

the AARDVARK JOURNAL

august 1980

vol.1 , no. 3

THIS MONTH IN THE JOURNAL

THE LEAD ARTICLE IS ON SPEED IN BASIC. WE ALSO HAVE A NEW FIX FOR THE QUICKPRINTER II, A NEW SOURCE OF THOSE TROUBLESOME MOLEX CONNECTORS, A WAY TO RECOVER A PROGRAM THAT WONT WARMSTART, AN OFFER OF FREE PLANS FOR CIP VIDEO CONVERSION, A COUPLE OF PRODUCT REVIEWS, A BUNCH OF LETTERS, AND SOME PROGRAMS.

THE PROGRAMS WERE CHOSEN FOR A VARIETY OF REASONS. THE ACEY DUCEY (HIGH LOW) GAME WAS PRINTED BECAUSE I BECAME DISTURBED AT THE NUMBER OF NON SHUFFLING CARD GAMES THAT HAVE BEEN SENT IN. I HAVE NOW SEEN SEVERAL PROGRAMS THAT TRY TO EMULATE A DECK BY DRAWING A RANDOM NUMBER FOR THE NEXT CARD. I CANNOT CONCEIVE OF THAT IN ANY WAY DUPLICATING A REAL CARD GAME. ONE OF THE MAJOR SKILLS IN CARD PLAYING IS REMEMBERING WHICH CARDS HAVE BEEN PLAYED AS THE ODDS CHANGE WITH EVERY PLAY IN A REAL GAME. WITH THAT IN MIND, I PUT TOGETHER ACEY DUCEY, ONE OF THE SIMPLEST AND TOUGHEST TO PLAY CARD GAMES AND SHOWED A COUPLE OF WAYS TO SHUFFLE CARDS.

MIKE IS IS GOOD FAST VIDEO GAME FROM BOB RETELLE. IT FITS IN A JOURNAL ABOUT SPEED AS IT USES A NUMBER OF SPEED TRICKS AND IS WELL PUT TOGETHER. (FUN TOO!)

COMUKU IS PUBLISHED IN SELF DEFENSE. I AM TIRED OF GETTING THEM IN THE MAIL. AND THIS IS THE BEST I HAVE SEEN YET.

LET'S START WITH.....

A GREAT NEW SCREEN CLEAR

HERE IS ONE OF THE SIMPLEST AND NEATEST SCREEN CLEAR (OR FILL THE SCREEN WITH CHARACTERS) ROUTINES THAT I HAVE EVER SEEN.

I WISH I COULD GIVE PROPER CREDIT FOR IT, BUT I RECIEVED IT ON SEVERAL TAPES VIRTUALLY SIMULTANEOUSLY.

```
100A=PEEK(129):B=PEEK(130):POKE129,0:POKE130,212:S$=" ":FORS=1T07
110S$=S$+S$+" ":NEXT:POKE129,A:POKE130,B:RETURN
```

WHAT THIS DOES IS TO RESET THE STRING STORAGE POINTER TO THE TO OF THE SCREEN AND THEN CAUSE A LOT OF STRING CONCANTENATIONS TO FILL THE SCREEN WITH BLANKS, BOY IS IT NEAT. I SAW SIMILAR VERSIONS OF THE ROUTINE IN BOTH LEVY'S NEW CURSOR CONTROL AND A NEW GAME WE HAVE FROM ED CARLSON CALLED "GODZILLA EATS TANKS". WHOEVER CAME UP WITH IT DID A NEAT BIT OF THINKING.

SPEED IN BASIC

ONE OF THE MAJOR PROBLEMS THAT I SEE IN THE PROGRAMS THAT ARE SUBMITTED TO AARDVARK IS THAT THEY USUALLY RUN MUCH TOO SLOW. THE SAME PROBLEMS AND SAME INEFFICIENT CONSTRUCTIONS SEEM TO CROP UP AGAIN AND AGAIN. I SUSPECT THAT IT IS BECAUSE MANY OF US LEARNED TO PROGRAM ON COMPILERS THAT HID OR COVERED UP MOST OF OUR INEFFICIENCIES.

SPEED IS AVAILABLE IN BASIC, PARTICULARLY IN OSI 65D BASIC. WE HAVE THE FASTEST MINI COMPUTER BASIC ON THE MARKET AND ONE OF THE FASTEST BASICS IN THE WORLD. AT AARDVARK, I HAVE DONE LITTLE IN MACHINE CODE UNTIL RECENTLY BECAUSE IT SIMPLY WASN'T NEEDED. ONE OF THE FIRST GAMES THAT AARDVARK MARKETED WAS "SEAWOLF". IN THAT GAME, WE HAVE THREE TARGET SHIPS IN CONSTANT MOTION, TWO TORPEDOES MOVING AT ONE TIME, UP TO THREE MINES FLOATING BY, REAL TIME SCORE AND "TIME-TO-GO" DISPLAYS. WHEN WE ADDED SOUND AND COLOR AND PUT IT ON THE 2MEG MACHINES, WE HAD TO ADD TIMING LOOPS TO SLOW IT DOWN ENOUGH TO BE PLAYABLE.

I SHOULD ALSO COMMENT THAT SPEED IS OF INTEREST TO - AND USUALLY IGNORED BY - BUSINESS PROGRAMMERS. THERE IS, HOWEVER, LITTLE IN THIS WORLD MORE IRRITATING THAN WAITING FOR A MACHINE TO FINALLY GIVE YOU AN ANSWER. THE BOSS ENDS UP PAYING FOR DEAD TIME WHILE HIS COMPUTER OPERATOR WAITS FOR THE MACHINE AND THE OPERATOR GETS BORED AND LESS ATTENTIVE WAITING FOR SOMETHING TO HAPPEN.

THE USUAL PROBLEM IS THAT THE PROGRAMMERS PAY TOO LITTLE ATTENTION TO WHAT THE MACHINE HAS TO DO. UNFORTUNATELY, BASIC BILLS YOU FOR EVERY CALCULATION, EVERY LINE NUMBER, EVERY ASCII DIGIT, EVERY JUMP HAS TO BE LOOKED AT, MANIPULATED AND *THEN* EXECUTED.

LET ME CITE ONE OF MY OWN ERRORS AS AN EXAMPLE. WHEN I FIRST GOT A COLOR MACHINE, I RAN INTO THE PROBLEM OF PAINTING IN COLOR BACKGROUNDS FOR MY GAMES. I WAS IN A HURRY TO START COLOR PROGRAMMING, SO I DID IT IN BASIC. FOR THOSE OF YOU WHO DO NOT HAVE COLOR, LET ME EXPLAIN THAT THE COLOR FUNCTION IS SIMPLE - YOU JUST PUT A CODE IN A MEMORY LOCATION 4096 BYTES UP FROM THE SCREEN LOCATION TO INDICATE THE COLOR OF THAT PIXEL. I.E. TO MAKE LOCATION 54040 BLUE, YOU POKE 54040+4096,13.

HERE'S WHAT I DID---

100FORX=53248TO55296

110POKEX+4096,13:NEXT

GOD!! THAT WAS SLOW. I DID ABOUT FOUR THINGS WRONG IN THAT SHORT PIECE OF CODE. I MADE THE MACHINE DO A LOT OF WORK. IF YOU LOOK AT THAT LITTLE PIECE OF CODE, YOU WILL NOTICE THAT THE SYSTEM PICKS A POINT (53248), ADDS 4096, POKES 13 IN THAT LOCATION, INCREMENTS THE POINT, ADDS 4096 AGAIN!, POKES 13, INCREMENTS AGAIN, ADDS 4096!! ETC. FOR 2048 POINTS. BESIDES THE NECESSARY WORK IN INCREMENTING A LOOP, I ALSO HAD THE MACHINE DOING 2048 EXTRA AND BIG ADDITIONS.

MY FIRST REVISION WAS A DEFINITE IMPROVEMENT---

100FORX=53248+4096TO55296+4096

110POKEX,13:NEXT

NOW THE MACHINE MADE ONLY TWO LARGE ADDITIONS. AFTER THAT IT INCREMENTED BY ONE, POKED, AND WENT ON. THE TIME SAVINGS WAS CONSIDERABLE. THE FIRST LOOP RAN IN 17.6 SECONDS AND THE IMPROVED ONE RAN IN 9.0, ALMOST TWICE AS FAST.

LEARN TO EXAMINE YOUR LOOPS. DO AS MUCH OUTSIDE THE LOOP AS POSSIBLE. EVERYTHING INSIDE THAT LOOP HAS TO BE DONE EVERY TIME THE PROGRAMS LOOPS. DON'T IGNORE SMALL THINGS. FOR INSTANCE-

100FORX=1TO100

110A=10:POKEX,A:NEXT

SHOULD HAVE BEEN WRITTEN-

100A=10:FORX=1TO100

110POKEX,A:NEXT

YOU TAKE THE VARIABLE ASSIGNMENT OUT OF THE LOOP. OTHERWISE THE VARIABLE GETS ASSIGNED 100 TIMES INSTEAD OF ONCE.

THE NEXT THING YOU HAVE TO DO IS TO REMEMBER THAT EVERYTHING THAT BASIC DOES TAKES TIME - AND THAT INCLUDES LOOKING UP A LINE NUMBER.

LET'S IMPROVE THAT FIRST CODE AGAIN

100FORX=53248+4096TO55296+4096:POKEX,13:NEXT

WE ARE NOW DOWN TO 8.3 SECONDS. SEVERAL SUCH LOOPS IN A PROGRAM WILL MAKE A

DIFFERENCE. AT THIS POINT, THOSE OF YOU WHO READ "CREATIVE COMPUTING" AND TELLS YOU NOT TO PROGRAM THAT WAY, IT AIN'T CIVILIZED! IN FACT, IF YOU WERE SO BOLD AS TO SUBMIT A PROGRAM TO CREATIVE FOR PUBLICATION, THEY WOULD TELL YOU TO UNPACK THE LINES SO THAT IT WOULD BE CLEARER. THE BOOKS OF STYLE EVEN TELL YOU TO NOT ONLY PUT EACH PHRASE ON A DIFFERENT LINE, BUT ALSO TO INDENT AND REMARK EACH SEGMENT OF THE LOOP. MY LONG STANDING ADVICE IS TO HELP THE ENERGY CRISIS. BURN THOSE BLASTED BOOKS OF STYLE. THEY WERE USUALLY WRITTEN BY SOMEONE WHO IS USED TO PROGRAMMING ON A BIG SYSTEM AND THE ADVICE IS LOUSY.

THAT ADVICE GOES FOR OTHER THINGS IN YOUR PROGRAM. EVERYTHING ON THE LINE TAKES UP TIME TO PARSE.

CONSIDER REMS. REMARKS ARE ESSENTIAL GOOD PROGRAMMING BUT DON'T PUT THEM IN A PORTION OF THE PROGRAM THAT IS BUSY. EVERY TIME THE SYSTEM HITS A REM, IT HAS TO DECODE THE LINE NUMBER, DECODE THE WORD REM, DECODE THE ADDRESS OF THE NEXT LINE NUMBER AND JUMP TO IT. THE TIME ADDS UP. IF YOUR PROGRAM HAS TO HURRY, PUT THE REMS AT THE END OF THE TEXT - OUT OF THE WAY.

I HATE SPACES FOR A SIMILAR REASON. THEY AREN'T THE TIME WASTERS THAT REMS ARE, BUT IT ADDS UP ALSO. EVERYTIME THE BASIC HITS A SPACE, IT HAS TO MOVE THE SPACE TO MEMORY, DO SOME COMPARISONS TO FIND OUT THAT IT IS A SPACE AND THEN JUMP TO THE NEXT LOCATION. IT ONLY TAKES A FEW WEEKS TO LEARN TO READ BASIC WITHOUT SPACES AND IT IS A SKILL THAT EVERY GOOD BASIC COMPUTERIST MUST LEARN.

THE BIG (AND USUALLY SECRET) STUFF

ONE SECRET IS THAT VARIABLES ARE FASTER THAN NUMBERS. THE FIRST PROGRAM I PUBLISHED WAS "STARFIGHTER". I WAS HAVING THE USUAL PROBLEM IN THOSE DAYS. I COULDN'T GET IT TO RUN FAST ENOUGH. THE MAJOR ACTIVITY OF THE SYSTEM IN THAT PROGRAM IS TO POKE UP THE INSTRUMENT READINGS ON THE CONTROL PANEL. TO SIMPLIFY MATTERS, I HAD WRITTEN THE DISPLAY ROUTINES IN TERMS OF VARIABLES. THE POSITION OF THE FIRST DISPLAY WAS X, THE SECOND INSTRUMENT WAS X+9 AND SO ON. I ALSO HAD SEPARATE VARIABLE NAMES FOR THE TARGET POINT, THE EDGES OF THE SCREEN AND SO ON. THE CIP WASN'T PRODUCED YET, BUT WE ALL KNEW IT WAS COMING, AND I WANTED TO BE ABLE TO CONVERT THE PROGRAM OVER TO RUN ON THE NEW SYSTEM BY JUST CHANGING THE VARIABLE VALUES. WHEN I RAN INTO RUN TIME TROUBLE, I DECIDED TO REWRITE THE PROGRAM WITH ABSOLUTE VALUES. RATHER THAN HAVE BASIC LOOK UP X, I TYPED IN POKE 54010... RATHER THAN HAVE IT LOOK UP "A", I TYPED IN POKE 53490,... AND SO ON.

BOY, THAT SURE SLOWED THINGS DOWN A LOT!

I HAD FORGOTTEN WHAT BASIC HAS TO DO TO USE A NUMBER. IF YOU LOOK AT THE LINE OF CODES IN MEMORY, YOU WILL SEE THAT BASIC STORES NUMBERS AS ASCII TEXT. THAT MEANS TO USE A NUMBER, BASIC MUST READ SEVERAL DIGITS AND CONVERT THEM TO FLOATING POINT STORAGE FORMAT. TO USE A VARIABLE VALUE, BASIC NEEDS ONLY TO LOOK THE NUMBER UP IN A TABLE. THE TIME CONSUMING CONVERSIONS ARE ALREADY DONE, THE SYSTEM CAN THEREFORE EXECUTE $A=B+C$ FASTER THAN $A=35+5984$. SO, IF YOU WANT TO SAVE TIME, WRITE YOUR PROGRAMS IN TERMS OF VARIABLES RATHER THAN ABSOLUTE VALUES.

THERE ARE A FEW OTHER TRICKS TO USING VARIABLES. THEY ARE, FOR INSTANCE, STORED IN A TABLE IN THE ORDER THAT THEY ARE ENCOUNTERED IN THE PROGRAM. THE ONES NEAR THE TOP OF THE TABLE ARE THEREFORE ACCESSED FASTEST. SO, FOR MAXIMUM SPEED, MAKE CERTAIN THAT THE VARIABLES WHICH ARE USED MOST OR ARE MOST TIME CRITICAL APPEAR EARLIEST IN THE PROGRAM. IF I DO A SCREEN SCROLL TO START A PROGRAM, I USE THE VARIABLE WHICH WILL APPEAR MOST OFTEN IN THE PROGRAM FOR THE LOOP COUNTER.

ALSO USE AS FEW VARIABLE NAMES AS POSSIBLE, AS IT WILL MAKE THE TABLE SHORTER.

"IF" STATEMENTS ARE A BIG TIME KILLER IF DONE IMPROPERLY.

THERE ARE SEVERAL SECRETS TO MAKING SPEEDY DECISIONS.

THE FIRST IS TO MAKE AS FEW DECISIONS AS POSSIBLE. EVERYONE SEEMS TO FORGET THAT TWO DECISIONS ARE MADE WHENEVER AN IF FUNCTION IS TESTED. FOR INSTANCE, I HAVE SEEN--

```
100IFX>10THENB=31
110IFX<=10THENB=40
```

OR

```
100IFA=15THENGOSUB1500
110IFA<>15THENGOSUB1600
```

THE DECISIONS MADE IN LINES 110 OF BOTH EXAMPLES ARE SPURIOUS. THEY WERE MADE WHEN THE TESTS WERE MADE FOR LINES 100. THE FIRST ONE SHOULD HAVE BEEN REWRITTEN--

100B=40:IFX>10THENB=31 REM MAKE ONLY ONE COMPARISON AND ON ONE LINE.
 THE SECOND ONE PROPERLY READS-
 110IFA=15THENGOSUB1500:GOTO1020:REM SKIP A LINE
 120GOSUB1600

IN EACH CASE WE CUT DOWN TO ONE THE NUMBER OF COMPARISONS THAT HAVE TO BE MADE BY MAKING USE OF THE ASSUMED COMPARISON DONE IN THE FIRST LINE.

CHAINED COMPARISONS ARE ALSO REAL TIME SAVERS. A CHAINED COMPARISON IS USED WHEN YOU HAVE SEVERAL "GREATER THAN" OR "LESS THAN" COMPARISONS TO MAKE.
 FOR INSTANCE, I RECENTLY RECEIVED A PROGRAM THAT HAD THIS CONSTRUCTION.

```
100IFA>100AND<200THENSC=1
110IFA>199AND<300THENSC=2
120IFA>299AND<400THENSC=3
130KFA>=400THENSC=4
```

IT IS, OF COURSE, OBVIOUS THAT THE SECOND COMPARISON IN EACH LINE IS TOTALLY FUNCTIONLESS. THE PROGRAM RUNS JUST AS WELL WITHOUT THEM. THERE ARE SEVERAL BETTER WAYS TO WRITE THAT CODE (SC=INT(A/100):IFA>4THENA=4) BUT LET'S USE IT TO DEMONSTRATE CHAINED COMPARISONS THIS ONLY WORKS, BY THE WAY, IF THE VALUE TESTED FOR IN EACH STEP IS HIGHER THAN THE ONE IN THE PREVIOUS STEP.

1100IFA>100THENSC=1:IFA>199THENSC=2:IFA>299THENSC=3:IFA>399THENSC=4 IN THIS CASE, THE SYSTEM WILL MAKE AS MANY COMPARISONS AS IT NEEDS TO TO FIND A CASE THAT DOES NOT FIT AND WILL SKIP THE OTHERS. IT IS FASTER IN MOST CASES.

TWO MORE COMPARISON TRICKS BEFORE WE GO.

YOU MAY NOT REALIZE THAT ALL STATEMENTS BEFORE THE "THEN" ARE TESTED ON EVERY "IF" LINE. EVEN IF THE FIRST TEST FAILS, THE SYSTEM MAKES ALL THE TESTS UNLESS IT HITS A "THEN". (THAT CAUSED LOGICAL ERRORS IN SOME OF MY EARLY PROGRAMS.) YOU CAN SPEED THINGS UP AND CUT DOWN ON ERRORS BY REPLACING THE WORD "AND" WITH THE WORD "THEN". FOR INSTANCE--

```
100IFA=3ANDB=14ANDC=26THENB=1
WILL GET CAUSE 3 LOGICAL TESTS TO BE DONE EVEN IF A =4 AND THE FIRST TEST FAILS.
100IFA=3THENIFB=14THENIFC=26THENB=1
WILL STOP AT THE FIRST TEST THAT FAILS.
```

IF YOU ARE TESTING FOR YES OR NO SITUATIONS, FLAGS ARE A LOT FASTER THAN TESTING FOR DISCRETE VALUES. AS WAS POINTED OUT IN SEVERAL OF THE AARDVARK CATALOGS, YOU HAVE THE ABILITY TO TEST FOR 0, NOT 0, -1, AND NOT -1 WITHOUT SPECIFYING AN ARGUMENT. OOPS, SORRY ABOUT THAT. SEVERAL PEOPLE LOOKING OVER MY SHOULDER JUST SAID "START THAT PARAGRAPH AGAIN!"

YOU HAVE IN BASIC THE "IFA" AND IFNOTA" FUNCTIONS THAT WORK THIS WAY (THIS IS IN THE CATALOG, BUT NO ONE READ IT)--

```
100IFATHENB=10: REM MAKES B=10 IF A HAS ANY VALUE BUT 0
100IFNOTATHENB=5:REM MAKES B=5 IF A IS -1.
```

ONE OF THE DISTINGUISHING CHARACTERISTICS OF THESE TWO CONSTRUCTIONS IS THEIR SPEED. THEY WORK ABOUT 50% FASTER THAN SAYING, FOR INSTANCE "IFA=99THEN". THEREFOR, IF YOU ARE TESTING FOR SIMPLE YES AND NO STATES, MAKE A VARIABLE EQUAL TO 0 FOR ONE STATE AND EQUAL TO 1 OR -1 FOR THE OTHER AND YOU CAN OFTEN SPEED UP YOUR PROGRAMS.

ONE MORE TIME. SET OR LET A=0 IN THE START OF THE PROGRAM. IF THE CONDITION YOU ARE TESTING FOR HAPPENS, SET A TO ANY VALUE. AND DO--
 IFATHEN(WHATEVER HAPPENS IF THE FLAG IS SET) -GO BACK TO A=0 TO RESET

ONE FINAL NOTE ON TESTS. ALWAYS TEST FOR THE MOST PROBABLE CONDITION FIRST, AND THEN (SPACE PERMITTING) SKIP TESTS FOR LESS LIKELY OUTCOMES. I.E IF YOU ARE MOVING A TARGET ACROSS A GENERALLY EMPTY SCREEN AND LOOKING TO SEE WHAT'S AHEAD, CHECK FOR A "32" FIRST. IF YOU ARE DOING A PAYROLL PROGRAM AND HAVE 3 INSURANCE PLANS, CHECK FOR THE MOST COMMON ONE FIRST. A LITTLE CLEAR THOUGHT WILL CUT DOWN GREATLY ON THE AVERAGE NUMBER OF COMPARISONS THAT HAVE TO BE MADE WHEN A PROGRAM IS RUN.

WE SHOULD COVER A FEW MORE OF THE MORE COMMON TRICKS BEFORE WE CLOSE THIS ARTICLE. EVERYONE KNOWS THAT IT IS FASTER TO INCREMENT THAT TO ADD AND FASTER TO ADD THEN TO MULTIPLY. THEREFORE, X+1+1 TAKES LESS TIME THAN X+2 AND X+A+A IS FASTER THAT X+2*A. I HAVE NOT PUT THE STOPWATCH ON THOSE TWO CONTRUCTIONS TO SEE WHAT THE BREAK-EVEN POINT IS. SOMEONE SHOULD DO THAT.

CONSTANTLY USED SUBROUTINES SHOULD NOT BE PLACED AT THE BOTTOM OF THE PROGRAM, AS

BASIC HAS TO SEARCH ALL THE LINE NUMBERS TO FIND THE SUBROUTINE. IF LOGICALLY POSSIBLE, PUT THE SUBROUTINE NEAR THE CALLING ROUTINE. BETTER YET, DON'T USE A SUBROUTINE UNLESS YOU HAVE TO.

TRANSLATE COMMONLY USED VALUES INTO A SINGLE VARIABLE NAME. FOR INSTANCE, SEVERAL THINGS IN ALIEN INVADERS MOVE TWO LINES AT A TIME SO WE SET UP TWO VARIABLES. L1 = NUMBER OF SPACES IN ONE LINE AND L2 = L1+L1. THAT REPLACED A LOT OF "2*L1" CONSTRUCTIONS. NOW BASIC CAN LOOK UP THE VALUE RATHER THAN RECALCULATING IT A LOT OF TIMES

GOSUB IS ALMOST ALWAYS FASTER THAN "FNA(A)=",

I AM PROBABLY FORGETTING A LOT OF THINGS THAT I COULD ADD TO THIS ARTICLE, BUT I WANT TO WRAP IT UP WITH THIS THOUGHT. ALL OF THE "TRICKS" IN THIS ARTICLE ARE NOT WORTH NEARLY AS MUCH AS ONE GOOD THOUGHT ABOUT A PROGRAM. LEARN TO GO OVER YOUR PROGRAM WHEN YOU THINK IT IS DONE AND REALLY CONSIDER HOW YOU CAN MAKE IT DO LESS WORK. THERE IS NO SUBSTITUTE FOR GOOD PLANNING, WHETHER IT COMES BEFORE OR AFTER THE PROGRAM IS WRITTEN THE FIRST TIME.

HIDDEN BYTES IN BASIC

YOU MAY BE AWARE THAT BASIC AUTOMATICALLY DELETES SPACES AT THE BEGINNING OF A STRING AND AT THE START OF A LINE. IT HAD, HOWEVER, NOT DAWNED ON ME UNTIL RECENTLY THAT IT MIGHT NOT DELETE FROM THE END OF A LINE. LIKE MANY COMPUTERISTS, I SOMETIMES ACCIDENTLY HIT AN EXTRA SPACE AT THE END OF A LINE BEFORE THE CARRIAGE RETURN.

UNFORTUNATELY, BASIC STORES ALL THOSE BYTES. IN ONE PROGRAM THAT WAS HEAVILY EDITED, IT FOUND THAT I HAD STORED 150 EXTRA SPACES AT THE ENDS OF LINES. -SO - IF YOU HAVE GONE BEYOND THE END OF A LINE (PERHAPS DECIDING WHETHER TO ADD ANOTHER PHRASE) - BACK UP - ELSE THE EXTRA SPACES WILL BE STORED HIDDEN ON THE END OF THE LINE.

QUICK PRINTER II FIX NUMBER 4 (OR SO).

DANIEL SCHWARTZ OF THE BRONX, SENT US A LETTER STATING THAT HE HAD TRACED DOWN THE PROBLEM WITH THE QUICKPRINTER-CIP INTERFACE. SEEMS THE CIP IS SENDING OUT NULLS THAT CONFUSE THE PRINTER. HE INCLUDED THIS ASSEMBLY CODE TO FIX THE PROBLEM. ADDRESS OBJECT CODE MNEUMONIC

```
0222.....202DBF.....JSR $BF2D
0225.....48.....PHA
0226.....AD0502.....LDA $0205 (SAVE FLAG)
0229.....F004.....BEQ $0225
022B.....68.....PLA
022C.....4CB1FC.....JMP $FCB1
022F.....68.....PLA
0230.....60.....RTS
YOU ALSO HAVE TO RUN THIS SET UP ROUTINE UPON INITIALIZATION AND RESET.
00D8.....A922.....(LOW BYTE OF START ADDRESS)
00DA.....801A02...(STORE IN LOW BYTE OF OUTPUT VECTOR)
00DD.....A902.....(HI BYTE OF START ADDRESS)
00DF.....8D1B02...(STORE OUTPUT VECTORS)
00E2.....4C74A2...(SET UP JUMP TO WARM START) -----
0000.....4CD800...(RESET WARM START VECTORS TO NEW ROUTINES)
```

WITH THAT LOADED UP, YOU SHOULD BE ABLE TO ADDRESS THE PRINTER WITH NORMAL COMMANDS, AND ASSUMING THAT YOUR CTS LINE IS HOOKED UP, IT SHOULD WORK AT 600 REAL BAUD.

I GOTTA EMPHASIZE THAT THIS ALL SOUNDS GOOD IN THEORY, AND WE HAVE DAN'S WORD THAT IT WORKS - BUT I HAVEN'T TRIED IT. IF ANYONE WANTS TO TRY IT OUT AND DO A BASIC POKE STATEMENT LOADER FOR THE PROGRAM, WE'LL PUBLISH IT IN THE NEXT ISSUE.

MEANTIME, WE'LL SEND A \$15 GIFT CERTIFICATE OUT TO DAN.

BEATING THE BEAST VERSION 12.45

(WHAT TO DO WHEN IT WONT WARM START!)

ASSUMING THAT YOU HAVE GARBAGED UP PAGES 0, 1, AND AS MUCH OF PAGE 2 AS YOU COULD GET YOUR POKES INTO, ALL IS NOT LOST. THE PROGRAM MAY BE SAVED.!!!!!! THIS TIP COMES FROM DAVE EDSON OF MERIDIAN, IDAHO

HIT BREAK,C

ANSWER "770" TO MEMORY SIZE (SAY ANYTHING ELSE AND HOPE IS GONE)

YOU SHOULD HAVE 1 BYTE FREE

TYPE IN "POKE770,1", RETURN

"LIST" BUT***

HIT THE BREAK KEY BEFORE THE LISTING HITS THE TOP OF THE PAGE- AND HOLD IT DOWN.

AT THE POINT THAT THE PROGRAM BEGINS TO GARBAGE YOU WILL SEE EITHER A 9252 OR A 12288.

HIT BREAK, W

TYPE IN THE NUMBER YOU SAW (9252 OR 12288), RETURN

LIST THE PROGRAM - IT SHOULD BE BACK

::::CAUTION - CAUTION - DO NOT RUN THE PROGRAM. JUST LIST IT OUT TO THE CASSETTE.

DAVE REALLY EARNS HIS \$15 GIFT CERTIFICATE.

CORRECTION OF THE AUTO START MODIFICATION FOR THE C1P

WE MENTIONED IN THE FIRST JOURNAL THAT A SMALL CAP BETWEEN PIN 40 OF THE 6502 AND +5 WOULD ALEVIATE THE NECESSITY OF HITTING BREAK WHEN THE COMPUTER WAS TURNED ON. WE BLEW IT. THE CAP GOES FROM PIN 40 TO GROUND!! THE AUTHOR ASSURES US THAT THAT IS THE METHOD USED ON THE TRS-80 (THAT'S A RECOMMENDATION?) AND A QUICK PERUSAL OF THE SCHEMATICS SEEMS TO VERIFY IT. IT IS PROBABLY, THEREFORE A SAFE MOD.

LEON DAUGHERTY OF RANCHO VERDES CA. SENT IN SOME INFORMATION THAT A LOT OF US HAVE NEEDED.

HE HAS FOUND A COMMON REPLACEMENT FOR THAT BLASTED 12 PIN MOLEX THAT IS SO HARD TO FIND. HE POINTS OUT THAT YOU CAN USE THE MORE COMMON GC .156 CENTER CONNECTORS. USE GC 41-242,244, OR 246 FOR 2, 4, AND 6 POSITION CONNECTORS (USE TWO TOGETHER FOR LARGER CONNECTIONS) . USE GC 41-202, 204, OR 206 FOR THE FEMALE SIDE. YOU'LL HAVE TO BEND THE MOUNTING TABS 90 DEGREES BUT THEY WILL WORK. THERE ARE EVEN FEMALE CRIMP CONNECTORS AVAILABLE. GC 41-332, 334, AND 336.

(A \$15 GIFT CERTIFICATE FOR LEON TOO.)

WE ARE GONNA OFFER YOU A FREEBEE - BUT FIRST WE GOTTA SAY----

WARNING

WARNING FREE VIDEO MODIFICATION PLANS FOR THE C1P!!!

32*64 VIDEO MOD FOR THE C1P

WE GET SEVERAL LETTERS EACH WEEK ASKING ABOUT VARIOUS VIDEO MODIFICATIONS FOR THE C1P. PLANS ARE AVAILABLE FROM SEVERAL SOURCES. MY ADVICE HAS BEEN CONSISTENT. DON'T DO IT.

THERE ARE SEVERAL REASONS TO AVOID THE MODIFICATION OF THE C1P (INCLUDING THE FACT THAT OSI WILL SOON OFFER AN ALREADY MODIFIED C1P) AND DAMNED FEW REASONS TO DO IT.

THE C1P IS NOT DESIGNED TO SUPPORT THE DISPLAY, SO YOU END UP WITH PIGGYBACKED CHIPS, AN AVERAGE OF 12-15 FOIL CUTS, LOTS OF JUMPERS AND A NEW CRYSTAL THAT SCREWS EVERYTHING UP. THE MOST HONEST AD THAT I HAVE SEEN FOR SUCH A MODIFICATION SPECIFIED THAT THE MOD TOOK ABOUT 12 HOURS. REMEMBER, SINCE YOU HAVE TO REPLACE THE MAIN CRYSTAL, EVERYTHING, CASSETTE, PRINTER, EVERYTHING IS SCREWED UP. (DIDN'T YOU WONDER WHY THEY OFFERED THOSE OTHER MODIFICATIONS "FREE" WITH THE VIDEO MOD? IT GETS YOU BACK TO NORMAL).

ON TOP OF THAT, YOU HAVE TO CONSIDER THE ECONOMICS. YOU WILL END UP WITH \$40 TO \$200 INVESTED, AND YOU COULD TRADE YOUR C1P FOR A USED C2 THAT WAS DESIGNED TO HAVE A WIDE DISPLAY FOR ABOUT THE SAME AMOUNT OF MONEY.

TWO MORE CONSIDERATIONS. UNLESS YOU BURN A NEW MONITOR ROM, THE C1P WILL STILL PRINT 24 CHARACTERS WIDE. YOU HAVE TO FEED IN A NEW PRINT PROGRAM (SIMILAR TO THE CURSOR PROGRAM) EVERYTIME YOU USE THE MACHINE.

LAST CONSIDERATION IS THAT YOU WILL NO LONGER BE ABLE TO USE MUCH SOFTWARE FROM ANYONE BUT YOURSELF. YOU WILL HAVE A C1P KEYBOARD WITH MOST, BUT NOT ALL, OF A C2/4/8 DISPLAY. GOOD LUCK!

ALRIGHT, IF AFTER READING ALL OF THAT, YOU STILL WANT TO DO IT, WE'LL GIVE YOU THE PLANS - FREE - AND YOU ARE PAYING MORE THAN I FEEL THAT THEY ARE WORTH. BUT GET THIS, WE ARE NOT RECOMMENDING THE CONVERSION, WILL NOT CORRESPOND ABOUT IT, DO NOT WANT TO HEAR ABOUT IT. BASICALLY, I AM HOPING THAT AFTER SEEING WHAT IS INVOLVED, YOU'LL DECIDE TO SKIP THE WHOLE PROCEDURE.

THE CONVERSION WAS DESCRIBED BY THE AUTHOR AS TAKING ABOUT \$20.00 IN PARTS, AND ABOUT 3 HOURS IN LABOR. I THINK HE WAS CONSERVATIVE ON THE LABOR ESTIMATE. IT YIELDS A 32x50 DISPLAY, WHICH IS 32x64 WITHOUT GUARDBANDS. THE DESCRIPTION IS ABOUT 10 PAGES LONG, ALONG WITH THE PROGRAM TO CHANGE THE DISPLAY ROUTINES. I WILL ASK THAT YOU REFUND THE 50 CENTS IT WILL COST TO COPY THE SHEETS AND SEND A SELF ADDRESSED STAMPED ENVELOPE. THATS IT - 50 CENTS. AND IT IS NOT A BARGAIN. I WANT TO WARN YOU AHEAD OF TIME THAT IT IS SIMILAR TO ALL THE OTHER CONVERSIONS. IT REQUIRES 19 JUMPERS, 2 PIGGYBACK CHIPS, 6 TO 10 FOIL CUTS, AND LOTS OF WORK. AS I DON'T WANT TO SPEND ALL DAY IN FRONT OF THE COPIER, PLEASE DO NOT ORDER THE FREE PLANS UNLESS YOU PLAN TO DO THE MODIFICATION.

WARNING

IF YOU ACCEPT THE FREE PLANS AND DO THE MODIFICATION - REMEMBER - WE DO NOT-REPEAT-NOT RECOMMEND THE MODIFICATION, WILL ACCEPT NO PHONE CALLS ABOUT IT, WILL NOT REFER YOU ANYWHERE, WILL NOT DISCUSS AND DON'T WANT TO HEAR ABOUT YOUR TROUBLES IF YOU DO THE MODIFICATION. JUST PRETEND THAT WE ARE OSI AND DON'T PHONE. WE WILL GIVE YOU THE PLANS AND THEN YOU ARE ON YOUR OWN.

PRODUCT REVIEWS

WE USUALLY AVOID DOING REVIEWS, BECAUSE I DOUBT THAT ANYONE WOULD BELIEVE WHAT A SOFTWARE HOUSE SAYS ABOUT A COMPETITOR. HOWEVER, THERE ARE THREE NEW PRODUCTS ON THE MARKET THAT I THINK DEMAND ATTENTION IN THIS JOURNAL. TWO ARE DRAGONS AND DUNGEONS GAMES AND ONE IS A BOOK.

I ORDERED TWO D & D GAMES THIS MONTH AND GOT TWO TOTALLY DIFFERENT PRODUCTS. DRAGONS AND DUNGEONS BY ORION SOFTWARE.

ORION SPECIFIES IN THEIR ADS THAT THIS IS A VIDEO GAME BASED ON D&D. IT IS MORE VIDEO GAME THAN D&D. THE PROGRAM DISPLAYS SUCCESSIVE LEVELS OF THE DUNGEON AND YOU MANEUVER A CHARACTER ACROSS THE SCREEN ATTEMPTING TO GET THE GOLD AND GET BACK TO THE STAIRWAY BEFORE THE DRAGON LUNCHES ON YOU. I WAS NOT OVERWHELMED BY THE PROGRAM BUT I WANT TO POINT OUT A COUPLE OF NICE THINGS ABOUT IT.

CONSIDERING THE QUALITY OF SOFTWARE OFFERED BY SEVERAL NEW OSI SOFTWARE HOUSES, THIS ONE WAS SURPRISING IN THAT IT PERFORMED AS ADVERTISED AND SOLD AT A FAIR PRICE. THE ADVERTISING WAS HONEST. YOU MIGHT NOT BRAG TO YOUR FRIENDS ABOUT IT, BUT YOU WOULDN'T FEEL THAT YOU HAD BEEN CHEATED.

DRAGONS AND DUNGEONS FROM AURORA SOFTWARE.

THIS IS A WHOLE DIFFERENT GAME. IT TRIES TO EMULATE A REAL DRAGONS AND DUNGEONS GAME AND CONSIDERING THE LIMITS PLACED ON THE PROGRAMERS WITH ONLY 8K TO USE, IT DOES A RESPECTABLE JOB.

THE GAME COMBINES LIMITED GRAPHICS WITH D&D TYPE COMBAT. YOU CHOOSE A CHARACTER TO BE OUT OF A LIST OF ABOUT 6 POSSIBILITIES AND THE COMPUTER ASSIGNS YOU CHARACTERISTICS- SO MUCH STRENGTH, INTELLIGENCE, ARMOR, STAMINA AND SO ON. WHEN YOU ARE NEW, IT DOESN'T

ASSIGN YOU MUCH! YOU BEGIN IN THE CITY (WHERE YOU FIND OUT THAT YOU CANNOT AFFORD ARMOR) AND ARE ASKED WHICH WAY YOU WANT TO GO. LEFT AND RIGHT ARE FOREST, UP AND DOWN ARE INTO AND OUT OF THE DUNGEON. YOU TRAVEL AROUND, STAYING CLOSE TO THE FIRST AID IN THE CITY, BEING GIVEN AN INCREDIBLE ARRAY OF MONSTERS PRETTY MUCH AT RANDOM. YOU CHOOSE TO FIGHT, RUN, OR SPELL AND THE COMPUTER TELLS YOU HOW YOU DID. D&D TYPES WILL BE HAPPY TO KNOW THAT THE "HIT" TABLES ARE FAIRLY GOOD COMPUTER SIMULATIONS OF THE ONES THAT HUMAN PLAYERS USE.

TO BE HONEST, MY FIRST IMPRESSION WAS NEGATIVE. BOB RETELLE AND I PLAYED IT FOR OVER AN HOUR BEFORE WE SURVIVED THE FIRST COMBAT (YOU GET STRONGER AS YOU WIN MORE) AND I DID NOT LIKE THE CHOOSE-A-NUMBER INPUTS. HOWEVER, THE GAME HAS AN INTEREST THAT GROWS AS YOU USE IT AND SOME OF OUR READERS HAVE PLAYED IT FOR 5 OR 6 HOURS AT A TIME. OF THE FOUR REPORTS WE GOT FROM OTHERS WHO HAD THE GAME, THREE WERE ENTHUSIASTIC AND ONE WAS SO-SO. NOT A BAD RECORD FOR A PROGRAM.

THE FINAL CONSIDERATION IS THAT THIS PROGRAM SELLS FOR \$12.95 ON TAPE. CONSIDERING WHAT OSI AND OTHERS OFFER FOR THAT PRICE, THIS PROGRAM QUALIFIES AS A BARGAIN. OSI BASIC IN ROM - BY ED CARLSON.

THIS IS ON THE OTHER END OF THE SCALE FROM OUR "FIRST BOOK OF OSI". THIS BOOK IS DESIGNED FOR THE BEGINNER. IT IS THE BOOK THAT YOU WERE HOPING WAS PACKED WITH YOUR COMPUTER AT THE FACTORY. ED EXPLAINS ALL THE COMMANDS IN BASIC, GIVES A CHART OF THE MONITOR ROM, AND POINTS OUT SOME PROGRAMMING TRICKS FOR THE OSI. IN FACT, I THINK I'LL CALL HIM AND SEE IF HE WANTS US TO CARRY THE BOOK.

I DO WANT TO POINT OUT ONE DRAWBACK OF THE BOOK - WHICH NO ONE WILL CARE ABOUT BUT ME. MR. CARLSON IS A KNOWLEDGABLE PROGRAMMER (HE WROTE ROBOTANK -WHICH WE MARKET- AND PUBLISHES FREQUENT ARTICLES), BUT HE AND I HAVE ALWAYS DISAGREED - AND STILL DO - ON PROGRAMMING STYLE. I THINK ED IS MUCH TOO WASTEFULL OF SPACE AND HE THINKS THAT I AM UNCLEAR. I THEREFOR DO NOT THINK THAT THIS BOOK TEACHES "GOOD" BASIC - BUT IT DOES TEACH BASIC BETTER THAN ANYTHING ELSE ON THE MARKET FOR YOUR MACHINE. AT \$8.95 IT IS A GOOD DEAL. (REM: JUST CALLED CARLSON - AARDVARK NOW CARRIES CARLSONS BOOK.) OTHER STUFF WE SAW THIS MONTH.

THIS MONTH HAS PROVEN THAT EVEN IF YOU ARE TURNED DOWN BY AARDVARK, YOU MAY GET YOUR PROGRAM PUBLISHED. I NOTED SEVERAL CASES WHERE PROGRAMS TURNED DOWN BY AARDVARK AS TOTALLY UNMARKETABLE HAVE SHOWN UP IN KILOBAUD AND MICRO ADVERTISEMENTS, SO, IF WE TURN YOU DOWN - THERE IS HOPE YET.

LETTERS TO ME

FROM CARL OTT OF OTT ENGINEERING IN COLORADO WE WILL BE ADDING A 610 BOARD. I DON'T KNOW WHETHER THAT WILL MAKE THIS A C2 OR NOT.....

WE ALSO INTEND TO ADD A PRINTER BUT ARE CONFUSED. QUALITY OF PRINTOUT IS PROBABLY MORE IMPORTANT THAN SPEED. I AM INCLUDING SOME SHEETS ON PRINTERS AND WOULD LIKE YOUR RECOMMENDATION. SEND THE CONVERSION DIAGRAMS ON WHAT YOU FEEL IS BEST."

(ED NOTE. SEVERAL ADS FOR USED EQUIPMENT WERE ENCLOSED. WE GOT SEVERAL SIMILAR LETTERS THIS MONTH AND SO DECIDED TO REPLY IN THE JOURNAL.)

DEAR MR. OTT,

I DO NOT SUGGEST THAT YOU USE ANY OF THE PRINTERS IN THE ADS THAT YOU SENT. USED PRINTERS IN THE CURRENT MARKET ARE USUALLY MORE TROUBLE THAN THEY ARE WORTH. THE ONLY ONE IN THAT LOOKED GOOD WAS THE \$1599 DIABLO.

THE BEST PRINTER FOR YOUR C1P DEPENDS ON WHAT YOU ARE GOING TO DO WITH IT. THERE ARE THREE LEVELS OF USAGE, EACH WITH ITS' OWN "BEST" PRINTERS.

(1) IF YOU PLAN TO DO MOSTLY PROGRAM LISTING WITH THE C1P, YOU USE THE QUICKPRINTER II FROM RADIO SHACK WHICH IS SOLD BY NON-RADIO SHACK STORES FOR \$197.00 - BRAND NEW. IT IS FAST, VERY RELIABLE, AND VERY CHEEP. IT ALSO HAS DRAWBACKS. IT PRINTS ON 3" WIDE METALLIC PAPER AND PRINTS EITHER 16 OR 32 CHARACTERS ACROSS. THE PRINT IS VERY LEGIBLE, BUT NOT AT ALL USEABLE FOR FORMS AND LETTERS.

(2) IF YOU PLAN TO DO INTERNAL FORMS (STUFF FOR YOUR OWN USE), DOT MATRIX IS THE WAY TO GO. THERE ARE SEVERAL GOOD PRINTERS ON THE MARKET THAT ARE AS ALIKE AS ORANGES ON THE SAME TREE. MOST USE A 7x9 DOT MATRIX AND ARE CAPABLE OF HIGH SPEED AND DEPENDABLE OPERATION. THE BEST BARGAIN IN THESE SEEMS TO BE THE BASEII. I HAVEN'T USED IT, BUT SEVERAL CUSTOMERS HAVE RECOMMENDED IT. CENTRONICS HAS A REPUTATION OF BEING THE BEST IN THE FIELD - I DO NOT KNOW FROM PERSONAL EXPERIENCE IF THAT IS A DESERVED REPUTATION. WE USE A PAPER TIGER FROM INTEGRAL DATA WHICH WE PURCHASED FOR \$995 AND HAVE BEEN FAIRLY SATISFIED WITH IT.

(3) I DOUBT THAT YOU WILL BE DOING WORD PROCESSING WITH A CIP. YOU COULD DO IT, BUT A DISK IS NORMALLY REQUIRED TO DO IT WELL. BUT, IF YOU ARE GOING TO DO FANCY LETTERS, A FANCY PRINTER IS REQUIRED. THAT COSTS A LOT OF \$\$\$\$\$\$ BECAUSE OF ALL THE CAMS AND GEARS AND MECHANICAL STUFF THAT THE PRINTER HAS TO HAVE. THERE ARE TWO COMMON SYSTEMS ON THE MARKET NOW. STAY AWAY FROM THE CHEAPEST AND MOST COMMON. DO NOT BUY A USED SELECTRIC UNLESS YOU KNOW A SELECTRIC REPAIRMAN VERY WELL. THE THING THAT THE USED PLACES GENERALLY FORGET TO MENTION IS THAT NEITHER THEY NOR ANYONE ELSE WILL USUALLY REPAIR THE BEASTS AND THEY REQUIRE A LOT OF REPAIRING.

IF YOU HAVE TO DO WORD PROCESSING, BUY A DAISY WHEEL PRINTER - PROBABLY A DIABLO OR GUME. THEY RANGE FROM ABOUT \$1500 USED TO AS MUCH AS \$4000 NEW. WE HAVE ORDERED A NEW GUME AND WILL PAY ABOUT \$2800 FOR IT.

MAKE CERTAIN THAT ANY PRINTER YOU BUY FOR THE CIP HAS AN RS232 INTERFACE AT 300 - 600 BAUD. DON'T ACCEPT GLIB PROMISES THAT OTHER INTERFACES WILL WORK. THEY WON'T.

CHARLES LUNDBERG OF OLYMPIA WASHINGTON ASKED FOR SPECIFIC STEP BY STEP INSTRUCTIONS FOR TRANSFERING TAPE TO DISK ON A CIP. - SO DID A LOT OF OTHERS - THE INSTRUCTIONS WORK WITH 430 BOARD ALSO (EXCEPT FOR PORT # ASSIGNMENT)

DEAR MR. LUNDBERG:

(1) LOAD THE TAPE INTO ROM BASIC.

(2) TYPE IN "SAVE:FORX=1TO20?:NEXT:LIST": DO NOT HIT CARRIAGE RETURN YET. START THE TAPE AND GET A LITTLE TONE FILLED LEADER GOING.

(3) HIT CR AND MAKE A TAPE. YOU NOW HAVE MADE A TAPE WITH A LOT OF PRINTS ON IT BEFORE THE PROGRAM. THAT IS TO AVOID NOISE ON THE TAPE. ANY NOISE WILL KICK THE DISK BACK TO NORMAL INPUT.

(4) BOOT UP DISK BASIC

(5) CREATE A FILE: TYPE IN NEW

(6) TYPE IN DISK"!IO 01": BUT DO NOT REPEAT-DO NOT- HIT RETURN

(7) START THE TAPE. GET ONTO THE TONE FILLED OR PRINT FILLED SECTION AND THEN HIT RETURN. IF YOU GET ANY NOISE, TRY AGAIN -YOU JUST LOST THE IO COMMAND AND ARE BACK TO THE KEYBOARD.

(8)LOAD AND SAVE THE PROGRAM.

(9) CHANGE THE POKES FOR CONTROL-C, KEYBOARD ROUTINES AND SUCH AND RUN THE PROGRAM.

HOW'S THAT FOR EXCRUCIATING DETAIL?

STEVE MOREHOUSE OF NEW MILFORD CONN. WANTS TO KNOW IF WE CAN DO "100IF E>4 THEN 1100 ELSE GOTO 500" IN OUR BASIC:

DEAR MR. MOREHOUSE,

NOPE, NOT IN OUR BASIC.

MR. SCOTT HUNTER OF BOHEMIA N.Y. ASKED WHAT THE COMMISSIONS WERE ON AARDVARK PROGRAMS. WE GET THE QUESTION ABOUT 3 TIMES A DAY.

DEAR MR. HUNTER

SOMEDAY I HAVE GOT TO GET A FORM LETTER FOR THIS ONE. THE ROYALTY RATE ON PROGRAMS IN BASIC IS 20%, ON PROGRAMS IN ASSEMBLER, 25% AND ON DATA SHEETS 25%. THE RULES ARE THAT AARDVARK GETS EXCLUSIVE MARKETING RIGHTS FOR A YEAR, BUT YOU KEEP COPYRIGHT. (WE FILE IT, BUT WILL ASSIGN IT TO YOU AT THE TERMINATION OF THE CONTRACT.)

IF YOU DECIDE TO SUBMIT A PROGRAM, MAKE CERTAIN THAT YOUR NAME AND ADDRESS ARE ON THE CASSETTE OR DISK. DOCUMENTATION CAN GET LOST AND WE DO NOT SAVE ENVELOPES TO LOOK FOR ADDRESSES.

THE AARDVARK JOURNAL PAYS POORLY. IT IS PRETTY MUCH A MONEY LOSER THAT I DO FOR THE FUN OF IT AND FOR THE ADVERTISING VALUE. PAYMENT FOR ARTICLES AND PROGRAMS FOR THE JOURNAL IS GIFT CERTIFICATES FOR AARDVARK MATERIALS AND FAME AMONG YOUR FELLOW COMPUTERISTS. MAYBE THAT PAY ISN'T SO BAD AFTER ALL.

HELP NEEDED! - IN A GOOD CAUSE.

WE HAVE ONE CUSTOMER WHO HAS A C1P AND WHO IS BLIND. HE CAN, HOWEVER, TYPE AND CAN READ MORSE CODE. HE NEEDS ALL THE HELP HE CAN GET IN GETTING HIS C1P TO OUTPUT IN MORSE RATHER THAN ON THE SCREEN. IF YOU HAVE A PROGRAM OR OTHER HELP, CONTACT US AND WE WILL PUT YOU IN CONTACT WITH THE CUSTOMER. THE PROGRAM MUST REPLACE THE NORMAL OUTPUT ROUTINES.

** ONE MORE HELP **

WE HAVE AN EXCELLENT MACHINE CODE RENUMBERING DISK THAT WE HAVE BEEN USING FOR THE LAST COUPLE OF WEEKS. UNFORTUNATELY, WE CAN'T SELL IT TO YOU. WE CAN'T FIND THE AUTHOR. IT CAME IN A DISK JACKET THAT WAS MARKED "L. CAIN" BUT NOWHERE DOES MR. CAIN'S ADDRESS OR PHONE APPEAR ON EITHER JACKET OR PROGRAM LINE. IF WE EVER FIND HIM, WE'LL OFFER YOU A DYNAMITE PROGRAM!

NEW FROM AARDVARK THIS MONTH

THERE IS SO MUCH THAT I DON'T KNOW WHERE TO START.

1) HIGH SPEED TAPE LOADER (C1P). SAVE AND LOAD TOKENIZED BASIC. MUCH FASTER THAN OSI ASCII TYPE LOADER. GET THIS - IT SUPPORTS A SOFTWARE SELECTABLE 1200/300 BAUD CASSETTE PORT THAT YOU CAN INSTALL IN ABOUT 10 MINUTES FOR ABOUT 75 CENTS IN PARTS. THE PROGRAM SELLS, WITH INSTRUCTIONS FOR THE MOD (MOD IS NOT NECESSARY BUT IS NICE) FOR \$12.95

2) WE HAVE 6 ADVENTURES NOW. TWO NEW ONES, PYRAMID AND NUCLEAR SUB ARE REAL BRAIN BUSTERS. VAMPIRE CASTLE IS A CONTEST WITH OLD DRAC.

PYRAMID - GO AFTER TREASURE IN A PYAMID FULL OF PROBLEMS. ONE OF OUR TOUGHEST BRAIN BUSTERS.

NUCLEAR SUB - ADVENTURE AFTER ADVENTURE AFTER ADVENTURE AT THE AT THE BOTTOM OF THE SEA ADVENTURES SELL FOR \$14.95 EACH ON TAPE OR DISK.

3) SHORTHAND FOR THE C1P. FIRST GOOD ONE I EVER SAW. ALLOWS SINGLE KEYSTROKE ENTRIES OF BASIC WORDS. YOU CAN INTERSPERSE REGULAR TYPING WITH THE SHORTHAND. SELLS FOR \$9.95

4) A NEW ALIEN INVADERS WITH MACHINE CODE MOVES. BIGGER AND BETTER AND FASTER THAN EVER. \$10.95 ON TAPE, \$13.95 ON DISK.

5) SUPERCOPY, A SINGLE DISK COPIER THAT TESTS YOUR MEMORY AND COPIES 5 TO 15 TRACKS AT A TIME, MAKES MULTIPLE COPIES, COPIES TRACK 0. \$15.95

6) DISK CATALOGER. READS ALL YOUR DISKS AND MAKES UP AN ALPHABETICAL FILE OF ALL YOUR PROGRAMS AND WHICH DISKS THEY ARE ON. LOTS OF EDIT FEATURES ARE INCLUDED. \$14.95

7) ASCII FILE EDITOR : ALLOWS YOU TO CREATE AND EDIT DATA AND PROGRAM FILES UNDER 65D OR 65U. HAS LINE SPECIFIC AND GLOBAL EDIT COMMANDS. (NEEDS 32K) \$39.95 IN 65D \$49.95 IN 65U

8) ORBITAL WAR. A REALLY CUTE VIDEO GAME - STAND OFF HORDES OF ODD LOOKING ALIENS WITH THE GUNS OF THE ENTERPRISE. \$8.95

9) CARLSONS "FIRST BOOK OF OSI" IS NOW AVAILABLE FROM US. A GOOD BASIC TUTORIAL \$8.95

10) A NEW CURSOR PROGRAM FOR THE C1P THAT FITS TOTALLY ON PAGE 2 AND USES NO NORMALLY AVAILABLE RAM. CURSOR 2 \$11.95

AVAILABLE IN 2-4 WEEKS

WE HAVE JUST RECIEVED PROTOTYPES OF THE C1P SOUND BOARD PC BOARD USING THE TI CHIP. THE BARE BOARD WILL SELL FOR ABOUT \$12.95 AS SOON AS WE FINISH THE TESTING.

WE JUST SENT TO THE PROTO HOUSE, THE 8K RAM WITH PIA BOARD FOR THE C1P. THE BARE BOARD SHOULD GO FOR ABOUT \$39.95 IF THERE ARE NO UNEXPECTED EXPENSES IN MANUFACTURE. (NO PROMISES ON THAT, HOWEVER.) IT WILL GIVE YOU 8K ADDITIONAL RAM AND A PARALLEL PORT.

WE HAVE JUST CONTRACTED WITH TWO EUROPEAN FIRMS TO MARKET THEIR VERSIONS OF THE C1/C4 MONITOR ROMS IN THE STATES. THEY PROVIDE FULL CURSOR AND EDIT FUNCTIONS, SELECTABLE SCROLLING OR NON SCROLLING SCREEN WINDOWS, HIGH SPEED CASSETTE ROUTINES AND SOME OTHER STUFF. THEY PRESERVE ALL OF THE OSI VECTORS SO YOUR CURRENT SOFTWARE WILL RUN WITHOUT MODIFICATION. BOTH FIRMS CLAIM THAT THEY HAVE ALREADY MAILED THE MASTERS TO US.

THEY WILL SELL FOR \$49.95 AND \$79.95 THE DIFFERENCES WILL BE DETAILED FOR YOU AS SOON AS WE GET THE DOCUMENTATION PRINTED UP.

WE ALREADY HAVE THE NEW BASIC CHIP 3 IN STOCK. IT IS IDENTICAL TO THE OSI ROM EXCEPT THAT IT FIXES THE STRING BUG. IT IS AVAILABLE FOR \$29.95 FOR THOSE WHO ARE WILLING TO PUT IN SOME JUMPERS ON THE BOARD. A LITTLE PC BOARD TO ELIMINATE THE JUMPERS IS A FEW WEEKS AWAY.

```

100 REM * GOMOKU *
110 REM *CARLTON ELLIS*
120 REM *****
130 REM * APRIL, 1980 *
140 REM *****
150 DIMB(361),Y(361)
160 PRINT:PRINTTAB(7)"GOMOKU":PRINT
170 PRINT"THE OBJECT OF THIS GAME":PRIN
T"IS TO GET FIVE MARKS IN"
180 PRINT"A ROW. WHOEVER DOES IT":PRINT
"FIRST, WINS! YOU ARE"
190 PRINT"X", AND THE COMPUTER":PRINT"
IS O":PRINT
220 INPUT"WHAT LEVEL OF PLAY (1-3)":KA
240 IFKA<1ORKA>3THENPRINT"ILLEGAL MOVE"
:GOTO220
250 ONKAGOSUB1150,1160,1170
280 GOSUB950:FORI=1TO361:B(I)=0:NEXTI
300 R1=4:R2=15:C1=4:C2=15:GOSUB990
320 INPUT"DO YOU GO FIRST":F$:M=0:IFASC
(F$)=89THENM=1
330 IFM=0THEN450
350 PRINT"YOUR MOVE (ROW, COL)":INPUTR,
C
370 T=(R-1)*19+C
380 IFT>361ORT<1THENPRINT"ILLEGAL MOVE"
:GOTO350
390 IFB(T)<>0THENPRINT"ILLEGAL MOVE":GO
TO350
400 IFR1=RTHENR1=R-1:IFR1<1THENR1=1
410 IFR2=RTHENR2=R+1:IFR2>19THENR2=19
420 IFC1=CTHENC1=C-1:IFC1<1THENC1=1
430 IFC2=CTHENC2=C+1:IFC2>19THENC2=19
440 B(T)=1:GOSUB990
450 FORI=1TO361:Y(I)=0:NEXTI:FORR=R1TOR
2:FORC=C1TOC2:D=0
490 I=(R-1)*19+C:IFC<3ORC>17THEN520
510 D=1:I1=1:GOSUB600
520 IFR<3ORR>17THEN540
530 D=D+1:I1=19:GOSUB600
540 IFD<2THEN570
550 I1=20:GOSUB600:I1=18:GOSUB600
570 NEXTC:NEXTR:GOTO810

```

```

500 N(1)=0:N(2)=0:N(3)=0:FORJ=-2TO2STEP
1
620 K=INT(B(I+J*I1)+1):N(K)=N(K)+1:NEXT
J
650 IFN(2)=0ORN(3)=0THEN670
660 RETURN
670 IFN(2)<5THEN700
680 PRINT"YOU WIN!":END
700 IFN(3)=4THENB1=1
720 IFN(2)THEN740
730 E=G(N(3)+1):GOTO750
740 E=F(N(2)+1)
750 FORJ=-2TO2:T=INT(I+J*I1):IFB(T)<>0T
HEN790
780 Y(T)=Y(T)+E
790 NEXTJ:RETURN
810 I1=1:Y1=Y(1):FORJ=2TO361:IFY1>Y(J)T
HEN840
830 I1=J:Y1=Y(J)
840 NEXTJ:IFY1>=1THEN880
860 PRINT"GAME IS DRAWN":END
880 B(I1)=2:GOSUB990:R=INT((I1-1)/19)+1
900 C=I1-19*(R-1):PRINT"MY MOVE IS:"R,
C
920 IFB1=0THEN350
930 PRINT"I WIN!":END
950 F(1)=HA(1):F(2)=HA(2):F(3)=HA(3):F(
4)=HA(4):F(5)=HA(5)
960 RETURN
990 ::FORJ=18TO0STEP-1:IFJ+1<10THENPRIN
T" ";
1020 PRINTJ+1::FORJ1=1TO19:J2=J*19+J1
1050 IFB(J2)=0THENPRINT"-";
1060 IFB(J2)=1THENPRINT"X";
1070 IFB(J2)=2THENPRINT"O";
1080 NEXTJ1:PRINT:NEXTJ
1110 PRINT" 1234567891111111111"
1120 PRINT" 0123456789":::R
ETURN
1150 HA(1)=1:HA(2)=2:HA(3)=3:HA(4)=4:HA
(5)=120:RETURN
1160 HA(1)=1:HA(2)=2:HA(3)=5:HA(4)=8:HA
(5)=120:RETURN
1170 HA(1)=1:HA(2)=3:HA(3)=8:HA(4)=24:H
A(5)=120:RETURN

```

SAVE:LIST

```

10 REM NIKE BASE REV.5
20 REM COPYRIGHT 1980
30 REM ROBERT J RETELLE
40 FORI=0T032:PRINT:NEXT:POKE11,0:POKE1
2,253:POKE56900,0
70 POKE15,24:PRINTTAB(6)"NIKE BASE":FOR
I=0T04:PRINT:NEXT
80 PRINT"DEFEND A MISSILE BASE":PRINT"A
GAINST ENEMY PLANES.":PRINT
90 PRINT"YOU HAVE 8 MISSILES.":PRINT:PR
INT"THE FIRE CONTROL IS THE
100 PRINT"LEFT SHIFT BUTTON.":PRINT:PRI
NT"IF A BOMB HITS A HOUSE,
110 PRINT"YOU LOSE 400 POINTS.":PRINT:P
RINT"IF YOUR HQ BUILDING IS
120 PRINT"HIT, YOU LOSE THE GAME!":PRIN
T:PRINT"HIT ANY KEY TO START"
130 POKE15,72:X=USR(X)
140 KB=57100:NH=8:ML=54053:P0=53885:K1=
250:W=32:RL=54031:UL=53284:IN=3
145 IN=31
150 IFPEEK(57088)>126THEN170
160 ML=54916:RL=54862:P0=54559:K1=5:W=6
4:UL=53246:IN=63
170 IN=ML:GOSUB580:IP=PL:M=0:SC=0
180 RESTORE:FORI=0T032:PRINT:NEXT:FORI=
-1T022:READJ:POKEML+I,J:NEXT
190 DATA120,17,17,17,17,17,17,17,120
,120,15,32,14,14,14,13,14,13,12
200 DATA120,120,120,120
210 R(0)=224:R(1)=226:R(2)=225:R(3)=32:
REM RADAR ANIMATION CHARACTERS
220 FORI=ML+W-4T0ML+2*W-3:POKEI,135:NEX
T:REM POKE IN GROUND LINE
230 PRINTCHR$(13)"SCORE:"SC;
240 IFNH=0ANDNOTMFTHEN710 :REM IF MISSI
LES ARE GONE,END GAME
250 PL=PL-1:REM MOVE PLANE
260 REM IF PLANE IS AT LEFT SIDE, START
IT OVER
270 IFPL<IP-30THENPOKEPL+1,32:GOSUB580:
IP=PL
280 IFPEEK(PL)<>32THENPOKEPL+1,32:GOTO5
20
290 POKEPL+239:POKEPL+1,32
300 IFRND(1)>.04ANDNOTBDTHENFORI=0T015:
NEXT:GOTO350:REM BOMB DROP
310 IFNOTBDTHENBD=-1:BL=PL+W:REM SET BO
MB DROPPED FLAG & BOMB LOCATION
320 REM POKE OUT OLD BOMB,MOVE BOMB,CHE
CK FOR A HIT
330 POKEBL,32:BL=BL+W:IFPEEK(BL)<>32THE
N570
340 POKEPL,30:REM POKE IN NEW BOMB
350 POKERL,R(R):R=R+1:IFR=4THENR=0
360 IFPEEK(KB)<>K1ANDNOTMFTHENFORI=0T04
5:NEXT:GOTO460
370 IFNOTHFTHEMGOSUB480:MF=-1:NH=NH-1:R

```

```

EM DECREMENT NUMBER OF MISSILES
380 REM IF MISSILE IS ABOVE GROUND LEVE
L, POKE OUT OLD MISSILE
390 POKEML,32
400 ML=ML-IN*2:REM MOVE MISSILE
410 REM POKE IN NEW MISSILE
420 POKEML,17
430 REM IFMISSILE IS AT TOP OF SCREEN,P
OKE IT OUT,RESET MISSILE FLAG
440 IFML<ULTHENMF=0:POKEML,32:POKEML+W,
32
450 IFML=PLGRML-IN=PLORML-IN+1=PLTHEN52
0:REM IF A HIT,GO EXPLODE
460 GOTO230:REM END OF THE LOOP, START
IT ALL OVER AGAIN!
470 REM LOOK FOR THE NEXT MISSILE IN LI
NE
480 MF=0:FORI=0T07:IFPEEK(INH+M+I)=17THE
NH=M+I:GOTO500
490 NEXTI:GOTO710:REM IF NO MORE MISSIL
ES GAME IS OVER
500 ML=IN+M:RETURN:REM NEW ML=IN+ NUMBE
R OF SPACES TO NEXT MISSILE
510 REM BLANK PLANE&MISSILE,POKE ML WIT
H EXPLOSION CHARACTERS
520 POKEML,32:FORI=1T032:POKEPL,I:NEXT
530 REM FIND NEW PLANE INITIAL LOC.,RES
ET MISSILE FIRED FLAG..cont
540 REM SF=SCORE FACTOR=NO.OF LINES UP
PLANE WAS WHEN HIT
550 SC=SC+SF*100:GOSUB580:IP=PL:MF=0
560 GOTO230
570 REM FIND A NEW STARTING LOCATION FO
R PLANE
580 SF=INT(RND(1)*7)+1:PL=P0-SF*W:RETUR
N
590 PK=PEEK(BL):REM SEE WHAT WAS HIT
600 REM IF A MISSILE, RESET THE MISSILE
FIRED FLAG
610 IFBL=MLORML-IN=BLTHENMF=0:POKEML,32
620 IFPK=17ANDBL<>MLTHENNH=NH-1:REM MIS
SILE ON GROUND,LOSE1 MISSILE
630 IFPK=15THEN690:REM IF HQ IS HIT,END
GAME
640 REM IF RADAR HIT,BLANK IT,BLOW UP H
Q, END GAME
650 IFPK>223ANDPK<227THENPOKEBL,32:BL=B
L+W:GOTO690
660 IFPK=14THENSF=SC-400:REM IF HOUSE H
IT,LOSE 400 POINTS
670 IFPK=135THENBL=BL-W:REM IF GROUND H
IT,GO BACK UP ONE SPACE
680 GOSUB700:BD=0:GOTO230:REM BLOW UP B
OMB,RESET BOMB DROPPED FLAG
690 FORJ=0T08:GOSUB700:NEXT:GOTO710:REM
BLOW UP HQ 8 TIMES!
700 FORI=16T032:POKEBL,I:NEXT:RETURN:RE
M BOMB EXPLOSION
710 PRINT:PRINT:PRINT"WANT TO TRY AGAIN
?":X=USR(X)
720 IFPEEK(531)=89THENCLEAR:GOTO140
OK

```

```

350 FORQ=1TOPR:T=RND(8):NEXT
10 REM ACEY DUCEY (HIGH LOW)
20 REM COPYRIGHT ARDVARK 1980
30 REM BY RODGER OLSEN
100 L=64:FP=54468:REM C2/4 VALUES
110 IFPEEK(57088)>127THENL=32:FP=53797
115 REM LINE 110 IS C1P VALUES
120 INPUT"HOW MANY PLAYERS":PR:IFPR>9TH
ENPRINT"TO MANY":GOTO120
140 INPUT"SIZE OF POT TO START":POT
160 INPUT"HOLDING OF EACH PLAYER TO STA
RT":X:FORX=1TOPR:HO(X)=X:NEXT
180 INPUT"MINIMUM BET EACH HAND ":MINUM
UM:PRINT:PRINT:PRINT
200 DIMA$(53),C(53),T(52):REM MAKE A DE
CK
220 FORX=2TO10:A$(X)=MID$(STR$(X),2):NE
XT:A$(1)="A"
240 A$(11)="J":A$(12)="Q":A$(13)="K"
260 FORX=1TO13:A$(X+13)=A$(X)+CHR$(230)
:A$(X+26)=A$(X)+CHR$(231)
280 A$(X+39)=A$(X)+CHR$(229):A$(X)=A$(X
)+CHR$(232):NEXT
300 GOSUB320:GOTO460
310 REM SHUFFLE
320 FORX=1TO52:T(X)=0:NEXT:PRINTCHR$(13
)"SHUFFLING ";
340 FORX=1TO52:Y=INT(RND(8)*52)+1:OP=1:
IFRND(8)>.5THENOP=-1
350 FORQ=1TOPR:T=RND(8):NEXT
360 IFT(Y)=0THENC(X)=Y:T(Y)=99:GOTO440
380 Y=Y+OP:IFY=53THENY=1
400 IFY=0THENY=52
420 GOTO360
440 NEXT:REM SECOND SHUFFLE FOLLOWS
441 FORX=1TO100:Y=INT(RND(8)*52)+1
442 SE=INT(RND(8)*52)+1
443 I=C(Y):C(Y)=C(SE):C(SE)=I:NEXT
445 RETURN
450 Y=0:FORX=1TOPR:IFHO(X)>0THENY=1
455 NEXT:IFY=0THEN1100
460 FORX=1TO32:PRINT:NEXT:FORP=1TOPR
465 IFHO(P)<1THENPRINT"PLAYER "P" IS BU
STED":GOTO695
475 PRINT"PLAYER "P" IS BETTING"
480 PRINT"POT IS "POT" - YOUR HOLDINGS
ARE "HOLDINGS(P)
490 REM START A TURN
500 FORX=1TO20:PRINT:NEXT:IFC=52THENPRI
NT"SHUFFLING":GOSUB320:C=0
505 F=C(C+1)
520 IFF>13THENF=F-13:GOTO520
540 IFF>1THEN580
560 INPUT"FIRST CARD IS ACE, HIGH OR LO
W":A$:IFASC(A$)=72THENF=14
580 PL=FP:GOSUB700:PL=FP+16:GOSUB700:UP
=0:S=C(C)
600 INPUT"YOUR BET":BET$:UP=UP+1:BET=VA
L(BET$):IFBE>HO(P)THEN600
620 IFBE<MITHENPRINT"MINIMUM BET IS "MI

```

```

:UP=UP+1:GOTO600
640 IFBET>POTTHENPRINT"POT IS "POT:UP=UP
+1:GOTO600
660 PL=FP+8-UP*L:GOSUB700:THIRD=C(C)
665 IFS>13THENS=S-13:GOTO665
666 IFS=1THENS=14
670 IFS>FTHENX=F:F=S:S=X
675 IFTH>13THENTH=TH-13:GOTO675
676 IFTH=1THENTH=14:PRINTF,S,TH
677 IFTH<FANDTH>STHENPRINT"YOU GOT IT":
HO(P)=HO(P)+BE:PO=PO-BE:GOTO690
680 PRINT"YOU LOSE":HO(P)=HO(P)-BE:POT=
POT+BET
690 INPUT"READY FOR NEXT PLAYER":A$
695 IFPOT<1THEN1000
696 NEXT:GOTO450
699 REM DEAL A CARD AT PL. INCREMENT CA
RD COUNT
700 C=C+1:IFC=53THENGOSUB320:C=1
710 REM DRAW A PICTURE
720 FORI=0TO5:FORJ=0TO6:POKEPL+I+J*L,32
:NEXT
740 FORI=1TO4:POKEPL+I,131:POKEPL+I+6*L
,132:NEXTI
760 FORI=1TO5:POKEPL+I*L,140:POKEPL+5+I
*L,139:NEXT
780 POKEPL,221:POKEPL+5,222:POKEPL+6*L,
220:POKEPL+6*L+5,223
800 POKEPL+L+1,ASC(A$(C(C))):POKEPL+L+2
,ASC(MID$(A$(C(C)),2))
810 POKEPL+L*4+3,ASC(A$(C(C)))
815 POKEPL+L*4+4,ASC(MID$(A$(C(C)),2))
817 IFLEN(A$(C(C)))>2THENPOKEPL+3*L+2,A
SC(MID$(A$(C(C)),3))
820 RETURN
1000 FORX=1TO10:PRINT:NEXT:PRINT"SORRY,
THE BANK IS BUSTED"
1005 PRINT:PRINT"HOLDINGS"
1010 FORX=1TOPR:PRINT"PLAYER "X" HAS $"
HO(X):NEXT
1090 END
1100 FORX=1TO20:PRINTTAB(X)"HEEE HEEE H
EEE HEEE HHEEE!!!!":NEXT
1110 PRINT"IT'S ALL MINE - ALL MINE- AL
L MINE":
1120 PRINT"GO HOME LOSERS!!!"

```

INSTRUCTIONS FOR ACEY DUCEY

THIS IS ONE OF THE SIMPLEST AND MOST DIFFICULT CARD GAMES TO PLAY. PLAYERS ARE DEALT TWO CARDS AND THEN MAY BET THAT THE NEXT CARD WILL FALL BETWEEN THE TWO ALREADY DEALT. THE PLAYERS BET AGAINST THE POT RATHER THAN EACH OTHER AND A MINIMUM BET IS USUALLY SET UP TO ACT AS AN ANTE. (IT IS PARTICULARLY IRRITATING TO HAVE TO BET A BUCK ON A 3-4 PAIR BUT IT'S PART OF THE RULES AND KEEPS THE POT GROWING.)

THE ONLY STRANGE RULE IS ON ACES - AND IT IS ONE OF THE REASONS THAT YOU HAVE TO DEAL A REAL DECK - IT IS IMPORTANT TO KNOW WHAT HAS BEEN PLAYED. ACES ARE NORMALLY HIGH, BUT IF YOU ARE DEALT AN ACE AS THE FIRST CARD, YOU CAN DECLARE IT HIGH OR LOW. ACES ON THE SECOND CARD ARE ALWAYS HIGH.

GOMUMKU IS SUPER TICK TACK TOE. YOU HAVE TO GET 5 X'S IN A ROW TO WIN.

NIKE IS FUN AND DOESN'T TAKE MUCH EXPLAINING.

IF YOU ARE REALLY TOO LAZY TO TYPE THESE PROGRAMS IN, WE WILL SEND YOU TAPES OF THE PROGRAMS FOR \$4.95 EACH, BUT YOU WON'T LEARN MUCH THAT WAY.

AARDVARK
TECHNICAL SERVICES
1690 Bolton, Walled Lake, MI 48088

FIRST CLASS