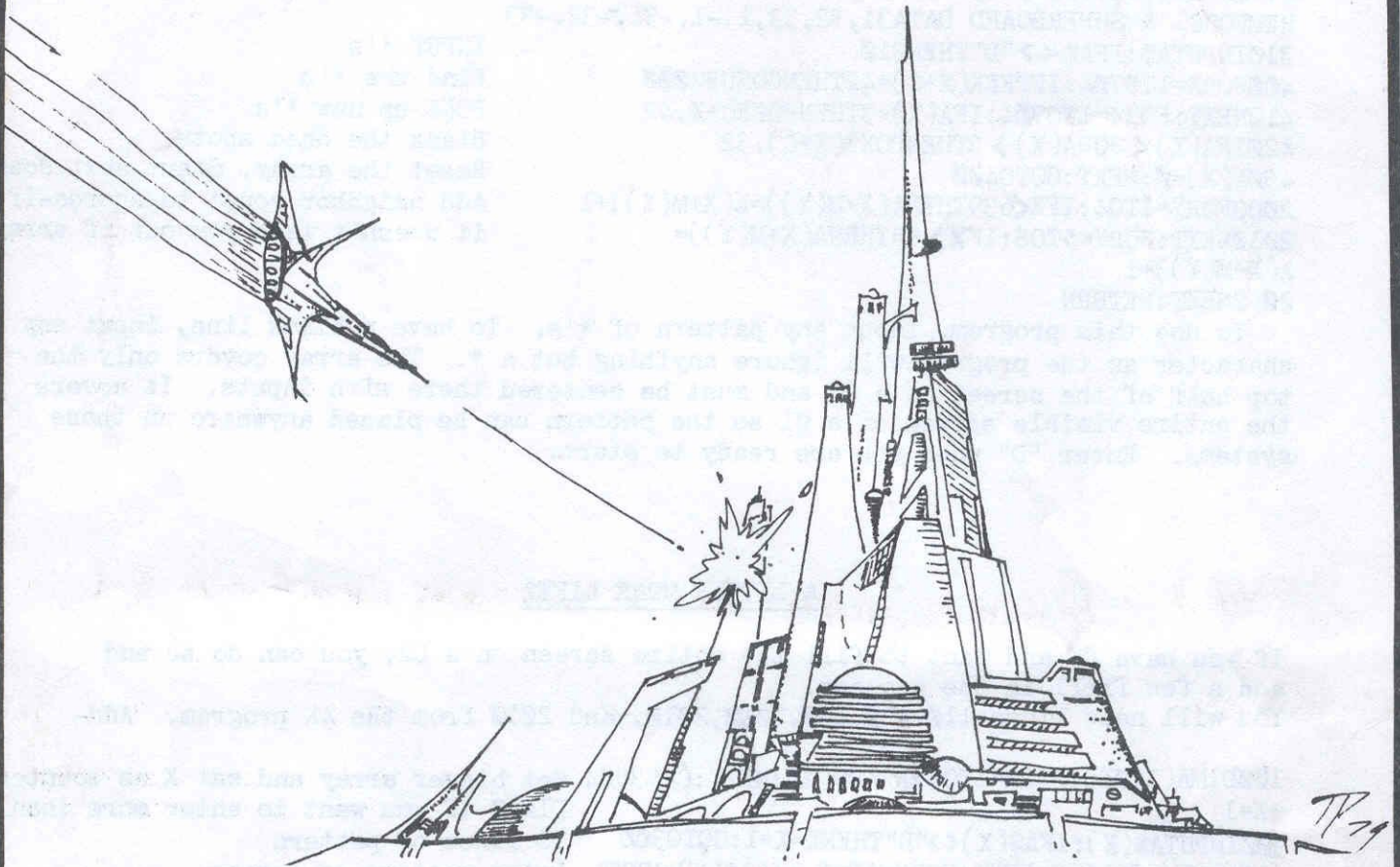# AARDVARK
TECHNICAL SERVICES
1690 Bolton, Walled Lake, MI 48088

Telephone: (313) 624-6316

APRIL, 1980 $1.00

PROGRAMMER'S NOTES

These programs have all been written with the idea that the
user should be able to change and customize them, but should
not be required to do so. Therefore, they all run well as
written, but all come with complete documentation so that
you can easily change them. You will get a listing with each
program and wherever unusual constructs have been used, you
will get an explanation of how they work. When you tire of
the original program, you can add a target, change the scor-
ing, change the display, speed it up, make it harder or easier,
or even use it as a subroutine in a new program of your own.

All of the program in this catalog, except CHESS and AUTO
LOADER are in BASIC. Over 30 of them run in 4K.

All of the programs are original. You won't find them in
books of games or old issues of BYTE. A few of them replay
old themes from machine code days, but those have been
rewritten from scratch to run well in BASIC and on OSI
computers.

PUT A LITTLE LIFE IN YOUR SYSTEM

There are a lot of LIFE games around, but most of them require at least
8K of RAM and most of them scroll the screen to show the next generation.
This one will run in 4K and POKE's the new generation up so that you can see
the change.

```
100DIMA(705):FORX=1TO8:READM(X):NEXT:C=53504        C=Starting point of display
110DATA63,64,65,1,-1,-63,-64,-65
REMFORC1 & SUPERBOARD DATA31,32,33,1,-1,-31,-32,-33
310INPUTA$:IFA$<>"D"THEN310                         INPUT *'s
400FORX=1TO704:IFPEEK(X+C)=42THENGOSUB2000          Find the *'s
410NEXT:FORX=1TO704:IFA(X)=3THENPOKEC+X,42          POKE up new *'s
420IFA(X)<20RA(X)>3THENPOKE(X+C),32                 Blank the dead spots
430A(X)=0:NEXT:GOTO400                              Reset the array. Start next scan.
2000FORY=1TO4:IFX<639THENA(X+M(Y))=A(X+M(Y))+1      Add neighbor count to sqares-if
2010NEXT:FORY=5TO8:IFX>65THENA(X+M(Y))=             it doesn't take you out of array.
A(X+M(Y))+1
2050NEXT:RETURN
```

To use this program, input any pattern of *'s. To have a blank line, input any
character as the program will ignore anything but a *. The array covers only the
top half of the screen on a C2 and must be centered there with inputs. It covers
the entire visible screen on a C1 so the pattern can be placed anywhere on those
systems. Enter "D" when you are ready to start.

A LITTLE MORE LIFE?

If you have 8K and want to fill the entire screen on a C2, you can do so and
add a few frill in the process.
You will need lines 110,420,430,2000,2010, and 2050 from the 4K program. Add-

```
100DIMA(1408):FORX=1TO8:READM(X):NEXT:C=53504   Set bigger array and set X as counter
:X=1                                            DIMA$ if you want to enter more than
300INPUTA$(X):IFA$(X)<>"D"THENX=X+1:GOTO300     10 lines of pattern
310FORY=1TO15:?:NEXT:FORY=1TOX-1:?A$(Y):NEXT    Print pattern on screen
320FORY=1TO15-(X/2):?:NEXT                      Center the pattern
340FORX=1TO192:POKEX+C+1407,161:POKEC-X,161     Draw the border
:NEXT
350FORX=65TO1407:IFPEEK(C+X)=42THENL=X:GOTO     Lines 350-380 find the edge of the
370                                             array.  Searching just that area
360NEXT:IFL<1THENL=1                            speeds up the program.
370FORX=1442TO1STEP-1:IFPEEK(C+X)=42THENU=X:
GOTO390
380NEXT:IFU>1407THENU=1407
390X=INT(G/10):POKE55005,X+48:POKE55006,G-      POKE up Generation count
(10*X)+48:G=G+1
400FORX=LTOU:IFPEEK(C+X)=42THENGOSUB2000
410NEXT:FORX=LTOU:IFA(X)=3THENPOKEX+C,42
2020IFX>U-65THENU=X+65:IFU>1408THENU=1408        Update size of display
2030IFX<L+65THENL=X-65:IFL<1THENL=1
In line 2000, Change 639 to 1343
```

This program could be changed to fit the 600 board (C1 and Superboard) by changing
the value 1408 to 1000 everywhere it appears, changing 639 in line 2000 to 935,
and POKEing G into 54157 and 54158. However, the 4K version runs well on the
C1 so that I doubt that it would be worth the effort to type in the longer version.

CHESS FOR OSI $19.95

This one offers a full graphics display, three levels of play and several possible opening books. It is in machine code and runs in less than 4K.
PLEASE SPECIFY SYSTEM!

CHESS on 5½ Disk   - $21.95

STARFIGHTER $6.95   Color & Sound $7.95

This is one of our best games and it will run on any video based OSI system. It is a real time spacewar game. You will pilot a cruiser on a mission where you will face up to ten alien vessels. You will be armed with a variety of weapons with realistic characteristics. STARFIGHTER features a full visual display of the alien vessels and working instrumentation. Your speed, range, weapons status and damage status are displayed continuously. It also has ten levels of difficulty built in. Due to the complexity of the display, this one comes in several versions. **PLEASE SPECIFY SYSTEM!**

ALIEN INVADERS $6.95   Color & Sound $7.95

Rows of Menacing Munching Monsters March On Earth! Kill enough with your laser turret and we are saved. Fail and we are snack food! Production was delayed somewhat as the testers wouldn't quit playing long enough for us to make copies. This one is fun!

BACKGAMMON (8K)   Special $9.95

This has an excellent graphics display and plays good backgammon just as it comes. However, as no two people agree on how backgammon should be played, we included exceptionally detailed documentation so that you can try out strategies of your own.

SEAWOLFE $6.95   Color & Sound $7.95

This one looks like it just stepped out of the Arcades. It features multiple torpedoes, floating mines and exploding ships. It even has separate levels of play for beginners and experts.

BOMBER $6.95   Color & Sound $7.95

Dogfight with oncoming aircraft and bomb moving targets that come in ever changing patterns below. Time and score are continuously displayed and no two games ever play quite the same. It includes both regular and masters levels of play.

AWARI $5.95

If you play Chess and Checkers and do not play AWARI, then you have missed one of life's little pleasures. The rules are simple and you can be playing your first game against the computer in minutes. The strategy is more complex than the rules and you are in for many hours of fun learning to play it well. By the way, when you learn to beat the computer at the first game, there is a second version included and several levels of difficulty.

***** ALL AARDVARK TAPES HAVE TWO COPIES OF THE PROGRAM - ONE ON EACH SIDE *****

FIGHTER PILOT $5.95

     This started life as a fairly simple get-him-in-the-crosshairs-and-blast-
him arcade game. All it had going for it was high speed and a realistic feel.
Then we got carried away and added a choice of joystick or keyboard controls,
real-time score and time displays, ten levels of difficulty and an option for
automatic fire control.

KILLERBOT $5.95   Color & Sound $6.95

     It is real time action as you run, sneak and dodge your way through a
bloody field filled with charged death traps and radar equipped killer robots.
There is no turning back. Once you start you either get across or you die. You
can use joysticks or the keyboard and play at 20 levels of difficulty.

LUNAR LANDER $4.95   Color & Sound $5.95

     I know that you probably have a lunar lander that you copied out of a
magazine as one of your first programs, but does yours work in real-time and
have a full graphics display? This one does! If you really want to Lunar
Lander, this is the one.

BATTLEFLEET $5.95

     This is our toughest mind twister. It is Battleship all grown up for
adults and with the luck removed. It is strictly a one man battle against the
computer. You fire volleys of six shots at a time and sonar can tell you how
many hit - too bad it can't tell you which one is hit. It is a tough topo-
graphical puzzle that changes with every volley.

STARTREK $5.95

     There are a lot of them around. Most in the public domain and available
from magazines. This one is standard and traditional. The only things that
make it exceptional are its lack of bugs and the lack of typing needed. We
already put it on tape for you. It should provide hours of Klingon-killing fun.


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**************************
*                        *
*  THE AARDVARK JOURNAL  *
*                        *
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     If you think our catalog is good - we're going to go one better and put
out The Aardvark Journal. It is going to be a Journal put out by professionals
who have an interest in every level of OSI products from C1 to C3 and the equip-
ment to try it out.- US!
     We will solicit articles, programs and paragraphs from readers, but we
will pay for them and we'll expect quality.
     The first issue is being typed up now. We will have six issues the first
year and it is all for the measly price of $9.00.
     P.S. We will also keep you abreast of all the new developments at
          AARDVARK.

TEN TANK BLITZ $9.95   Color & Sound $10.95

In this top of the line game, each player maneuvers up to five Juggernauts at a time through a forest of ironwood trees. Each tank is armed with three launch racks that fire steerable missles. The tanks have tough armor and can handle from one to five hits before being disabled - but each hit is more dangerous than the last one. It can be played as a simple tank shoot-em-up game and can also be played at levels of strategy that approach Risk and Blitzkrieg in complexity. The whole thing runs in real time and fits in 4K with 14 spacious bytes left over. Color version takes 5K.

TANK FOR TWO $5.95

One darned good tank game played on a complex of fixed and random barriers. The excellent weaponry (three launch racks per tank, steerable missles) allows you to hit almost any spot on the board from any other spot - if you are good. Will use keyboard or joystick controls.

ROBOTANK $5.95   Color & Sound $6.95

This one pits your fleet of tanks against a fleet of radar equipped and computer driven tanks. Just for variety, we include a two man version that allows you to play a human opponent and set it up to use keyboard or Joystick controls. It includes some of the neatest graphics that I have seen in a tank game.

SUPER DOODLER (8K) $5.95

This one lets you draw pictures and then save them on tape. The pictures can even be saved as DATA statements and then used in other programs. It has a choice of transparent, erasing, or drawing cursor, draws with any symbol and displays the memory location of each screen location you use.

BREAKTHRU $5.95   Color & Sound $6.95

This has the best of Pong and Pinball. It has a standard (but very well done Breakthru game and an option for Pinball like bumpers that add a new dimension to the action. You can use keyboard or joystick controls.

BARRIERBALL $5.95

An excellent rendition of the build as you go barrier game that used to be available only in arcades. This has high level graphics, several levels of difficulty and uses either keyboard or joystick controls.

REFLEX $5.95

How fast can you move? Test your reflexes against the electronic speed of the computer. A strange little game that keeps kids busy for hours. (Doesn't do a bad job on parents either. It makes a great Drunk-o-Meter)

MASTERMIND II $4.95

A mind twisting version of MASTERMIND that offers enhanced graphics and play that is virtually (numbers instead of colors) identical to the original. Warning - Habit Forming.

BIORHYTHM $4.95

Accurately lists out the three basic biorhythms for any timespan. Automatically calculates leap years.

MATH PRACTICE $4.95

This is a particularly handy math drill program. In addition to the usual four functions and automatic adjustment to the age of the user, it also features division with remainder for the younger set.

WORMS $4.95

You are a hungry worm and the screen is a feast of apples. Survival depends on gobbling down all you can before the worm of an opponent can get to them. Uses keyboard or joystick, two players.

CONCENTRATION $4.95

Everyone knows this game. However, look out for little kids. Some of them have great short-term memories and end up beating embarrassed adults. Fun for the entire family.

GOBBLER $4.95

This package actually contains three programs. It plays Mongol, Hordes, Gobbler and Artist. All three games use the Gobbler, an eternally hungry, always eating and easily starved beast. He has a little memory to keep him out of trouble and ends up being a very realistic life construct.

SLASHBALL $5.95   Color & Sound $6.95

I usually describe this one as the thinking man's arcade game. It has all the fast real-time action of a good arcade game, and it also requires fast and clear thinking. Basically, you steer a fast moving ball through a growing maze by placing barriers in front of it. The barriers you add are permanent and make each round tougher than the last one.

NEW!

****BRAND NEW****

*****JUST ARRIVED!!*****

THE FIRST BOOK OF OSI $15.95
                    This book is not for beginners. It is essentially a 65 page expansion of the ROM BASIC DATA SHEET advertised elsewhere in this catalog. See that description, and then multiply three (or four). For the serious computerist only.

You'll notice, no doubt, that we now feature programs from authors other than myself. Unlike some software houses, we do not promise instant riches. However, the commissions on a good game will pay for a printer and utilities do even better. Also, we usually evaluate a program in about three weeks and put it into production in about six weeks. (Usually there are exceptions. Alien Invader came in during a busy period and sat here unran for over two months)
     If you send us a program, it must be on tape or disk and include enough documentation so that I can tell what it is supposed to do. If you tape it, set the tone control in the center and the volume high, and then make another copy or two at different tone settings.

Rodger Olsen, President
Aardvark Technical Services

C1P   OLE' STUFF BY OLIN BOYERS   SUPERBOARD

Unfortunately, Mr. Boyers will only program for the C1P and Superboard, so none
of his stuff is available for the C2/4/8 yet.

MACHINE CODE LIFE $9.95

     This provides four generations a second, an easy set up procedure, and a
lot of extras. It will stop on any generation, pause for a look or print out
any one or more generations on the printer.

FLASHBOARD $8.95

     This program accepts messages up to 255 characters long and then flashes
them across the screen from right to left in characters about 5" high. It has
a gripping display that is hard to ignore in messages, advertising or display.

TICK TOCK $5.95

     It may not be as accurate as a swiss watch, but it is a heck of a lot more
fun. Displays the time in 5" high letters with a continuous update of seconds.

KALEIDOSCOPE AND MAGIC SQUARE $6.95

     These are not games. They don't ask you to do anything but sit and watch
two very impressive displays. Ole is almost as good an artist as he is a
programmer.

OLE' PAK $21.95

     All of Olin's programs - LIFE, FLASHBOARD, TICK TOCK AND KALEIDOSCOPE AND
MAGIC SQUARE.

AIR-SEA-BATTLE $5.95

     You command a destroyer beset by enemy submarines and aircraft. Use your
depth charges and anti-aircraft guns to battle your way out of it.

                    ***   ***   ***

SCHNIEDERSTUFF BY SCHNIEDER

TEENAGE DRIVER $4.95

It is a tasteless little dittie, but the kids _love_ it. You get to drive a lumbering tank around the parking lot looking for all those pedestrians you've always wanted to get even with. Hit one, and a cross springs up. Look out for trees, you are not allowed to hit them.

BATTLEGROUND $4.95

In this game, you drive a tank trying to blow up two enemy bunkers. The problem is to get by all the trees, mines, houses, barriers and walls without losing your entire force.

BLACKJACK (8K) $8.95

There are a lot of Blackjack games around and you can get one almost free if you are willing to type one out of an old magazine. We, therefore, did not offer one until we found one worth spending money for. This one shuffles 52 cards so that you cannot get five Jacks in a row. It plays _all_ of the current and real Vegas rules including insurance, double down and splitting a pair and is accurate enough to test betting systems. The display is also of professional quality.,

SCHNIEDERPAK   All three of Schnieders games listed above. $14.95

Mr. Schnieder also wrote the POKER MAKER which appears on the Utilities page. That gives us an excuse for:

SUPER-SCHNIEDER PAK - All three games _and_ Poker Maker. $17.95

*** NOW AVAILABLE ON DISK ***

*** 5¼" and 8" FLOPPY - Color & Sound ***

GAMES DISK #1 $29.95

Includes STARFIGHTER, SEAWOLFE, ROBOTANK, TEN TANK BLITZ AND BOMBER. Five of our best battle games.

GAMES DISK #2 $29.95

Includes BREAKTHRU, SLASHBALL, KILLERBOT, ALIEN INVADERS AND LUNAR LANDER. Five games that require quick thinking and/or reflexes.

As this catalog goes to the printer, we are in the process of putting a number of black and white versions of our games on 5¼" and 8" disks. Write for details!

DISK GAMES require 540 Board and Polled Keyboard.

AARDVARK BEXEC*   1-5¼" Disk - $11.95   1-8" Disk - $12.95

A people-engineered BEXEC*, runs a numbered directory on power up, allows selection of any program with a single number input. Has CREATE, DELETE AND CHANGE on the same track as the BEXEC* (all basic utilities available with only one tract reserved). Other tracks have RENUMBERER, SEARCH AND DISK-VIEW utilities. Comes in a package of two disks (an original and a backup) with complete documentation and instructions for use.

**** UTILITIES ****

C1P CURSOR CONTROL $9.95

    No fancy name. Just the most valuable utility we carry for the C1P. It
provides a real backspace, one key screen clear and mid-line editing features.
It does all of that and still uses up less than 200 bytes of your free RAM.
This would literally be a bargain at twice the price.

AUTOLOADER $5.95

    One of the most frequent questions we get is "How do I store machine code
programs?" This program is the how! It generates a self-loading machine code
tape of your program. PLEASE SPECIFY SYSTEM!

PACKER $12.95

    This little gem is one of the most amazing utilities that we offer.
The program packs your program into the smallest possible memory by removing
all spaces (except those in remarks and print statements) and combining lines
wherever possible. This is the cure for a lot of OM errors. With this program
and a renumberer, all your programs will look professional and run as tight as
possible.

RENUMBERER $5.95

    This valuable little program makes you look like a pro. It lets you
renumber a BASIC program at your choice of starting line number and at whatever
increments you specify. Of course it also renumbers the GOTO, GOSUB AND THEN
statements.

VARIABLE TABLE MAKER $4.95

    This program generates a table of the variable names used in a program and
tells which lines they appear in. Very handy for long programs.

SEARCH $4.95

    This utility searchs a program for a variable name, value or command
(i.e. it can find GOSUB2000) and lists the lines it appears in. If you have
ever had to search through 90 lines of code to find out where you put something,
you are gonna love this one.

DISASSEMBLER $6.95

    This is a 6K program that disassembles machine code. It is invaluable
for looking at the ROMs in your system and examining USR routines.

POKER MAKER ROUTINE $3.95

    This routine turns your already written machine code program into a DATA
statement format suitable for merging with a BASIC program. It generates a tape
at your choice of line numbers and even generates the statement that POKEs the
correct starting vectors into the USR routine call locations. Very handy if
you write USR functions.

GRAPHICS INSTRUCTIONS $4.00
          Thirteen pages on how to add Klingon killing type graphics to your programs.
Detailed instructions on how to POKE ships, torpedoes, put scores onto your
screen, move them around and detect when you hit something.

HOW TO READ A LINE OF MICROSOFT $1.00
          Ever wonder what those funny numbers in the program storage area meant?
This explains how MICROSOFT stores the program. It allows you to play with
neat programming ideas like a renumberer.

600 BAUD CASSETTE/PRINTER CONVERSION FOR THE C1P   3 sheets $2.00

RS 232 CONVERSION FOR THE C1P AND SUPERBOARD $3.00   5 sheets
          Detailed instructions and diagrams for adding the printer interface.

JOYSTICK INSTRUCTIONS AND PLANS $3.00
          You can buy joysticks locally about anywhere in the U.S. and install them
in about an hour on any polled keyboard OSI system. They will cost about $10.00
a piece and take about an hour to install. We will also include a sheet on how
to make a simple pair of homemade joysticks and do the whole job for about $2.00
a joystick on either C1 or C2.

REVERSE VIDEO FOR THE C1P $3.00
          Detailed instructions on how to add switch selectable reverse video to a
C1P or Superboard. Parts cost about $1.00, and it takes about an hour.

HOW TO WRITE PROFESSIONAL PROGRAMS that will run on both C1 and C2/4 systems.
This data sheet has no price as it is free but is available only to those serious
programmers who have submitted a program to us for publication.

OSI ROM BASIC DATA SHEET $9.95
          This is a 20 page description of ROM BASIC. It includes decoding of the
jump tables, descriptions of variable storage, locations of the major sub-routines,
flow charts of the warm start, execution and decoding of BASIC routines. It is
still somewhat of a rough draft, but it is very interesting.

DISASSEMBLED ROM LISTING $8.95
          We don't want to oversell this one. It is not, repeat, NOT a commented or
explained listing of the ROMs. It consists of the disassembler output of all
the ROMs in a ROM BASIC OSI. It is simply a little handier and possibly
cheaper to get a copy of ours rather than use 50 pages of printer paper and all
that time to do it yourself.

G.T. CONVERSION $1.00
          Double the speed of your C1 with a switch and wire. Takes about 10 minutes
but may require the replacement of a couple of your slower memory chips.

SAVING DATA ON TAPE $4.00
          Instructions for several methods of generating tape based files.

          We now also accept DATA sheets for publication. If you have made any
interesting modifications or additions to your OSI, others would probably like
to know about it.

C1 TAPE CONTROL $3.00
      Put your tape recorder under software control. Includes instructions for hardware modifications.

C1 BEEPER   3 Sheets $3.00
      Add a software controlled Beeper to your C1-P.

ADAPTING THE BASE 2 PRINTER FOR THE C1-P   7 Sheets $4.00

**** SPECIAL DEALS ****

JOYSTICK PACKAGE $19.95   Add $1.50 for 2 C/S, 2 B&W

      This one contains KILLERBOT, TANK J, BARRIERBALL, FIGHTER PILOT and plans for the Joystick Conversion. Normal cost would be $26.80.

BATTLEPAK $17.95   Add $2.00 for 3 C/S, 1 B&W

      For the battlebuff, this package contains STARFIGHTER, BATTLEFLEET, SEAWOLFE and BOMBER. Normal cost would be $24.80.

SUPER-BATTLEPAK $39.95   Add $3.00 for 6 C/S, 2 B&W

      For the battlebuff who just can't get enough - has STARFIGHTER, ALIEN INVADER, BATTLEFLEET, SEAWOLFE, BOMBER, TEN TANK BLITZ, ROBOTANK AND BATTLEFIELD. Normal cost would be $58.75.

SUPER-UTILITY PAK $12.95

      Three utilities in one package. (LINE RENUMBERER, VARIABLE TABLE MAKER AND SEARCH) All co-resident. Programs to help you write and document programs.

THE LIBRARY $99.95 Add $6.00 for C/S version - has C/S programs as available

$160.00 worth of programming all come on seperate tapes with complete documentation.

STARFIGHTER	BIORHYTHM	AWARI
SEAWOLFE	MATH	BLACKJACK
TANK FOR TWO	BOMBER	LUNAR LANDER
FIGHTER PILOT	BARRIERBALL	MASTERMIND II
BREAKTHRU	GOBBLER	DISASSEMBLER
BATTLEFLEET	RENUMBERER	TEN TANK BLITZ
CONCENTRATION	VARIABLE TABLE MAKER	BACKGAMMON
SLASHBALL	SEARCH	JOYSTICK PLANS
KILLERBOT	ALIEN INVADER	

!!!GOOD NEWS If you have already purchased one of the programs in a package from our ads, we will discount your package $3.00 for each program you have already ordered.

BAD NEWS!!! No discounts on Library Deals. One enterprising fellow ordered our old $49.95 Library, added a $1.00 catalog and asked for a 10% discount. No Can Do!!!

**** BUSINESS PROGRAMS FOR C1 AND C2 SYSTEMS ****

SMALL BUSINESS ANALYSIS $15.95

     Written by Dr. James Owens and written about in <u>Small Business Computers</u>
<u>Magazine</u> (June, 1979). Enter operating data for a year, quarter or month - or
a series of them - and program displays all essential information for both your
profit and loss statement and financial condition statement (balance sheet).
For example: gross margin, net profit on sales and as a percentage of invest-
ment ("R.O.I"), owner equity, current inventory, current and "quick" ratios,
ratio comparisin of fixed versus variable costs and much more. Even individuals
not in "small business" can use it by merely substituting personal income
(as doctors, engineers, executives or other professions) for "sales revenues"
in the convenient data lines. The thirteen pages of documentation are a good
short course in business analysis and are themselves worth the price of the
package.

PERSONAL LOAN ANALYSIS $4.95

     Another excellent business program from Dr. James Owens, which is just
as useful to the individual as it is to the small business owner. The program
takes three values (loan amount, interest rate and life of the loan) and outputs
total interest and an amortization table showing interest paid, amount applied
to principal and balance of the loan <u>month by month.</u>

STOCK PORTFOLIO $9.95

     This is actually two 4K programs. One generates a DATA tape containing
information on your current holdings. The second program provides an analysis
of growth, earnings and current worth. If you have 8K or more, the two programs
can be co-resident in the system.

SAVINGS AND LOAN PACKAGE $10.95

     This new deluxe package does it all. It will figure the interest, total
payments, monthly payment, or time to pay off on a loan and will generate
amortization tables. It will also give you the return on an investment or
savings account for any number of years assuming either a single initial invest-
ment or a initial investment and continued regular investments. It is the most
complete interest package that I have ever seen.

MORSE CODE CONVERTER $14.95

     This program decodes MORSE. It requires a hook-up of your system to a
receiver. We will include a diagram of the necessary hardware. It should cost
less than $10.00 to build, but it is definately for the experienced HAM or
hobbyist.

PAGE 0

0000	JUMP TO WARM START (4C/74/A2)
00FB	CASSETTE/KEYBOARD FLAG
00FC	DATA TEMPORARY HOLD FOR MONITOR

PAGE 1

0100-0141	STACK
0130	NMI VECTOR. NMI INTERRUPT CAUSES A JUMP TO THIS LOCATION
01C0	IRQ VECTOR

PAGE 2

0200	CURSOR POSITION
0203	LOAD FLAG
0204	SAVE FLAG
0206	CRT SIMULATOR BAUD RATE-VARIES FROM 0=FAST to FF=SLOW BAUD RATE
0212	CONTROL C FLAG
0218	INPUT VECTOR (C1P only)
021A	OUTPUT VECTOR
021C	CONTROL C CHECK VECTOR
021E	LOAD VECTOR
0220	SAVE VECTOR
0222-022FA	**UNUSED** A NICE PLACE TO PUT USR ROUTINES

PAGE 3 and up to end of RAM is BASIC work space.

A000-BFFF	BASIC IN ROM
D000-D3BF	VIDEO REFRESH MEMORY
DF00	POLLED KEYBOARD
F000-F001	CASSETTE PORT ACIA (C1P)
F800-FFFF	MONITOR EPROM
FC00	FLOPPY BOOTSTRAP
FD00	KEYBOARD INPUT ROUTINE (SEE "INPUTTING WITHOUT SCROLLS")
FF00	BASIC I/O SUPPORT

USEFUL SUBROUTINES IN ROM

A274	BASIC warm start *NOTE-FOR DISK BASIC WARM START IS 051A*
BD11	BASIC cold start
BF2D	CRT simulator-prints character in Accumulator to screen offset by value in 0200
FD00	Input character from keyboard result in A and in 0213
FCB1	Output character in A to cassette
FE00	Entry to Monitor
FE00	Entry to Monitor -bypass stack initialization.
FE93	Converts ASCII hex to binary-result in A.-80 if bad value
FF69	BASIC output to cassette routine-outputs one character to port and screen, outputs 10 nulls if character is a carriage return.
FFBA	BASIC input routine
FF9B	Control C routine
FF00	Reset entry point

SEMI FAST SCREEN CLEAR (WITHOUT THE USR FUNCTION)

I hate to be bothered with the USR screen clear. I can't remember it off hand and I hate to take time to look it up. Besides, it takes too much memory. This one is fast-it clears the screen in less than 2.16 seconds-and easier to remember

```
         C2/4/8                          C1P
100FORX=1TO29:?:NEXT             100FORX=1TO29:?:NEXT
110FORX=55168TO55295:POKEX,32:NEXT   110FORX=54174TO054275 (54307 on some
                                         monitors):POKEX,32:NEXT
```

**** FREE UTILITY ****

One of the first things that most programs need is to have a number of lines combined or eliminated to save space. Working with a strange program you got from someone else or wrote long ago yourself, there is a real problem making sure that the line is not addressed by a THEN or GOTO or GOSUB statement. This simple little utility will scan a program and print a list of all branched line numbers.

```
63950 A=769:X=PEEK(127)+PEEK(128)*256-180      X=ending address of text
63955 A=A+1:B=PEEK(A):IF B<>136ANDB<>140        REM 136,140,&160 are tokens
      ANDB<>160ANDA<XTHEN63955                  for GOTO,GOSUB & THEN
63960 IFA=> XTHENSTOP                           Look for end
63965 A=A+1:B=PEEK(A):IFB=32THEN63965           Look for blank after GOTO'
63970 IFB<470RB>57THEN?A$"!":A$="":GOTO        Print number
      63985
63975 A$=A$+CHR$(B):GOT063965                   ADD a digit to number found
63985 IFB=44 THEN63965                          Look for "," - meaning
63990 GOT063955                                 ONGOTO
```

**** INPUT WITHOUT SCROLLS ****

Everyone has times he wants to input something without scrolling the screen. We usually use PEEKs of the keyboard - and still have to do so to run in real-time. However, if you are doing a stop and wait for input, use this routine: 1000 POKE11,0:POKE12,253:X=USR(X):P$=CHR$(PEEK(531)). That will input one letter. If you want a number then P=PEEK(531). If you want a word or sentence, add up the PEEKs with A$=A$+P$. By using the print at statement elsewhere in this catalog, you can print the input to anywhere on the screen and seem to input at any location.

**** MAKING MACHINE CODE TAPES ****

"How do I make machine code tapes?" is one of the most common questions that people ask us. I have bad news - you don't make them! That is a slight exaggeration, but the fact is that OSI assumed that you would, of course, spend 15 minutes loading up the Assembler or Extended Monitor whenever you wanted to Save or Load a machine code tape and they therefore, made almost no provision for doing it with the resident Monitor.

To make a tape that self-loads the way that the Assembler or Monitor does, requires the use of a second program called an Auto Loader. You load the Autoloader in with the program that you want to save and it generates a self-loading tape. You can reload the program without any other program being in the system. (OSI's famous "PUSH L AND LOAD" format)

OSI published an Autoloader in one of the old Journals, but it didn't work very well. We have one for sale in the Utilities section, or you can adapt one of the old KIM programs to do it.

The other alternative is to turn the program into a set of BASIC DATA statements and have a BASIC program POKE it into memory. Both Schnieder and Boyers used that method to write some of the programs in this catalog. If you are doing short routines, you can convert them by hand. If you are going to do extensive programming, I suggest Schnieders POKER MAKER. It takes a machine code program and automatically generates a tape of DATA statements that you use in a BASIC program.

BASICS "SECRET" FUNCTIONS

Your OSI has a couple of functions left over from the days when BASIC was trying to immitate FORTRAN. They are usually ignored in most manuals.

You will find an example of one of them in STARTREK-and that is the only place I have seen it used. It is there because STARTREK was written in the early days and I suspect that no one later understood the lines enough to change them. As for as I know, the function has no name that has survived into modern times. The form usually looks like this-

$$B=(A > X)+(A < Y)$$

The part in ( ) returns a -1 if the statement is true and a $\emptyset$ if it is false. The line above therefor reads logically "B equals -1 if A is greater than X and /or one more if A is less than Y." They used iT in TREK to set the numbers of Klingons and Bases.

The NOT function is also a secret despite the fact that it is mentioned in the manuals. It is mostly used to detect and set flags. We used it extensively in Alien Invaders-Just for the Heck of it.
The statements

        100 IFNOTAFTHEN......   200 IFAFTHEN

Mean

        100 If AF<>-1THEN.....   200   IFAF<>ØTHEN....

The NOT and the IF with only a variable name after it test for simple values of the variables. As it is a yes-no test, it was designed and used primarily for flags.

REMEMBER THE OTHER "AND"

I know that most of you are aware of it, but some users had difficulty making sense out of the Keyboard polling routine in the OSI Graphics manual, and some users had a little difficutly understanding the coding OSI used to read their joysticks. The problem is that the programmer was using an arithmetic 'and' rather than the logical 'and that we are all more used to. It tests to see if specified bits in the binary representation of two or more numbers are on.

Example. Assume that you have PEEKed the Keyboard for an input from joystick or keystroke and since more than one key or joystick switch could be closed (he could be moving and firing) you need to know if a specific switch was closed-lets say the column 16. Assume that you set the P equal to the value PEEKed from the keyboard. YOU enclose the value you have and the value you want to test for in ( ).

        IF (P AND 16)=16THEN

The ( ) will equal a 16 if the 16 bit is set on the original number (P) and $\emptyset$ otherwise. To get a good understanding, you need to look at binary numbers and AND them together. Just remember that (A AND B) gives a number which is Binary number given by all the bits that are set in both numbers. I would explain more, but that is enough confusion for one issue. Later, we'll discuss actual programming of OSI joysticks.

P=   48   01100000
AND WITH 16   00100000
RESULT   16   00100000

PRINT AT STATEMENT

OSI has a great BASIC but the lack of a PRINT AT command makes it difficult to print scores and names and similar items where you want them on the screen. You usually end up with a long series of POKE statements and you have to divide the score up into individual digits to do even that. There is a simple solution. Add this subroutine to your program-

```
5000FORY=1TOLEN(D$):POKED+Y,ASC(MID$(D$,Y,1)):NEXT:RETURN
```

To POKE up any name, word, or even sentence on the screen simply set the name equal to D$ and make D=equal the starting address on the screen. i.e.

```
300D$="WINNER IS":D=54040:GOSUB5000
```

Scores should be done just a little differently. You start at the second digit because the BASIC thinks the sign is the first digit in the string and can set you over one space from where you planned. You may also want to blank the digit after the string to allow for the possibility that the score may decrease (say from three to two digits). To use it you set the score equal to D$ and the final product looks like this-

```
300D$=STR$(SCORE):D=54040:GOSUB5000
5000FORY=2TOLEN(D$):POKED+Y,ASC(MID$(D$,Y,1)):NEXT
5010POKED+Y,32:RETURN
```

SOME POKES YOU SHOULD KNOW

To aid in reading you may want to set the line length down to 32 on a C2 or to 23 on a C1. Unfortunately, if you set them down when you start up the system you will be unable to make tapes. Fortunately. the line length is stored in location 15. You can reset line length by executing 100POKE15,32 (or any other number down to as little as one) and then reset with 200POKE15,72 to record the program.

If you find it annoying to reserve space for user programs when you fire up the system (I always forget to do it when I am using the rapid screen clear) you can set the memory space by POKEing the high order digit (in HEX) into location 134 and the low order digit into 133. For instance, the line 100POKE134,14 will reserve space for the screen clear without reseting the system.

You can even make self starting BASIC programs if you are willing to do a few additional moments work when you make the tape. The flag for LOAD is in location 515. A 1 POKEd into that location turns off the load mode. Therefor, to make a self start tape-as soon as the program finishes reading out to the tape and while the system is still in SAVE mode, type in POKE515,1:RUN

That command will record on the tape and start the program automatically when it finishes loading.

SAVE can be turned off in a similar manner by POKEing a 0 into location 517

EASY KEY DETECTION

If you are doing a one player game, you can detect the control keys without either POKEing the keyboard or turning off the CONTROL C scan. The values for the shifts, rept, control, and esc keys are recorded continuously in location 57100. i.e. If you push the right shift, a 3 always appears in 57100. To see how it works try this program

```
10PRINTPEEK(57100):GOTO10
```

Then push the control keys one at a time. It is simple, fast, and allows you to keep the CONTROL C function to break the program..

COVER ART BY TULLIO PRONI

DISKVU UTILITY

Have you ever wondered what is on your disk? Here is a way to look at
any track without worrying about #9 ERRORs. The program will work on any
OSI disk, but you will mot be able to see the entrie track on C1 and C8's.
The C1's screen is too small and the C8's disk tracks are too large.

```
 80 REM DISKVU UTILITY
 90 REM HIT SHIFT KEY TO SEE NEXT TRACK
100 INPUT"START TRACK";A:INPUT"END TRACK";B
110 FORX=ATOB
120 X$=STR$(X):X$=RIGHT$(X$,LEN(X$)-1)
130 IFX<10THENX$="0"+X$
140 D$="EXAM D000="+X$
145 DISK! D$
150 IFPEEK(57088)=254ORPEEK(57088)=1THEN150
160 NEXT:GOTO100
```

PEEK A PORT UTILITY

Ever want to look at a tape without disturbing your program? This little
goodie will do it!

```
 4 REM PEEK A PORT UTILITY
 8 REM C2/4/8 VALUES
10 A=64512:B=A+1
20 WAITA,1:PRINTCHR$(PEEK(B));:GOTO10
35 REM C1 VALUES
40 A=61440:B=A+1
50 WAITA,1:PRINTCHR$(PEEK(B));:GOTO50
```

This is a TWO line program. C2/4/8 users enter lines 10 and 20.
C1 users enter lines 40 and 50.

NOTES ON JOYSTICK GAMES

The situation on joysticks is somewhat confused at this point. We have
been offering joystick plans for over a year and there are a lot of systems
out there using our scheme. Apparently OSI did not like the idea of owners
installing joysticks for $5.00 a piece instead of buying OSI's $40.00 a pair
stuff. Perhaps they also did not like the fact that we offer more joystick
programs than they do and even have the audacity to show users how to program
their own. When OSI finally offered joysticks (for the C4 only), they were
expensive and difficult to program. They have also not at this time offered
ready made joysticks for the more popular C1 and Superboard.

We will therefore, continue to offer all black and white joystick programs
set up for the joystick plans offered in this catalog. Color programs will be
rewritten to use the somewhat slower and more awkward OSI Joysticks. We will
provide routines to convert from one system to the other.

All of our tapes are computer originals to insure reliable reads.
However, the process of loading the program into the machine each time
we run a batch occassionally causes a tape misread. We usually catch
the problems with in-house testing, but sometimes one gets through. If you
ever get a bad tape from us or a program that doesn't run, please let us
know. It could save others from getting the same problems. We would
appreciate it if any bad tapes were returned as soon as possible so that we
can run them on our systems and find out exactly what went wrong.

(Remember, the program is taped TWICE, once on each side of the
cassette. Try both sides before panicking!)

WE'VE BEEN BUSY

SUPER DISK C2/4/8   1-5¼" $24.95   1-8" $26.95

Contains a complete basic text editor and allows midline
insertion, deletion and correction of basic lines. Also has BEXEC*,
RENUMBERER, SEARCH and VARIABLE TABLE MAKER.

MORE MODEMS!!!!

We now have Dumb Terminal programs for the C2/4, C4MF and C8DF.

C1 Tape	$10.95	C4MF (5¼")	$12.95
C2/4 Tape	10.95	C8DF (8")	15.95

CANNONEERS $ 5.95

I never thought I'd see the day when we would offer one of those pro-
grams where two people shot at each other over a mountain range, but this
one is SO GOOD that I couldn't resist it. You see the shells in motion as
you fire at each other over ever changing terrain. It offers cold sweats
while you wait for his shell to land.

AND WE HAVE PLENTY FROM NEW AUTHOR - BOB RETELLE - (and he's almost as good
as I am.) He has done some smooth and exciting arcade games and a super
real-time Startrek.

TIME TREK $9.95

Bob and I worked together on this one. We eliminated several of the
inconsistencies of the original Startreks, added real-time displays and
action and came up with a real 8K TREK (well, almost 8K. We had 11 bytes
left over.) This is the best TREK that I have ever seen on an OSI.

GRAND PRIX $5.95

You have to drive your car down a twisting, ever-changing road, watching
curves, fuel and other drivers in the road. It's a long way to victory.

U-BOAT $5.95

This one makes you wish you had at least one extra set of eyes. You
have to pilot your U-BOAT around mines, dodge depth charges and still torpedo
the guy overhead.

AIR-SEA BATTLE $5.95

As described on the C1P page, it is now available for all systems.

In keeping with our tradition of offering a Deal on all of an authors works,
we now offer the RETELLE PAK. All four games, TIME TREK, U-BOAT, GRAND PRIX
and AIR-SEA BATTLE for a package price of $21.95.

AND GAMES DISK THREE IS OUT - This one is mainly thinking games and is done
in black and white and silence. (I just couldn't come up with proper sound
effects for BACKGAMMON.)

GAMES DISK #3   5¼" $21.95   8" $24.95

BACKGAMMON, CONCENTRATION, BATTLEFLEET, MASTERMIND II, AWARI and BLACKJACK.