TRSTimes

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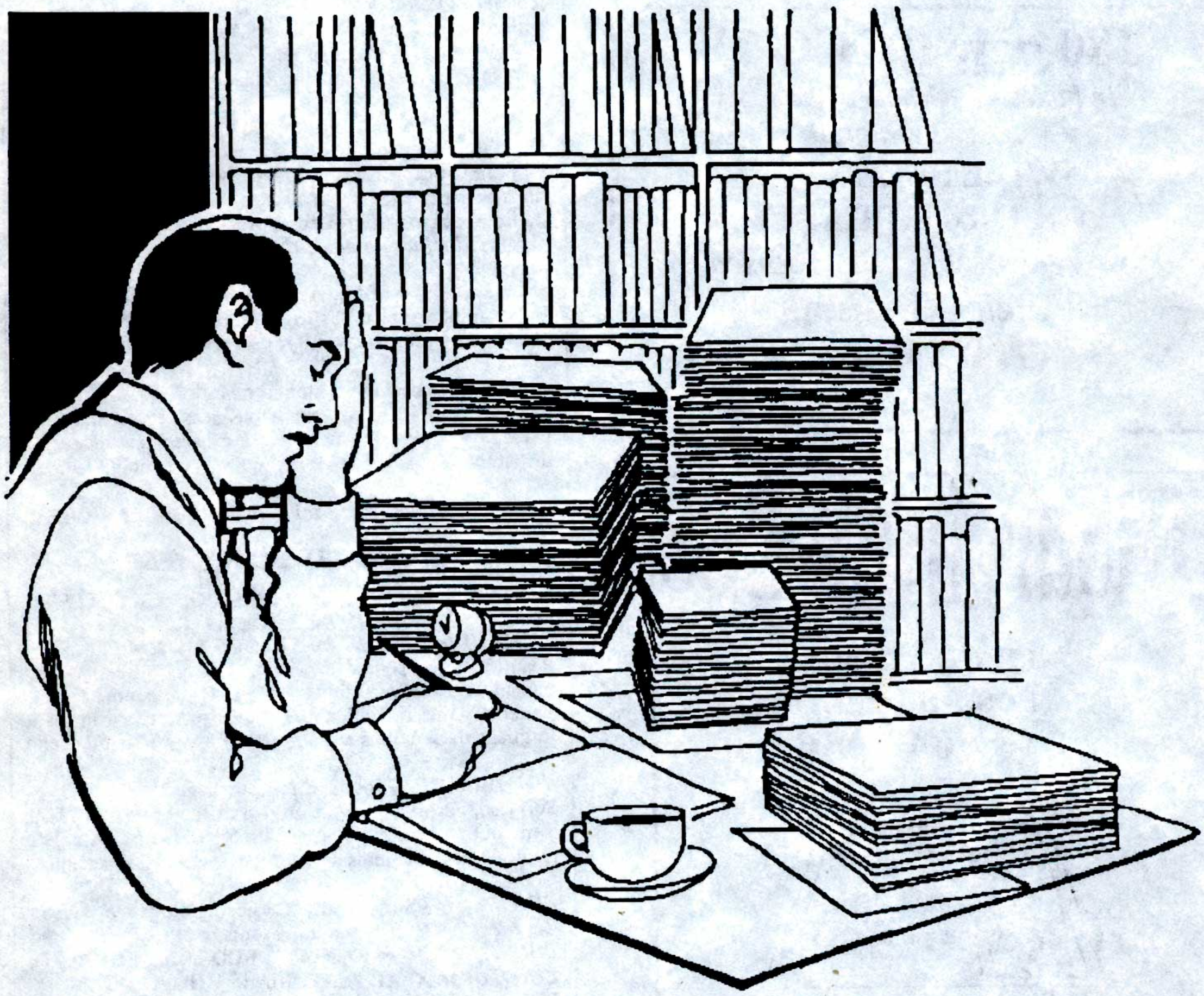

IF YOU HAD A MODEL 4 YOU'D BE DONE NOW!!

LITTLE ORPHAN EIGHTY

Due to severe space space limitation in this issue, let me just acknowledge the people who helped make it a reality. A big, big 'Thank You' to Roy Beck, George Fischer, Daniel Solomon, David Rosenbluth, G.E. Speer, John Fielke, Kevin Formby, Gary Bryce, Kelly Bates and Daniel Myers.

TRSTimes is now on the Internet. You can now send us E-mail at the following address:
lancew@ix.netcom.com

And now....Welcome to issue 8.3

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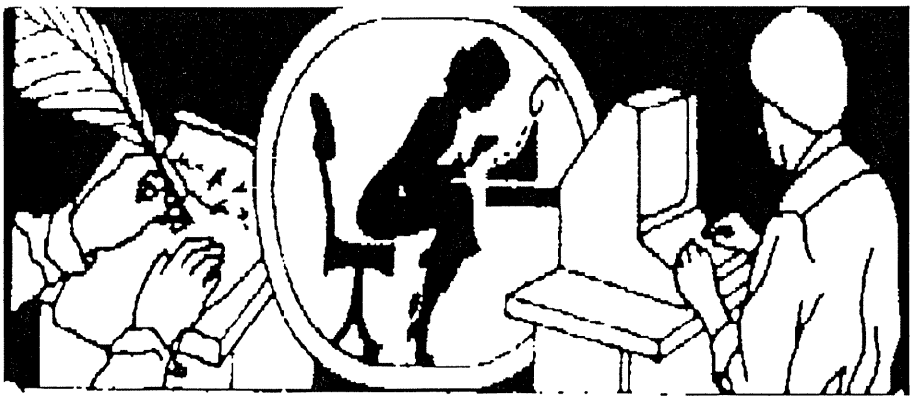
Article submissions from our readers are welcomed and encouraged. Anything pertaining to the TRS-80 will be evaluated for possible publication. Please send hardcopy and, if at all possible a disk with the material saved in ASCII format. Any disk format is acceptable, but please note on label which format is used.



MITNIK THE HACKER

by Roy T. Beck

Well, Kevin Mitnik is in the clink, which is probably good news for us ordinary computer users. And how was he caught? By cooperation between Tsutomu Shimomura of the San Diego Supercomputer Center, a national laboratory for computer science and agents of the US government.

Over the years, Mitnik has been a pain in the posterior to many large computer systems and their operators. Numerous allegations have been made against him, including invasion of many government and university computers, and theft of services, such as reprogramming of cellular phones so usage charges get fobbed off onto others.

Many people have been searching for Mitnik, but it did require significant skill to run him to earth. Shimomura got involved because Mitnik broke into Shimomura's machines, which roused him to action. Shimomura is also a very clever person, and having been invaded by Mitnik, he decided to go after him.

Mitnik has been on the run as a parole violator for previous hacking convictions for at least two years, and has used the nickname "Condor" after a movie character. He is alleged to have broken into some personal accounts in a spirit of vindictiveness. A reporter named John Markoff has written a number of articles about hackers such as Mitnik, and apparently Mitnik later broke into Markoff's accounts.

Sid Karrin, director of the San Diego Supercomputer Center remarked in an interview that the activities of such as Mitnik is going to force all users of publicly accessible machines to use secure encryption algorithms to maintain security. This will obviously hinder development of such systems as Internet, and will raise costs, directly and indirectly for all users.

Shimomura remarked upon Mitnik's sloppiness, which was an identifying mark, and while conceding Mitnik was clever, it is apparent that Shimomura has him in cards and spades, as it required only four days of intensive effort to run down Mitnik in North Carolina where he was staying. In fact, Shimomura has remarked that Mitnik is not all that clever, and that what he did could be done rather easily by others. This may reflect the relative skill levels of the two persons, but the clear implication is that hackers pose a problem for all of us.

US District Judge Manuel Real, a tough judge in the LA area has indicated he will "throw the book" at another Kevin, that being Kevin Poulsen, another hacker who has already spent 4 years in jail for some of his escapades. Judge Real's position is on the basis that the normal sentencing guidelines do not take into account the potential for damage that Poulsen represents. Poulsen is being sentenced for an episode wherein he rigged the phone lines into radio stations KIIS-FM and KPWR-FM, and won $50,000 and several luxury cars by means of his control of the phone lines. It is interesting to note that Poulsen learned his hacking on a TRS-80!!

The term hacker used to be a respectable term, implying one who was clever at modifying programs and/or hardware to accomplish results not originally attainable by the programs or equipment. Sometimes this was to clear up bugs in the original, sometimes to extend the capabilities. It certainly never contemplated theft of services, materials, alteration of other peoples' files and even risks to national security which has been done by some "hackers" in recent years.

I almost hate to admit membership in the Valley TRS Hackers User Group, the term hacker having become such a bad word. Anyway, it will be interesting to follow on the Mitnik story to see where it finally leads.

BASIC WITH GEORGE

Model 4 Basic

by George Fischer

VARPTR, USR and DATA — these three functions seem to cause more trouble with students of the Basic programming language than most others. So I thought that a short tutorial in one of their uses might be in order. What follows is not meant to fully explore the many uses of these functions, but rather to offer a simple example of their use in invoking a machine language subroutine from your Basic program.

DATA

The DATA statement simply tells Basic that the information that follows is not code in the normal sense, but is information that needs to be accessed by the program for it's internal use. DATA statements can occur anywhere in the program, but are usually put at the end. If the DATA statement is in the midst of your other code, Basic will happily skip right over it, much like it does a REM statement.

What do you use a DATA statement for? Well, in this case we are going to store the machine language instructions for the subroutine into some DATA statements so they can be POKEd into a dummy string variable. There are many other uses for them, but we're not interested in them at the moment.

Once the DATA is typed into the statement, how do we get it out? We READ it, of course. Consider the following worthless program.

```
10 READ A
20 PRINT A
30 DATA 100
```

On execution the program will READ the value 100 into variable A, and will then print 100.

Try this one.

```
10 FOR X=1 TO 4
20 READ A$
30 PRINT A$;
40 NEXT
50 DATA "I"," AM"," A"," DATA STATEMENT"
```

Here the data elements are in the form of STRINGS, so we must read them into a STRING VARIABLE. Basic keeps track of which DATA it has already read, and gets the next one on successive READS. If you run out of data you will get an error message. In order to READ data more than one time you must execute a RESTORE. This sets Basic's pointer to the first data element. Try this one.

```
10 FOR X=1 TO 4
20 READ A$
30 PRINT A$;
40 RESTORE
50 NEXT
60 DATA "I"," AM"," A"," DATA STATEMENT"
```

Remember you can mix numeric and string type variables in the same DATA statement, but you must be careful to read them into the correct type of variable.

That is by no means all there is to know about DATA statements, but for our purposes it's enough.

USR

The USR function is one of the ways we can tell Basic to jump to a USeR supplied machine language routine. Most Basics allow up to ten USR functions to be defined at one time. Before we can use this function, we must define it's location or the place where the subroutine resides. The statement DEF USR0=&H8000 tells Basic that each time we invoke USR0, jump to ram location 8000H and execute the code found there.

Other information we need to know is:

- Will the subroutine expect an argument, and what kind.
- Will the subroutine return a value, and what kind.

In the Basic program that follows, we are going to type in a few words, then jump to the subroutine

where the sentence will be worked over and the start of every word will be capitalized. So the subroutine must have as an argument the name of the variable that the string is stored in — in this case it's B$.

Since our routine actually modifies B$, we'll use that for the USR's return variable. So the statement B$=USR0(B$) directs Basic to jump to the routine at 8000H and take the variable B$ as an argument, execute the routine, and return with the new B$. The B$ on the left side of the USR statement is the one that is returned, while the B$ on the right is the argument sent to the subroutine.

VARPTR (VARiable PoinTeR)

All we need to do now is get our data into memory where it can be accessed by the USR, and execute it. A real nifty place to store such data is in a STRING VARIABLE, but to do that we need to know where Basic has stored it.

VARPTR functions in a couple of different ways depending on what type of variable it is operating upon. For the purpose of this application we are interested in locating a STRING. Line 20 creates DUMMY$ which is happily just long enough to hold all the data.

Now we have to find out where Basic stored DUMMY$. VARPTR, when operating on a STING VARIABLE, returns an address in ram. This address contains the following information.

- The byte at ADDRESS will be equal to the LENGTH of the STRING.
- The byte at ADDRESS+1 is the LEAST SIGNIFICANT byte of the address in memory where our string resides.
- The byte at ADDRESS+2 is the MOST SIGNIFICANT byte of the string's address.

So, if we say V=VARPTR(DUMMY$), we know that V+1 and V+2 somehow contain DUMMY$'s address, right? Trust me.

There are many ways to convert V+1 and V+2 to a recognizable number. I like the method in line 40 of the program. It takes these two bytes and makes a string (POINTER$) of them, then line 50 converts string to an integer using CVI.

All that remains is to define the USR, poke the data into DUMMY$, and try it out.

```
5 'BASDEMO/BAS
10 CLS
20 DUMMY$=STRING$(41,32)
30 V=VARPTR(DUMMY$)
40 POINTER$=CHR$(PEEK(V+1))+
CHR$(PEEK(V+2))
50 ADDRESS=CVI(POINTER$)
60 DEF USR0=ADDRESS
70 FOR X=1 TO 41
80 READ I
90 POKE ADDRESS,I
100 ADDRESS=ADDRESS+1
110 NEXT
120 LINE INPUT B$
130 B$=USR0(B$)
140 PRINT B$
150 GOTO 120
160 DATA 14,0,26,71,19,213,225,94,35,86,26,24,14
170 DATA 19,26,254,32,32,5,19,11,26,24,3,16,243
180 DATA 201,254,97,56,7,254,123,48,3,230,95,18
190 DATA 16,229,201
```

For an interesting diversion, try these changes:

```
120 B$="this is a test of this good for nothing pro-
gram"
150 LIST
```

HINTS & TIPS

ARTIST/BAS
for Model I/III
from the TRSTimes Vault

Here is a nice short program for Model I & III that allows you to use the arrow keys to draw on the screen. Left Arrow draws a line to the left; the Right Arrow draws a line to the right; the Up Arrow draws the line up, while the Down Arrow draws the line line down. Use the Shift key in combination with the arrow keys and you can now erase in the direction of the arrow key. Have fun.

```
10 CLS:Y=23:X=63
20 GOSUB 130
30 A$=INKEY$
40 IF A$=CHR$(91) AND Y>0 THEN Y=Y-1:
GOSUB 130
50 IF A$=CHR$(10) AND Y<47 THEN Y=Y+1:
GOSUB 130
60 IF A$=CHR$(8) AND X>0 THEN X=X-2:
GOSUB 130
70 IF A$=CHR$(9) AND X<126 THEN X=X+2:
GOSUB 130
80 IF A$=CHR$(52) AND X>0 THEN GOSUB 140:
X=X-2
90 IF A$=CHR$(54) AND X<126 THEN
GOSUB 140:X=X+2
100 IF A$=CHR$(50) AND Y<147 THEN
GOSUB 140:Y=Y+1
110 IF A$=CHR$(56) AND Y>0 THEN
GOSUB 140:Y=Y-1
120 GOTO 30
130 SET(X,Y):SET(X+1,Y):RETURN
140 RESET(X,Y):RESET(X+1,Y):RETURN
```

Selecting a Programming Language Made Easy
Daniel Solomon & David Rosenblueth

With such a large selection of programming languages it can be difficult to choose one for a particular project. Reading the manuals to evaluate the languages is a time consuming process. On the other hand, most people already have a fairly good idea of how various automobiles compare. So in order to assist those trying to choose a language, we have prepared a chart that matches programming languages with comparable automobiles.

ASSEMBLER	A Formula I race car. Very fast, but difficult to drive and expensive to maintain.
FORTRAN II	A Model T Ford. Once it was king of the road.
FORTRAN IV	A Model A Ford.
FORTRAN 77	A six-cylinder Ford Fairlane with standard transmission and no seat belts.
COBOL	A delivery van. It's bulky and ugly, but it does the work.
BASIC	A second-hand Rambler with a rebuilt engine and patched upholstery. Your dad bought it for you to learn to drive. You'll ditch the car as soon as you can afford a new one.
PL/I	A Cadillac convertible with automatic transmission, a two-tone paint job, white-wall tires, chrome exhaust pipes, and fuzzy dice hanging in the windshield
C	A black Firebird, the all-macho car. Comes with optional seat belts (lint) and optional fuzz buster (escape to assembler).
ALGOL 60	An Austin Mini. Boy, that's a small car.
Pascal	A Volkswagon Beetle. It's small but sturdy. Was once popular with intellectuals.
Modula II	A Volkswagon Rabbit with a trailer hitch.
ALGOL 68	An Astin Martin. An impressive car, but not just anyone can drive it.
LISP	An electric car. It's simple but slow. Seat belts are not available.
PROLOG/LUCID	Prototype concept-cars.
Maple/MACSYMA	All-terrain vehicles.

FORTH — A go-cart.

LOGO — A kiddie's replica of a Rolls Royce. Comes with a real engine and a working horn.

APL — A double-decker bus. Its takes rows and columns of passengers to the same place all at the same time. But, it drives only in reverse gear, and is instrumented in Greek.

Ada — An army-green Mercedes-Benz staff car. Power steering, power brakes an automatic transmission are all standard. No other colors or options are available. If it's good enough for the generals, it's good enough for you. Manufacturing delays due to difficulties reading the design specification are starting to clear up.

TRSTRAIN

a fun program for Model I/III Basic

by G.E. Speer

TRSTRAIN/BAS is a graphics program for Model I or III which represents a tiny train running around a track. When it encounters a switch in the track, a random decision is made to choose the direction for the train. The SET function, which turns on the graphic blocks, uses Y (vertical) values from 10 to 46. The double-width X (horizontal) values must be either multiples of 4, or 1 more than a multiple of 4 (0, 1, 4, 5, 8, 9, 12, 13, etc.) up to 61. These horizontal positions are generated in the first few lines of the program to make them easier to keep track of later. In this way, X(H) is the horizontal location of block #H. For example: the eight block position is SET(17,Y) — because X(8)=17. You might notice that X values of 0 and 1 are not used — this is to maintain a small left margin. The margins are essential because the train look (POINTs) beyond the track to see if it continues when it comes to a corner.

```
10 'TRSTRAIN
20 'for TRS-80 Model I/III
30 'Written by G. E. Speer
40 '
50 CLS:PRINT CHR$(23)
60 PRINT TAB(8)"T R S  T R A I N"
70 DIM X(60)
80 FOR H=2 TO 60 STEP 2:
X(H)=H*2+1:X(H-1)=H*2:NEXT
90 FOR X=X(1) TO X(58):SET(X,10):NEXT
100 FOR Y=10 TO 40:SET(X(58),Y):NEXT
110 FOR X=X(58) TO X(1) STEP -1:SET(X,Y):NEXT
120 FOR Y=41 TO 10 STEP -1:SET(X(1),Y):NEXT
130 FOR Y=11 TO 40:SET(X(20),Y):NEXT
140 FOR X=X(21) TO X(57):SET(X,20):NEXT
150 H=6:Y=10:D=2:T=1
160 C=0:N=0:E=0:S=0:W=0
170 IF D=3 OR POINT(X(H),Y-1)=0 THEN 180
ELSE C=C+1:N=1
180 IF D=4 OR POINT(X(H+1),Y)=0 THEN 190
ELSE C=C+1:E=1
190 IF D=1 OR POINT(X(H),Y+1)=0 THEN 200
ELSE C=C+1:S=1
200 IF D=2 OR POINT(X(H-1),Y)=0 THEN 210
ELSE C=C+1:W=1
210 R=RND(C)
220 C=0
230 IF N=1 THEN C=1:IF C=R THEN
D=1:GOTO 270
240 IF E=1 THEN C=C+1:IF C=R THEN
D=2:GOTO 270
250 IF S=1 THEN C=C+1:IF C=R THEN D=3:GOTO
270
260 IF W=1 THEN C=C+1:IF C=R THEN D=4
270 IF T<7 THEN X7=2:Y7=10:T=T+1 ELSE
X7=X6:Y7=Y6
280 X6=X5:X5=X4:X4=X3:X3=X2:X2=X1:X1=X(H)
290 Y6=Y5:Y5=Y4:Y4=Y3:Y3=Y2:Y2=Y1:Y1=Y
300 ON D GOTO 310,320,330,340
310 Y=Y-1:GOTO 350
320 H=H+1:GOTO 350
330 Y=Y+1:GOTO 350
340 H=H-1
350 RESET(X(H),Y)
360 SET(X1,Y1):RESET(X2,Y2)
370 SET(X3,Y3):RESET(X4,Y4)
380 SET(X5,Y5):RESET(X6,Y6)
390 SET(X7,Y7)
400 GOTO 160
```

VISICALC AND DIF FILES

by John Fielke

When I first started using VISICALC, DIF files were one aspect that I did not initially attach much importance to. My spread sheets were relatively uncomplicated creations, and there was no need to transfer data between them. After mastering the basic commands, I concentrated on applying these to my particular purposes. DIF files remained something of a mystery for the next twelve months.

My interest was rekindled after seeing the listing of a BASIC program which would read data from a DIF file. One of the few limitations of Visicalc is that

data cannot be sorted automatically. However, this could be done easily in BASIC and data returned to the spreadsheet. With this thought encouraging me, I returned to the reference material to first find out what a DIF file was.

For the benefit of those who enjoy the same blissful ignorance of DIF files that I once did, DIF stands for Data Interchange Format. In the same way BASIC provides the facility for reading and writing numerical and string data from and to disk files, Visicalc supports DIF files. Data is written sequentially in ASCII and as such is compatible with BASIC. Files are recognizable by the default extension /DIF.

Creating a DIF file from an existing spreadsheet is no more difficult than producing a printout. Move the cursor to the top left cell of the block of data you wish to save. From the command line, select S (storage).

The prompt will read "STORAGE: L S D Q #". Select # (shift-3) and you will see "DATA: Save Load". On pressing S you will be asked "File for Saving". Type in a valid filename terminated by ENTER. The extension /DIF will be added if you do not specify one. The next prompt will be "Data Save: Lower Right", requesting you to provide the coordinate of the lower right corner of the block of cells. This may be typed on the command line, or the cursor moved to the cell position by the arrow keys. ENTER is then pressed. The next choice can cause some confusion: "Data Save: R, C or ENTER". If R or ENTER is pressed, data is saved row by row; using C saves data one column after another. Or that's what it's supposed to do; my copy of Visicalc won't save data in column order to a DIF file, but I don't find that this restricts me in any way. (I am using the Model I version).

Loading data from a DIF file is accomplished by following the prompts in a similar manner, after selecting the L(oad) option. The cursor must be positioned where you wish the top left cell of the data to be, before the data is loaded. Unlike /VC files, which save a complete spreadsheet and will load into the same cell positions as they were saved from, DIF files will save continuous blocks of data from any part of a spreadsheet, which can then be reloaded into any part of the same or another sheet. This feature lends itself to "cutting and pasting".

While whole rows and columns within a spreadsheet can be shifted by the /M command, I usually find it more convenient to save blocks of data in one or more temporary DIF files, and then reposition them in the desired places.

One important point must be remembered. DIF files contain only data, not formulae. In the simple spreadsheet shown, cell C21 contains the formula SUM (C5,C7,C9...C11,C13...C19), which calculates the total of the dollar amounts in column C. If the data in the blocks C5 to C21 is saved and subsequently relocated elsewhere, cell C21 will contain the value 356.52, and will no longer recalculate the total of the column.

This attribute is useful in the case where we want to take the totals C21 to G21 and transfer them

	A	B	C	D	E	F
1						
2						
3	MONTH	Feb	Mar	Apr	May	Jun
4	.....					
5	Electricity	107.99			99.45	
6						
7	Gas	30.00		25.26		41.37
8						
9	Water	37.92			37.92	
10	Sewer	39.15			39.15	
11	Excess W				60.48	
12						
13	Phone		101.16			110.91
14						
15	Insurance	141.46			69.10	
16						
17	Registration			206.00		
18						
19						
20	.....					
21	TOTAL	356.52	101.16	231.26	306.10	152.28

to another spreadsheet. We would then want only values transferred.

Another use, admittedly trivial, is in producing the line of dots in row 20. Normal Visicalc users write a cell full of dots at A20, then R(eplicate) the cell across the page. As I use these lines a lot, I keep one in a DIF file and load it whenever I need it.

If any readers use files in different ways, why not share it with the rest of us. I, and many others, will be most interested.

HI REZ ORBITS

Hi-Rez board and BASICG

by Kevin Formby

This is a simple little Basic program that enables drawing of elliptic orbits to illustrate planetary motion. I wrote it to show that Newton's universal law of gravitation does in fact lead to stable orbits. There are probably easier equations to use, but this is very fundamental. As will be seen by the remarks after the program listing, this is not really suitable for Basic. I must now bestir myself and have another crack at machine language.

The program requires high-resolution graphics, and was written for Model 4, utilizing the Tandy Hi-res card and Tandy's BASICG.

The program is stopped by pressing BREAK. To start a new orbit, type RUN.

```
10 CLS: 'ORBIT  an attempt to map planetary orbits
20 'an original by JKF
30 'the origin is placed at 0,0
40 'the initial velocities are made VX, x-component; VY, y-component
50 'the constant of gravitation is G
60 CLR
70 CIRCLE(100,120),10,1: 'circle representing central body
80 INPUT"Enter initial velocity in the X direction: ";VX
90 INPUT"Enter initial velocity in the Y direction: ";VY
100 GLOCATE (0,0),0
110 PRINT#3,"Horz comp =",VX,"  Vert comp =", VY
120 X=0:Y=-50: 'arbitrary starting point
130 G=10000
140 DT=.1: 'time step. This line can be varied -- see the final notes
150 SCREEN 0
160 DN=X*X+Y*Y:DEN=DN^.5
170 A=G/DN: 'acceleration towards center
180 IF DEN=<10 THEN 180: 'stop if satellite collides with central body
190 AX=A*X/DEN: 'acceleration in x dir
200 AY=A*Y/DEN: 'acceleration in y dir
210 DX=VX*DT+,5*AX*DT*DT: 'increment of x
220 DY=VY*DT+.5*AY*DT*DT: 'increment of y
230 X=X+DX: 'new value of x
240 Y=Y+DY: 'new value of y
250 PSET(X+100,Y+120),1: 'values of x and y referred to origin at 100, 120
260 VX=VX+AX*DT: 'new x velocity
270 VY=VY+AY*DT: 'new y velocity
280 GOTO 160
```

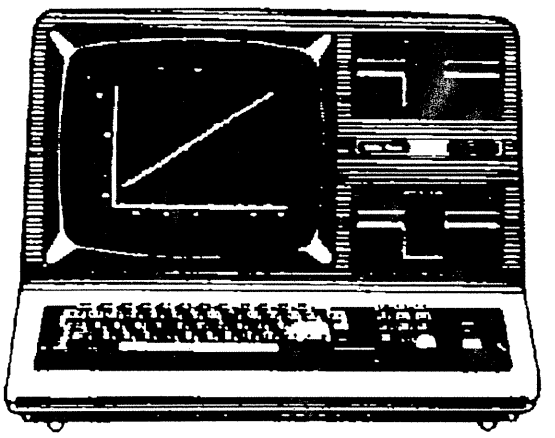
Approximate orbits can be produced, for example, by making VX=10 and VY=0, but they are not ellipses, but spirals. This is because DT is too large, and the accumulated error becomes excessive around the orbit. If we make DT=.01 we get fairly good ellipses, but the drawing of them is too slow to be interesting.

SCREENING FILE FOR SWAP/CMD

by Gary Bryce

If you ever have occasion to to want to disassemble Roy Soltoff's SWAP/CMD, the following screening file will aid you greatly if you are using DSM-BLR III or PRO-DUCE III.

$26f7, $26FB, $26FF, $2703, $2719-2738, $2739-273B, $273C-2751, $2752-277A, $277B-279B, $279C-27B7, $27B8-27BA, $27BB-27BE, $27BF-27C6, $27C7-27CD, $27CE-27DB, $27DC-2803, $2804-2852, $2853-2892



RUB TWO STICKS TOGETHER

by Roy T. Beck

Recently I had occasion to handle a tool which was an old friend and helpmate for many years of my professional engineering career, to wit: my good old slide rule! However, in 1979 I purchased a new gadget from Hewlett-Packard, a Model HP-35 pocket calculator. I must confess I abandoned my old friend on the date of delivery of the HP-35, and have only on rare occasions revisited it.

Reflecting the other night on this turn of affairs lead me to think back over the history of our calculating devices, and all the different devices we, as humans, have used.

Pens and Pencils

One of the early tools used by humans as calculators is our old friend, the pen and/or pencil, which has also been described elsewhere as the earliest word processor. The invention of those two items were really seminal events, which have lead to our whole written history and encouraged the development of both languages and mathematics. I know there are variations on these, such as charcoal used to draw on cave walls, and the use of fine brushes to write on various media, but I class all of these together.

The Abacus

Getting back to calculators, a very early device, elegant in its simplicity, is the oriental abacus, or soroban, which consist of sliding beads or other objects strung upon wires or slender rods. For the benefit of those who do not understand these devices, they have any number of rows of beads, each row corresponding to one column of our western style of presentation of addition or subtraction problems. In the examples with which I am familiar, each column of beads consists of two groups five in one and two in the other, or four in one and one in the other. The beads in the group of four beads or five beads each represent unit values in that column. The one bead or two beads in the other group are valued at five units apiece. By sliding all beads to the same end of every rod, the abacus represents a sum of zero.

As an example, let's consider how we would add 263 and 872 on an abacus. First, we will enter the 263. By displacing two unit beads in the third column from the right, one five-unit bead and one one-unit in the second column from the right end, and three unit beads in the right-most column, we have set the value of 263 into the abacus. Note that the six is represented by a five-unit bead plus a one-unit bead.

Now we can go ahead and add the value 872. First note the three beads in the rightmost column. Adding the two from the 872 to the three already on the abacus is five. On an abacus with five-unit beads, simply slide the remaining two unit beads up to represent five as the sum of the three and two. If the abacus has only four unit-beads, then the first three beads are slid back to the zero position, and the five-unit bead is slid up. Now we must deal with the second digits. The value of six is already in the abacus. The sum of six and seven is thirteen. We represent the thirteen as a three in the next to last column, and we carry a one to the next column to the left. In the next to last column, set three beads up in the unit-bead area and reset the five-unit bead to the zero position. Move one unit bead up in the next column to the left to represent the carry. Finally we add the eight in the leftmost column. Since there is a three there already (two plus a carry), adding eight more mentally means we need a single unit-bead in the third column from the right, and a single unit-bead in the fourth column from the right. After this manipulation, reading from left to right, we see one, one, three and five, or 1135, the sum of 263 plus 872.

Subtraction on the abacus is similar, except the columns are used to hold the subtracted digits instead of added digits, and carries are moved from the column at the left of the column under consideration.

When you consider the mechanics of multiplication with pencil and paper, it is easy to recognize that multiplication is really successive addition, which can be accurately done on the abacus, albeit somewhat tediously. Long division is, accordingly, repetitive subtraction, which can also be done on the abacus.

Mechanical Calculators

Early in this century, as mechanical design and manufacturing techniques permitted, the

mechanical desk top calculator came into existence. Some versions were by Burroughs, Friden, Monroe, and Comptometer. I am sure there were many others. These basically functioned by turning wheels with 10 values (0-9) around their perimeter, and gear teeth so arranged that each unit of value rotated the wheel by 1/10 of a rotation. The "carry" is handled by a geneva gear drive which caused each wheel to the left to rotate 1/10 of a revolution when a given wheel has completed one full rotation.

As time went along, motors were added to the original mechanical designs to turn all the gears with little or no manual effort.

Slide Rules

But where did slide rules fit into the development history of calculating devices? Before slide rules could become practical, a whole branch of mathematics had to be invented. John Napier, a mathematician, invented the system of natural logarithms. Another mathematician, named Briggs, invented a related system, called common logarithms. There is a base number implied in each of these names, which for natural logs is the transcendental value e, approximately equal to 2.7183, and for common logs is exactly 10. The two systems function identically in principal, but for some purposes, one or the other system is more easily used. For engineering purposes, the common log system is generally used.

Logarithms allowed multiplication and division of very large and very small numbers with limited accuracy. The "limited accuracy" qualification renders logarithms unacceptable to financial types, who insist on accuracy to the penny for numbers of any size, large or small. Engineers, astronomers and such-like people, however, are quite willing to accept small errors in large numbers as acceptable for most purposes, and therefore were delighted when it became possible to multiply or divide very large or very small numbers by simply adding or subtracting values taken out of a handbook.

Technically, the logarithm of any number is the exponent of the base (e or 10) which will give the original number. For example, the common log of the number two (2) is 0.30103 This means that 10 raised to the exponent 0.30103 is equal to 2.0

Following the rules of algebra, the product (10 exp a) x (10 exp b) is equal to 10 exp (a + b). If we wish to multiply two large numbers together, and can represent one of them as 10 raised to the power a, and the second one as 10 to the power b, then we can effect the multiplication by adding the two exponents (the logs) of the numbers together, and then taking the antilog of the sum. The antilog is simply the value of 10 raised to the power a + b.

For convenience of use and to reduce the size of reference tables, only the logarithms of numbers from 1.000 to 10.000 are tabulated in handbooks, similar to the style of trigonometric values of angles. Because smaller and larger numbers must be dealt with, a simplifying trick is used. To handle the range of values from very small to very large, all numbers are reduced to the above range by simply including a "characteristic" which is the power of 10 which must be multiplied by the 10 exp a value to account for the decimal value. The log of large numbers will include digits before and after the decimal point. The numeric value before the decimal is known as the "characteristic" and the numeric value after the decimal point is called the "mantissa".

Numeric values smaller than 1.000 or larger than 10.000 can be represented in this range by assuming a number which is a power of 10 as a multiplier of a number in the 1.000 to 10.000 range. For example, 15,360 can be represented by 1.5360 x 10 exp 4. The user need only look up the log of 1.5336, which is 0.18639, add the 4 and arrive at 4.18639, the common log of 15,360.

The Slide Rule

But what about my ol' pal, the slide rule? Well, some clever person realized that one could layout distances along the edges of two pieces of wood in proportion to the common logarithms of the numbers 1.000 to 10.000 The decimal markings along the wood are the original numbers, but the distance from the origin is proportional to the log of the value. Since 10 inches was found to be a convenient length for a slide rule, the log of 1.000 (which is 0.000) falls at the origin of the rule, but is labeled 1.0. The log of 2.0 is 0.30103, and so falls at 3.1013 inches along the 10 inch scale, the log of 5 is 0.69897 and falls at 6.9897 inches, and the log of 10 is 1.0000, or 10.000 inches on the scale.

For convenience, a cursor, or hairline was added to the pair of wood slides. To use the slide rule in multiplication, one number, without regard to the decimal point, is located on one scale and the hairline placed there as a visual reference. The origin of the second scale is placed on the hairline, and the second number is located on the second scale. The cursor is next moved to the second value on the second scale. The reading on the FIRST scale is now the sum of the logs of the two numbers but is marked with the

resulting product. The next task is to locate the decimal point, as the slide rule assumes all numbers fall in the range of 1.0 to 10. By inspecting the original two numbers, the approximate answer can be determined, which allows one to accurately place the decimal point in the value read off the slide rule.

Since one is dealing with engraved pieces of wood, with some parallax error, sticky slides, and finite width hairline, the accuracy of a slide rule is usually taken to be somewhere between 0.1 and 1.0%. This is far from perfection, but is very adequate for most engineering work, which has been my career. From the movements of the two slides comes my title for this piece!

The Electronic Calculator

The electronic calculator is in reality a computer with a fixed program, stored in ROM. Besides the usual operating system which can scan the keyboard, drive the display, and store and recover data from RAM, it has numerous algorithms which have been tailored to provide fast response for long calculations, especially the higher order math functions such as trigonometry, logarithms, conversions from degrees to decimal and conversely, and various specialized functions as required. Bankers, for example love to have mortgage and annuity functions readily available. Since it is impractical to have all the mathematical functions represented in lookup tables because of the huge ROM requirement which would result, all functions are generated as needed by special algorithms.

Some very competent and well-paid mathematicians have been employed to derive formulas, usually series, I believe. As long as they do their tasks well, all is well with the results. Those of you who noted Intel's recent monkeyshines will appreciate the difference in corporate attitude taken by HP when a clinker was discovered in their original HP-35. About a year after release, someone (a user) discovered the algorithms used for some of the functions had some bugs. It turned out that if you called for the log or trig function (I forget which) of certain exact values, the algorithm would blow up and produce a horribly wrong value. If the input value was different in only the very last decimal place, the functions were correct. It seems the algorithms in the ROMs had a couple of holes in them which the mathematicians hadn't caught. Here there truly was a situation which statistically would only affect a tiny percentage of the user population only a tiny percentage of the time. HP publicized the problem by mailing a notice to all purchasers. The notice acknowledged and described the problem, and offered a no-charge replacement of the ROMs in your machine. I sent mine in and they promptly replaced the ROMs and returned it to me. Now that's the way Intel should have behaved!

My HP-35 cost me $395 plus tax when new, in 1979. I was working for the Bechtel Corporation at the time, a major A&E outfit. In our branch of the company, with some 500 people, the company realized the value of this new tool and purchased 6 of them, to be checked out to specified individuals. The company was so frightened of the possibility of theft that they bought the security kits to go with them, that being a cable and padlock scheme to anchor the HP-35 to the user's desk! Since I purchased my own calculator, mine was the only one of the seven in the company not bolted down. I took delight in carrying it around in my shirt pocket just to tease those six engineers who couldn't relocate theirs without the permission of management! Shame on me!

The year after I bought mine, the price dropped to $225 (ain't it always the way?) and a year later it was obsolete and out of the catalog. Some three or four years later, a different model of somewhat greater capability was selling by HP for around $50. Regardless of the progression of new models and falling prices, I still have, and USE my good old HP-35. It has a 3 cell nicad battery pack, and in the 16 years I have owned it, I must have worn out about 10 battery packs. It is tough on batteries, due to its LED's which pull quite a bit of current. Later models mostly use liquid crystal displays, which are essentially voltage sensitive instead of the being current sensitive like the LEDs. Regardless, I still use it on a daily basis, even in retirement. It just seems like part of me. And the poor old slide rule gathers dust in the garage. Incidentally, if anyone ever asks why the first HP model should be identified as the -35 model, the answer is easy. It had 35 buttons on it! S'Truth, so help me.

Would I ever go back to my old pal, the slide rule? Only in desperation! The HP-35 far outshines it in every capability. The slide rule was a 19th century relic which survived until 1978 simply because there wasn't a decent electronic calculator until then. Once it happened, courtesy of HP, and later Texas Instruments and others, there was no place, except in a powerless wilderness where the slide rule was attractive. Anyway, while I still know how to "rub two sticks together" I sure don't do it anymore. RIP, ol' pal.

TINKERING WITH KELLY

by Kelly Bates

My new Model 4D developed some shaky video and then finally it locked up completely. I have a spare desktop 4, so I opened it up and pulled the power supply. The design was close enough to the 4D, so I swapped the power supplies. Video problems cleared up. Checked the other unit, no problems, it also worked great. So in actuality, all I needed to do was pull the connectors and reseat them.

Three and a half inch floppies. They are not all compatible. Last year, in Chicago, I bought two new ones for $31.00 a piece. Swapped them out with the ones I had in the 4P and used them while on vacation. Everything seemed fine.When I got back to Oklahoma City in September, I put the now spare floppies into my old XT. Everything worked great, I thought.

Using the 4P recently to convert the MS mess icons to DotWriter fonts, I had occasion to use Hypercross to move the files from an MS-Dos diskette to a Model 4P diskette. Hypercross told me that the drive :1 device was not there (or the door was open). I yelled back unspeakable things, but the machine persisted, so I did the conversion using a Model 4 desktop instead. I finished up the font (I am now in excess of 21 Window icons Dot fonts), and started wondering what was up with the 4P drives.

I know I used to use the 4P for file transfer, so the problem must be the new drives I bought in Chicago. Let's see, where do I have the old ones.Finally figured out where; it took a while since I now have 10 each 3 1/2" floppy drives installed in old computers — four in this 4D, two in the 4P, two in another desktop, and two in the old XT. I had earlier bought some 5 1/4 to 3 1/2 white-faced conversion hardware, so moving the floppies around I made sure the 3 1/2" drives all had faces that matched the drives. Finally got to exchanging the XT floppies for the ones in the 4P that would not let Hypercross work. This all took a couple of days as I was in no hurry and wanted everything right.

While doing the above, I put the two new ones in the 4P and they would not even boot (Panasonics, reconditioned - $22.00 a piece, warranted 30 days), so I put the same two in a desktop — and they worked fine. That exercise tells me that the drive controllers are different in the 4P and the desktop. The two in the 4P are TEAC, and the ones in this desktop are Panasonics. The two I bought in Chicago are MITSUMI. All of them are 1.44 megabytes. The two now spare, so they will probably go in an external unit.

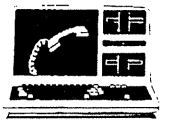
Anyway, it was quite an adventure. I am converting some more 8-color Window icons to B/W using the MS mess, so now I can get back to doing that.

Another on-going project is assembly of a Heathkit composite monitor. A guy got tired of seeing it in his garage and asked me if I'd like to tinker/assemble it. I said sure, and he brought it by last week. (Spare time project).

Another item — been playing with building a Model 4 speaker board. R-3 is 120 ohms, but if a potentiometer is put in place of it, you can get a volume control. And if you put a real speaker on the output, you can get some real sound! The transducor emits noise, but a speaker is much better. The Tandy board is numbered 8709403 if anybody wants to play with it. By the way, many old MS computer keyboards have those transducers. I picked up a slew recently along with about 50 of those Aztec power supplies we used to pay $49.95 for mail order. Gave some of my friends all the power they need.

At the moment all my computer systems are 'GO' — that is, until I find something else to do to them. Another mod I want to do sometime, is to mount the volume control on the from of my 4P on the hardware that holds drive :0 (up at the top). Just a matter of extending the wire and acquiring a cute volume control know. There's plenty of room.

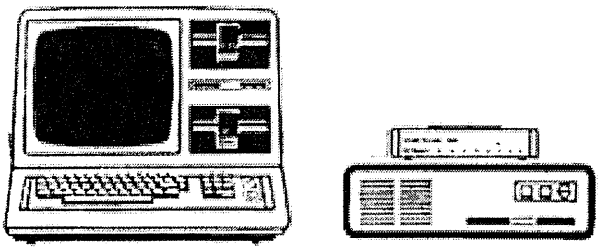
That's about it for now, I'm staying busy. Happy computing to all.



CONFIGURING A 5 MEG HARD DRIVE

Model 4/LS-DOS 6.3.x and Model 3/LDOS 5.x.x

by Lance Wolstrup



When I recently offered one of my Radio Shack 5 meg hard drives for sale, I thought the right thing to do would be to reconfigure it from scratch. This, of course, meant partitioning the drive, and then in turn formatting each partition individually. Following this, I'd need to install the DOS and make the first partition the SYSTEM drive.

If you're new to working with hard drives, the step-by-step description which follows may be of interest. If you're an old hand, you may have forgotten some of this (*as I did — I had to call Roy Beck for help*), and it may strike your fancy. I am writing this for pure selfish reasons — simply to have the information available the next time I set out to play with the hardware.

OK, first some facts. The Radio Shack 5 meg hard drive has 153 cylinders (numbered 0 to 152) and 4 heads (numbered 1 to 4). The easiest (and most logical) way to set up the hard drive is to divide it into 4 smaller drives (called partitions). Each of these drives will have 153 cylinders and use one of the four heads.

Now for the goodies. Connect the hard drive to the Model 4 and boot with a copy of the normal LS-DOS 6.3.1 boot-disk. Answer the date and time prompts, then insert the disk containing the hard disk DRIVER in drive :1 and copy it onto drive :0. (The driver is called RSHARD6/DCT and it was available from MISOSYS until they went out of business. I believe that Roy Beck still has a few **LEGAL** copies for sale — see his hard drive ad elsewhere in this issue). From the same disk also copy RSFORM6/CMD to drive :0 for later use.

Next, type the following command from the DOS Ready prompt:

```
SYSTEM (drive=2,disable,driver="RSHARD6")
```

The driver program (RSHARD6/DCT) is invoked and the screen looks like this:

```
RS HARD DISK WD1000/WD1010 DRIVER - VERSION 1.0b
Copyright 1987 MISOSYS, Inc., All Rights Reserved

Enter drive address <1-2> and F/R  [1;F] ——>
```

Press the <ENTER> key to choose the default drive address 1 and Fixed disk.

Next comes the STEP RATE prompt:

```
Enter the STEP RATE <10us - 7.5ms  [10] ——>
```

Again, press <ENTER> to choose the default inside the brackets.

Now comes the TRACK prompt:

```
Enter the physical TRACKS per surface  [306] ——>
```

This time do NOT select the default; rather type **153** and press <ENTER> to indicate that the drive has 153 tracks.

The next prompt asks about the number of heads:

```
Enter the total number of Heads  [4] ——>
```

Since the drive does have 4 heads, press <ENTER> to choose the default of 4.

The program then displays:

```
Heads already in use <.-.-.-.->
Enter partition's number of heads <1-4> ——>
```

Answer this prompt by typing **1** and then press <ENTER>.

RSHARD6/DCT continues by prompting:

```
Enter starting head ——>
```

Press **1**, followed by <ENTER> to select head number 1.

The final prompt then appears:

```
Enter partition's number of cylinders [153] ——>
```

Press <ENTER> to select the default shown in-

side the brackets — 153 cylinders.

This completes the first partition and the program warns that the partition appears to be unformatted, then it exits to DOS Ready.

Now, we need to format the partition, so use the hard-drive formatter, called RSHARD6/CMD, to do this. Type:

RSFORM6 :2 <ENTER>

It begins by displaying the name and copyright notice — pretty much like RSHARD6/DCT. The screen looks like this:

RS FORM - WD1000/WD1010 Formatter - version 1.0a
Copyright 1987 MISOSYS, Inc., All rights reserved

Disk Pack name ?

Answer the prompt by typing SYSTEM. This gives the partition the name SYSTEM. Though the partition is at this point drive :2, it will eventually become drive :0 — the system drive — so the name is appropriate.

The next prompt asks:

Master password ?

Type PASSWORD, followed by <ENTER> and the program will begin to format the partition. After a few minutes, the process is done and DOS Ready again appears.

The information about the newly-made partition resides in memory and will disappear if the computer is rebooted or turned off. To avoid having to do it all over again, be sure to save the information to the boot-disk by typing:

SYSGEN <ENTER>

THE SECOND LS-DOS PARTITION

Now, it is time to configure the next partition, drive :3. Type:

SYSTEM (drive=3,disable,driver="RSHARD6")

Press <ENTER> and the program displays the header and copyright notice as before, and then prompts:

Enter drive address <1-2> and F/R [1;F] ——>

Answer as before by pressing <ENTER> to choose the default of drive address 1 and Fixed disk.

The STEP RATE, physical TRACKS per surface, and total number of heads prompts are skipped, as the information is already available from the previous partition — no need to enter it again. Instead, RSHARD6/DCT goes directly to:

Heads already in use <1-.-.->
Enter partition's number of heads <1-3> ——>

Type **1** <ENTER> and we are then prompted:

Enter starting head ——>

Select head number 2 by typing **2** <ENTER> and we are then given the final prompt:

Enter partition's number of cylinders [153] ——>

Chose the default of 153 cylinders by pressing <ENTER>.

The program again warns that the partition appears to be unformatted, and it exits to DOS Ready.

Format the new partition — type:

RSFORM6 :3 <ENTER>

The header and copyright notice appears as before, and to the **Disk Pack name** prompt, type

HARDB <ENTER>

and to the **Master password** prompt, again type:

PASSWORD <ENTER>

Soon, the second partition is formatted and at this point be sure to save the partition information to the boot-disk by typing:

SYSGEN <ENTER>

THE THIRD LS-DOS PARTITION

Configuring the third partition is as easy as the second — type:

SYSTEM (drive=4,disable,driver="RSHARD6")

After the header and copyright notice appears, the prompt is once again:

Enter drive address <1-2> and F/R [1;F] ——>

Answer same as before, by pressing <ENTER>, selecting the default.

The next prompt is:

Heads already in use <1-2-.->
Enter partition's number of heads <1-2> ——>

Type **1** <ENTER>, and we are then prompted:

Enter starting head ——>

Select head number 3 by typing **3** <ENTER> and we are then given the final prompt:

Enter partition's number of cylinders [153] ——>

Chose the default of 153 cylinders by pressing <ENTER>.

The program again warns that the partition appears to be unformatted, and it exits to DOS Ready.

Now format the new partition — type:

RSFORM6 :4 <ENTER>

The header and copyright notice appears as before, and to the **Disk Pack name** prompt, type:

HARDC <ENTER>

and to the **Master password** prompt, again type:

PASSWORD <ENTER>

Before long the third partition is formatted and we are back at DOS Ready. To save the information, type:

SYSGEN <ENTER>

THE FOURTH LS-DOS PARTITION

Finally, the last partition. Type:

SYSTEM (drive=5,disable,driver="RSHARD6")

After the header and copyright notice appears, the prompt is once again:

Enter drive address <1-2> and F/R [1;F] ——>

Same answer as before — press <ENTER> to select the default.

The next prompt is:

Enter partition's number of cylinders [153] ——>

Chose the default of 153 cylinders by pressing <ENTER>.

The program again warns that the partition appears to be unformatted, and it exits to DOS Ready.

Now format the new partition — type:

RSFORM6 :5 <ENTER>

The header and copyright notice appears as before, and since we plan to use this partition for LDOS531, answer the **Disk Pack name** prompt by typing:

LDOS531 <ENTER>

and to the **Master password** prompt, again type:

PASSWORD <ENTER>

In no time the fourth (and last) partition is formatted and we are back at DOS Ready. To save the information, type:

SYSGEN <ENTER>

PREPARING THE LS-DOS SYSTEM DRIVE

Now we need to copy the DOS from the boot-floppy in drive :0 over to the first partition on the hard drive. Do the following:

BACKUP SYS0/SYS:0 :2 (S) <ENTER>

BACKUP /SYS:0 :2 (S) <ENTER>

BACKUP /:0 :2 (I) <ENTER>

It is important that the three backup commands are issued in the above order, as the /SYS files (especially SYS0/SYS) must be placed correctly on the hard drive.

At this point the drive configurations are:

:0	Boot Floppy	LS-DOS
:1	Floppy 1	whatever
:2	SYSTEM	partition 1 - LS-DOS
:3	HARDB	partition 2 - empty
:4	HARDC	partition 3 - empty
:5	LDOS531	partition 4 - empty

Since hard drives are much, much faster than floppies, we want to make SYSTEM in drive :2 the

system drive. Type:

SYSTEM (SYSTEM=2) <ENTER>

This command swaps the previous system drive (:0) with drive :2. The configuration is now:

:0	SYSTEM	partition 1 - LS-DOS
:1	Floppy1	whatever
:2	Boot Floppy	LS-DOS
:3	HARDB	partition 2 - empty
:4	HARDC	partition 3 - empty
:5	LDOS531	partition 4 - empty

Type SYSGEN (drive=2) <ENTER> to save the new information and, just to see if everything works, reboot the computer. Sure enough, after the boot, the configuration is as described above.

Next, we want to swap the drives to a more logical order; that is, the 4 partitions first, followed by the 2 floppies. Issue the following commands:

SYSTEM (DRIVE=1,SWAP=3) <ENTER>
SYSTEM (DRIVE=2,SWAP=4) <ENTER>
SYSTEM (DRIVE=3,SWAP=5) <ENTER>

SYSGEN (drive=4) <ENTER>

The drive configuration is now saved on the boot floppy as:

:0	SYSTEM	partition 1 - LS-DOS
:1	HARDB	partition 2 - empty
:2	HARDC	partition 3 - empty
:3	LDOS531	partition 4 - empty
:4	Boot Floppy	LS-DOS
:5	Floppy1	whatever

This completes the configuration for Model 4 LS-DOS. But now it would be handy if we could also configure the hard-drive to boot with LDOS 5.3.1. OK, back to the drawing board.

CONFIGURING LDOS 5.3.1.

The most logical configuration (in my opinion) is to set up the Model III LDOS hard-drive as shown above — with drive :0 and drive :3 swapped. In other words:

:0	LDOS531	partition 4 - LDOS
:1	HARDB	partition 2 - empty
:2	HARDC	partition 3 - empty
:3	SYSTEM	partition 1 - DOS
:4	Boot floppy	LDOS
:5	Floppy1	whatever

First, boot up in Model III model with the LDOS 5.3.1 boot disk. Immediately make a backup of this boot disk.

Now, insert the disk containing the hard-disk DRIVERS (the one we used earlier) in drive :1 and copy RSHARD5/DCT from drive :1 to the boot-disk in drive :0.

We are now ready to partition the drive for use with Model III LDOS. Type:

SYSTEM (drive=2,disable,driver="RSHARD5")

The driver program (RSHARD5/DCT) is invoked and the screen looks just like when we partitioned for LS-DOS:

RS HARD DISK WD1000/WD1010 DRIVER - VERSION 1.0b
Copyright 1987 MISOSYS, Inc., All Rights Reserved

Enter drive address <1-2> and F/R [1;F] ——>

Press the <ENTER> key to choose the default drive address 1 and Fixed disk.

Next comes the STEP RATE prompt:

Enter the STEP RATE <10us - 7.5ms [10] ——>

Again, press <ENTER> to choose the default inside the brackets.

Now comes the TRACK prompt:

Enter the physical TRACKS per surface [306] ——>

This time do NOT select the default; rather type **153** and press <ENTER> to indicate that the drive has 153 tracks.

The next prompt asks about the number of heads:

Enter the total number of Heads [4] ——>

Since the drive does have 4 heads, press <ENTER> to choose the default of 4.

The program then displays:

Heads already in use <.-.-.-.->
Enter partition's number of heads <1-4> ——>

Answer this prompt by typing **1** and then press <ENTER>.

RSHARD5/DCT continues by prompting:

Enter starting head ——>

Press **1**, followed by <ENTER> to select head number 1.

The final prompt then appears:

Enter partition's number of cylinders [153] ——>

Press <ENTER> to select the default shown inside the brackets — 153 cylinders.

This completes the first partition, and we go directly to LDOS Ready. Note that there is no 'unformatted' warning because we formatted that very partition under LS-DOS.

Save the partition information — type:

SYSTEM (SYSGEN) <ENTER>

THE SECOND LDOS PARTITION

Let's now configure the next partition, drive :3. Type:

SYSTEM (drive=3,disable,driver="RSHARD5")

Press <ENTER> and the program displays the header and copyright notice as before, and then prompts:

Enter drive address <1-2> and F/R [1;F] ——>

Answer as before by pressing <ENTER> to choose the default of drive address 1 and Fixed disk.

The STEP RATE, physical TRACKS per surface, and total number of heads prompts are skipped, as the information is already available from the previous partition — no need to enter it again. Instead, RSHARD5/DCT goes directly to:

Heads already in use <1-.-.->
Enter partition's number of heads <1-3> ——>

Type **1** <ENTER> and we are then prompted:

Enter starting head ——>

Select head number 2 by typing **2** <ENTER> and we are then given the final prompt:

Enter partition's number of cylinders [153] ——>

Chose the default of 153 cylinders by pressing <ENTER>.

Again, no 'unformat' warning — we are returned directly to LDOS Ready. Here, save the partition information by typing:

SYSTEM (SYSGEN) <ENTER>

The SYSTEM and HARDB drives are now available to LDOS, and we will continue by configuring HARDC.

THE THIRD LDOS PARTITION

The HARDC drive is the third partition and it is as easy to configure as the second — type:

SYSTEM (drive=4,disable,driver="RSHARD5")

After the header and copyright notice appears, the prompt is once again:

Enter drive address <1-2> and F/R [1;F] ——>

Answer same as before, by pressing <ENTER>, selecting the default.

The next prompt is:

Heads already in use <1-2-.->
Enter partition's number of heads <1-2> ——>

Type **1** <ENTER>, and we are then prompted:

Enter starting head ——>

Select head number 3 by typing **3** <ENTER> and we are then given the final prompt:

Enter partition's number of cylinders [153] ——>

Chose the default of 153 cylinders by pressing <ENTER>.

Again, no 'unformatted' warning. Instead we are returned to LDOS Ready. Here, save the partition information — type:

SYSTEM (SYSGEN) <ENTER>

THE FOURTH LDOS PARTITION

Finally, the most important partition for LDOS. This one will end up being the system drive. First, let's partition it by typing:

SYSTEM (drive=5,disable,driver="RSHARD5")

After the header and copyright notice appears, the prompt is once again:

Enter drive address <1-2> and F/R [1;F] ——>

Same answer as before — press <ENTER> to

select the default.

The next prompt is:

Enter partition's number of cylinders [153] ——>

Chose the default of 153 cylinders by pressing <ENTER>.

There is no 'unformatted' warning, and we are back at LDOS Ready. Save the partition information by typing:

SYSTEM (SYSGEN) <ENTER>

All partitions are now available to LDOS. The drive configuration is now:

:0	Boot Floppy	LDOS
:1	Floppy1	whatever
:2	SYSTEM	partition 1 -LS-DOS
:3	HARDB	partition 2 - empty
:4	HARDC	partition 3 - empty
:5	LDOS531	partition 4 - empty

Let's put the system files on drive :5. Type:

BACKUP SYS0/SYS:0 :5 (S) <ENTER>

BACKUP /SYS:0 :5 (S) <ENTER>

BACKUP :0 :5 (I) <ENTER>

When the files have been copied over to drive :5, we can make it is system drive. Type:

SYSTEM (SYSTEM=5) <ENTER>

SYSTEM (DRIVE=3,SWAP=1) <ENTER>

SYSTEM (DRIVE=2,SWAP=4) <ENTER>

SYSTEM (DRIVE=3,SWAP=4) <ENTER>

SYSTEM (DRIVE=4,SWAP=5) <ENTER>

We now have the desired configuration, so save it with SYSTEM (SYSGEN,drive=5) <ENTER>.

;0	LDOS531	partition 4 - LDOS
:1	HARDB	partition 2 - empty
:2	HARDC	partition 3 - empty
:3	SYSTEM	partition 1 - LS-DOS
:4	Boot Floppy	LDOS
:5	Floppy1	whatever

The 5 meg hard drive is at this point capable of running LS-DOS and LDOS. It is indeed quite handy. However, in order to get from LS-DOS to LDOS it is necessary to insert the LDOS boot disk in drive :0 and reboot.

There is a better way. Roy Beck wrote an article in TRSTimes 5.1 (Jan/Feb 1992) about a program called BOOT5/CMD. The author, Alan Rubin, wrote it for LDOS 5.3.0, and we patched it to work with LDOS 5.3.1.. It is a marvelous program that allows you to go from LS-DOS directly to LDOS without an LDOS boot disk in drive :0. You copy the program to the LS-DOS partition and once there, you type the command:

BOOT5 :3 <ENTER>

BOOT5 is the name of the program, and :3 is, in this case, the drive number where LDOS can be found.

While the program is in the public domain, the author requests that it not be altered. Respecting his wishes, we were never able to distribute the LDOS 5.3.1 version of BOOT5/CMD. However, for those of you interested, I believe that the LDOS 5.3.0 version is available for download on the TRSuretrove BBS — 213 664-5056.

Get it from the BBS and if you send a self-addressed, stamped envelope to TRSTimes, I will send a copy of the patches.

Have fun with your hard drives.

TRSQUIZ

Model 4 - Basic

by Lance Wolstrup

Some time ago I wrote a program for a friend, a teacher, who needed help with his daily student quizzes. After some thinking and planning, the program became a simple engine that would read and manipulate plain text files. The quiz would be written on an ASCII text editor. The very first piece of information in the file would be the number of questions in the file, followed in turn by each question and answer.

The program was originally called "QUIZ" (I've always been good with names!), and it went through many changes and updates. It was, by necessicity, written in QUICK BASIC on a PC, but I thought that it might be fun to adapt it for my Model 4. Here it would be useful for anyone having a need to be quizzed, such as someone getting ready for a real estate exam, a citizen test, a driving test, or just about any other test you can think of.

So, I translated QUIZ to Model 4 Basic, in the process renaming it TRSQUIZ. I also made a few modifications, the major one being the implementation of a menu system; that is, the program is now able to handle more than one file. TRSQUIZ/BAS looks for a file (in line 120) called TRSQUIZ/MNU which is read and it, in turn, determines which /QIZ data files are available. TRSQUIZ/MNU is written with a plain ASCII text editor (TED, for example) and, as in QUIZ, the first piece of data is the number of data following — and then the data itself. In this case the data would be the name of the menu entry and the corresponding filename, separated by a comma. (See listing for TRSQUIZ/MNU later in this article).

Also using an ASCII text editor, the quizzes themselves are written in an identical manner. The very first piece of data is the number of questions/answers that follows — then the questions and answers themselves, separated by a comma. (See listings to ENTRTAIN/QIZ, GENERAL/QIZ, GEOGRAPH/QIZ and SPORTS/QIZ).

Just for fun, I decided to fix the one thing that has become my 'pet-peeve' when I search through public domain TRS-80 programs. Many times I will 'run' a program just to get an error message telling me that the software cannot find a required data file. Somehow, the program got on the disk, but the data files were left off. What a 'bummer'! This renders the particular program completely useless.

```
1 'trsquiz
2 'for TRS-80 Model 4
3 'copyright 1994 by Lance Wolstrup
4 'all rights reserved
5 '
10 DEFINT A-Z:SW=80
11 FOR X=1 TO 3:FOR Y=1 TO 50:READ A:
A$(X)=A$(X)+CHR$(A):NEXT:NEXT
12 DATA 129,131,147,191,131,131,128,137,147,191,131,
139,155,180,128,150,190,135,131,139,137,128,150,190,
135, 131,139,155,189,128,169,171,151,128,128,169, 171,
151,128,137,147,191,131,128,129,131,131,155,187,135
13 DATA 128,128,149,191,128,128,128,128,149,
191,140,190, 142,129,128,137,139,141,172,172,180,128,
149,191,128,128,164,165,159,128,170,170,149,128,128,
170,170,149,128,128,149,191,128,128,128,160,166,158,
129,128
14 DATA 128,160,165,191,144,128,128,160,165,191,146,
166,173,176,128,164,164,176,184,185,159,128,165,175,
180,184,185,135,164,128,138,154,189,176,176,182,190,
133,128,152,177,191,176,128,152,185,183,176,176,176
15 PRINT CHR$(15):CLS:FOR X=1 TO 3:A$=A$(X):
GOSUB 20:V=V+1:NEXT:V=0:H=58:
A$="copyright 1994":GOSUB 23:V=1:H=57:
A$="by Lance Wolstrup":GOSUB 23:V=2:H=56:
A$="all rights reserved":GOSUB 23:V=3:
A$=STRING$(SW,140):GOSUB 20
17 DIM Q$(100,2),QF(100)
18 POKE &HA0B,&H18:
POKE &H7C,PEEK(&H7C) OR 16
19 GOTO 100
20 H=0:GOTO 23
21 H=(SW-LEN(A$))/2:GOTO 23
22 H=SW-LEN(A$)
23 PRINT@(V,H),A$;:RETURN
30 FL=0:L=0:I$="":A$=STRING$(ML,46):GOSUB 23:
A$=CHR$(14):GOSUB 23
31 A$=INKEY$:IF A$="" THEN 31
32 IF A$=CHR$(13) THEN PRINT CHR$(15);:RETURN
33 IF A$=CHR$(27) THEN FL=1:PRINT CHR$(15);:
RETURN
34 IF (A$=CHR$(8))*(L=0) THEN 31
35 IF A$=CHR$(8) THEN L=L-1:I$=LEFT$(I$,L):H=H-1:
A$=CHR$(46):GOSUB 23:A$="":GOSUB 23:GOTO 31
36 IF (A$<CHR$(32))+(A$>CHR$(122)) THEN 31
37 IF L=ML THEN 31
38 GOSUB 23:H=H+1:L=L+1:I$=I$+A$:GOTO 31
40 V=12:A$=CHR$(30)+"Incorrect answer -- would you
like a hint (Y/N)? ":GOSUB 21:H=H+LEN(A$)
41 ML=1:GOSUB 30:IF I$="Y" THEN 42 ELSE IF I$="N"
THEN F=1:H=0:A$=CHR$(30):GOTO 20 ELSE 40
42 R1=RND(LEN(AN$)):IF MID$(HI$,R1,1)<>CHR$(46)
THEN 42
43 MID$(HI$,R1,1)=MID$(AN$,R1,1)
```

Even for an reasonably experienced programmer, trying to figure out what the author had in mind is frustrating and usually not worth the time it takes to clean it up.

TRSQUIZ/BAS would be prone to the same problem. In line 120 it attempts to open the menu data file, TRSQUIZ/MNU. If the menu data file is not found, the program will crash big-time. However, should the menu file not be found, rather than crashing, TRSQUIZ/BAS will invoke a program within the program and continue by using the built-in quiz. It is a simple quiz on the nicknames of the 50 states and it is much more fun answering the questions than staring at a 'file not found' error message. This routine begins in line 110 where, if a file error occurs, program flow is routed to line 130 through 495.

Now, the program would also crash if one or more of the data files listed in the menu do not exist (or are bad). Therefore, the error trap in line 570 (routing the program flow up to line 700) will inform the user that the menu selection is unavailable, and that he/she will have a choice of using the default quiz or going back to the menu.

Admittedly, these error traps are not earth shaking (to use some LA terminology), but they do make the program more usable and friendly.

The POKEs in line 18 force all key strokes to uppercase and disables the BREAK key. The forced uppercase makes it simple to check if an answer is correct (that is assuming that the answers in the data files are typed in uppercase, as they are in all the data examples later in the article).

The POKEs in line 280 reset key strokes to be whatever case is typed, and the BREAK key is enabled.

Finally, the /qiz data files are made up of trivia that I have collected over the years which I believe to be correct. However, should the readers find errors, let me know and we will publish the correction in a future issue.

```
44 V=12:A$=CHR$(30):GOSUB 20:A$="Here is your
hint: "+HI$:GOSUB 21:H=H+LEN(A$):HI=HI+1:
IF HI$<>AN$ THEN 47
45 V=15:A$="Press <ENTER> to continue ":
GOSUB 21:H=H+LEN(A$)
46 ML=1:GOSUB 30:IF I$="" THEN A$=CHR$(30):
GOSUB 20:F=1:V=12:GOTO 20 ELSE 45
47 RETURN
50 RANDOM:QA=0:QC=0:HQ=18:HC=77:HI=0
51 V=4:A$=CHR$(31):GOSUB 20:V=22:
A$="Questions asked:":GOSUB 20:
PRINT@(V,HQ),USING"##";QA:H=60:
A$="Correct answers:":GOSUB 23:
PRINT@(V,HC),USING"##";QC:V=21:
A$=STRING$(SW,131):GOTO 21
55 QA=QA+1
53 RR=RND(R):IF QF(RR) THEN 56 ELSE QF(RR)=1
57 AN$=Q$(RR,2):HI$=STRING$(LEN(AN$),46):
RETURN
80 V=12:
A$="You correctly answered"+STR$(QC)+" out of"+
STR$(QA)+" questions":GOSUB 21
81 PC=(QC/QA)*100
82 V=14:A$="for a score of"+STR$(PC)+"%":GOSUB 21
83 V=16:A$="You used"+STR$(HI)+" hints":GOSUB 21
85 V=19:A$="Would you like to play again (Y/N)? ":
GOSUB 21:H=H+LEN(A$)
86 ML=1:GOSUB 30:IF I$="" THEN 86
87 RETURN
100 V=4:A$=CHR$(31):GOSUB 20
110 ON ERROR GOTO 130
120 H1=0:OPEN"i",1,"trsquiz/mnu":
INPUT#1,R:FOR X=1 TO R:FOR Y=1 TO 2:
INPUT#1,Q$(X,Y):NEXT
122 H1=LEN(Q$(X,1)):IF H1>H THEN H=H1
124 NEXT:CLOSE:ON ERROR GOTO 0:GOTO 500
130 CLOSE:RESUME 140
140 ON ERROR GOTO 0
150 FOR X=1 TO 50:FOR Y=1 TO 2:
READ Q$(X,Y):NEXT:QF(X)=0:NEXT
160 R=50:GOSUB 50
170 FOR X=1 TO 20:GOSUB 55
220 A$=CHR$(30)+"What state is nicknamed "+
Q$(RR,1)+"? "
230 V=9:GOSUB 20:H=H+LEN(A$)
240 ML=LEN(AN$):GOSUB 30:IF FL THEN X=20:
GOTO 270
245 F=0:IF I$="" OR I$<>AN$ THEN GOSUB 40:
IF F THEN 260 ELSE 220
250 IF I$=AN$ THEN QC=QC+1
260 V=22:PRINT@(V,HQ),USING"##";QA:
PRINT@(V,HC),USING"##";QC
262 V=12:A$=CHR$(30):GOSUB 20:
IF I$=AN$ THEN A$=AN$+" is correct" ELSE
A$="Sorry, the correct answer is "+AN$
263 GOSUB 21
264 V=15:A$=CHR$(30)+"Press <ENTER> to continue ":
GOSUB 21:H=H+LEN(A$)
266 ML=1:GOSUB 30:IF I$<>"" THEN 264
268 A$=CHR$(30):V=12:GOSUB 20:V=15:GOSUB 20
270 NEXT:IF FL GOTO 280
272 GOSUB 80:IF I$="N" THEN 280 ELSE IF I$<>"Y"
THEN 272
274 A$=CHR$(30):V=12:GOSUB 20:V=14:GOSUB 20:
V=16:GOSUB 20:V=19:GOSUB 20:GOTO 155
280 POKE &HA0B,&H20:
POKE &H7C,PEEK(&H7C) AND 239:
PRINT CHR$(14);:CLS
400 END
490 DATA COTTON STATE,ALABAMA,
LAND OF THE MIDNIGHT SUN,ALASKA,
GRAND CANYON STATE,ARIZONA,
LAND OF OPPORTUNITY,ARKANSAS,
GOLDEN STATE,CALIFORNIA,
CENTENNIAL STATE,COLORADO,
CONSTITUTION STATE,COMNNECTICUT,
DIAMOND STATE,DELAWARE
491 DATA SUNSHINE STATE,FLORIDA,
PEACH STATE,GEORGIA,
ALOHA STATE,HAWAII,
GEM STATE,IDAHO,
```

```
PRAIRIE STATE,ILLINOIS,
HOOSIER STATE,INDIANA,
HAWKEYE STATE,IOWA,
SUNFLOWER STATE,KANSAS,
BLUEGRASS STATE,KENTUCKY,
PELICAN STATE,LOUISIANA
492 DATA PINE TREE STATE,MAINE,
OLD LINE STATE,MARYLAND,
BAY STATE,MASSACHUSETTS,
WOLVERINE STATE,MICHIGAN,
NORTH STAR STATE,MINNESOTA,
MAGNOLIA STATE,MISSISSIPPI,
SHOW ME STATE,MISSOURI,
TREASURE STATE,MONTANA,
CORNHUSKER STATE,NEBRASKA
493 DATA SILVER STATE,NEVADA,
GRANITE STATE,NEW HAMPSHIRE,
GARDEN STATE,NEW JERSEY,
LAND OF ENCHANTMENT,NEW MEXICO,
EMPIRE STATE,NEW YORK,
TARHEEL STATE,NORTH CAROLINA,
SIOUX STATE,NORTH DAKOTA,
BUCKEYE STATE,OHIO,
SOONER STATE,OKLAHOMA
494 DATA BEAVER STATE,OREGON,
KEYSTONE STATE,PENNSYLVANIA,
OCEAN STATE,RHODE ISLAND,
PALMETTO STATE,SOUTH CAROLINA,
COYOTE STATE,SOUTH DAKOTA,
VOLUNTEER STATE,TENNESSEE,
LONE STAR STATE,TEXAS,
BEEHIVE STATE,UTAH,
GREEN MOUNTAIN STATE,VERMONT
495 DATA OLD DOMINION,VIRGINIA,
EVERGREEN STATE,WASHINGTON,
MOUNTAIN STATE,WEST VIRGINIA,
BADGER STATE,WISCONSIN,
EQUALITY STATE,WYOMING
500 IF R>9 THEN R=9
510 H=INT((SW-H-3)/2):FOR X=1 TO R:
A$=STR$(X)+". "+Q$(X,1):V=X+7:GOSUB 23:
NEXT:V=V+2
520 A$=CHR$(30)+"Please make your selection
(1 - "+STR$(R)+") "+CHR$(14):GOSUB 21:
H=H+LEN(A$)
530 ML=1:GOSUB 30
540 IF FL THEN 280
550 I=VAL(I$):IF I<1 OR I>R THEN 520
560 FI$=Q$(I,2)
570 ON ERROR GOTO 700
580 OPEN"I",1,FI$
585 A$=CHR$(30):GOSUB 20:
A$="Loading "+FI$+" ...":GOSUB 21
590 INPUT#1,R:FOR X=1 TO R:FOR Y=1 TO 2:
INPUT#1,Q$(X,Y):NEXT:NEXT
595 CLOSE
600 GOSUB 50
610 FOR X=1 TO 20:GOSUB 55
620 A$=CHR$(30)+Q$(RR,1)
630 V=9:GOSUB 20:H=H+LEN(A$)
640 ML=LEN(AN$):GOSUB 30:IF FL THEN X=20:
GOTO 670
645 F=0:IF I$="" OR I$<>AN$ THEN GOSUB 40:
IF F THEN 660 ELSE 620
650 IF I$=AN$ THEN QC=QC+1
660 V=22:PRINT@(V,HQ),USING"##";QA:
PRINT@(V,HC),USING"##";QC
662 V=12:A$=CHR$(30):GOSUB 20:
IF I$=AN$ THEN A$=AN$+" is correct" ELSE
A$="Sorry, the correct answer is "+AN$
663 GOSUB 21
664 V=15:
A$=CHR$(30)+"Press <ENTER> to continue ":
GOSUB 21:H=H+LEN(A$)
666 ML=1:GOSUB 30:IF I$<>"" THEN 664
668 A$=CHR$(30):V=12:GOSUB 20:V=15:GOSUB 20
670 NEXT:IF FL GOTO 100
672 GOSUB 80:IF I$="N" THEN 280 ELSE
IF I$<>"Y" THEN 672
674 A$=CHR$(30):V=12:GOSUB 20:V=14:
GOSUB 20:V=16:GOSUB 20:V=19:GOSUB 20:GOTO
100
700 RESUME 710
710 ON ERROR GOTO 0
720 V=22:A$=FI$+" is unavailable.  (D)efault quiz or
(M)enu ":GOSUB 21:H=H+LEN(A$)
730 ML=1:GOSUB 30:IF FL THEN 280
740 IF I$="D" THEN 150 ELSE IF I$="M" THEN 100
ELSE 720
```

TRSQUIZ/MNU

```
4
Entertainment,entrtain/qiz
General,general/qiz
Geography,geograph/qiz
Sports,sports/qiz
```

ENTRTAIN/QIZ

```
100
Who wrote 'HEARTBREAK HOTEL'? ,
MAE AXTON
Name Bill Haley's band? ,THE COMETS
Who played lead guitar for the Beatles? ,GEORGE
HARRISON
Name the guitarist for CREAM? ,ERIC CLAPTON
Who was known as 'SATCHMO'? ,LOUIS ARMSTRONG
Who recorded the hit 'STRANGER ON THE SHORE'? ,
ACKER BILK
In what city is the Grand Ole Opry located?, NASHVILLE
Who wrote the song 'YOUR CHEATING HEART'? ,
HANK WILLIAMS
Who played the male lead in 'CARMEN JONES'? ,
HARRY BELAFONTE
Name the actor who portrayed HOPALONG CASSIDY? ,
WILLIAM BOYD
What is 'DIRTY HARRY'S' last name? ,CALLAHAN
Who directed the movie 'PSYCHO'? ,ALFRED
HITCHCOCK
What is Tarzan's last name? ,GREYSTOKE
Who played Captain Marvel in the 1940's serial? ,
TOM TYLER
What is the name of the second 'STAR WARS' movie? ,
THE EMPIRE STRIKES BACK
```

What is the name of the third 'STAR WARS' movie? ,RETURN OF THE JEDI
Who played 'LITTLE JOE' in the TV series Bonanza? , MICHAEL LANDON
Who played 'MURDOCK' on 'THE A TEAM'? ,DWIGHT SCHULTZ
In 'MASH' - what was Hawkeye's last name? ,PIERCE
Who played the female lead in 'REMINGTON STEELE'? ,STEPHANIE ZIMBALIST
They sang 'BRIDGE OVER TROUBLED WATERS'. SIMON AND -? ,GARFUNKEL
They sang 'SOUL MAN'. SAM AND -? ,DAVE
Who recorded the hit 'BY THE TIME I GET TO PHOENIX'? ,GLEN CAMPBELL
What name did CHICAGO use for their first album? , CHICAGO TRANSIT AUTHORITY
Where is Hercule Poirot from? ,BELGIUM
Who wrote 'MURDER ON THE ORIENT EXPRESS'? , AGATHA CHRISTIE
Who played the title role in 'MARY POPPINS'? , JULIE ANDREWS
Who played CAPTAIN KIRK in STAR TREK series? ,WILLIAM SHATNER
What was BEAVER's last name in 'LEAVE IT TO BEAVER'? ,CLEAVER
Who sang the hit 'COUNTRY ROADS'? ,JOHN DENVER
Who played 'CHESTER GOOD' in the TV series GUNSMOKE? ,DENNIS WEAVER
Who played the male lead in the movie 'BEDTIME FOR BONZO'? ,RONALD REAGAN
Who recorded the hit 'SPLISH SPLASH'? ,BOBBY DARIN
Who recorded the hit 'JOHNNY B GOODE'? ,CHUCK BERRY
Jazz great - BUDDY RICH - played what instrument? , DRUMS
Who composed the theme from TV the series 'PETER GUNN'? ,HENRY MANCINI
Who recorded the hit 'BEAT IT'? ,MICHAEL JACKSON
Who played the male lead in 'SMOKEY AND THE BANDIT? ,BURT REYNOLDS
Who played the female lead in 'SMOKEY AND THE BANDIT'? ,SALLY FIELD
Who wrote the novel '1984'? ,GEORGE ORWELL
Who authored the James Bond novels? ,IAN FLEMING
What is James Bond's codenumber? ,007
Name the Harlem Globetrotters' themesong? , SWEET GEORGIA BROWN
What is the full name of 'SHERLOCK HOLMES' creator? ,ARTHUR CONAN DOYLE
Who played NAPOLEON SOLO in 'THE MAN FROM UNCLE? ,ROBERT VAUGHN
Who hosted the 'TONIGHT SHOW' just prior to Johnny Carson? ,JACK PAAR
Who was the original 'TONIGHT SHOW' host? , STEVE ALLEN
Who recorded the hit 'CHARLIE BROWN'? ,THE COASTERS
The group 'ABBA' hailed from what country? ,SWEDEN
Who played 'MATT HELM' in the movies? ,DEAN MARTIN
Who recorded the hit 'SWEET CAROLINE'? ,NEIL DIAMOND
What name has B.B. KING given his guitar? ,LUCILLE
What did Sammy Davis Jr. call his autobiography? , YES I CAN
Who recorded the hit 'IN THE GHETTO'? ,ELVIS PRESLEY
Name the 'THE FOUR SEASONS' lead singer? , FRANKIE VALLI
Who recorded the hit 'THE GREEN-GREEN GRASS OF HOME'? ,TOM JONES
What was the last name of the 'FINLANDIA' composer? ,SIBELIUS
The TV series 'GUNSMOKE'-in which town was MATT DILLON sheriff? ,DODGE CITY
Who played the title role in the movie 'OH GOD'? , GEORGE BURNS
Name the actor who starred in the TV series 'CANNON'? ,WILLIAM CONRAD
Name the country-western singer who starred in 'THE GAMBLER'? ,KENNY ROGERS
Who played the drunken cowboy in the movie 'CAT BALLOU'? ,LEE MARVIN
Name the creator and host of 'THE TWILIGHT ZONE'? , ROD SERLING
Who played the title role in the 1982 movie 'GANDHI'? , BEN KINGSLEY
Name the star of the TV series 'BARETTA'? ,ROBERT BLAKE
Name the creator of the TV series 'CANDID CAMERA'? , ALLEN FUNT
Who starred in the movie 'DEATH WISH'? ,CHARLES BRONSON
Name the actor who played 'DIRTY HARRY'? ,CLINT EASTWOOD
Name the lead singer with 'THE ROLLING STONES'? , MICK JAGGER
Who played the titlw role in the TV series 'QUINCY M.E.'? ,JACK KLUGMAN
Name the creator of 'THE MUPPETS'? ,JIM HENSON
Name the star of the movie 'GHOSTBUSTERS'? ,BILL MURRAY
From what state do Donni and Marie Osmond hail? , UTAH
Who sang the hit song 'MOON RIVER'? ,ANDY WILLIAMS
In country-western circles - who is known as 'THE MAN IN BLACK? ,JOHNNY CASH
Name Star Trek's 'MR. SPOCK'? ,LEONARD NIMOY
Radio station 'WKRP' is located in what city? , CINCINATTI
Who played Judge Hardcastle in 'HARDCASTLE & MCCORMACK? ,BRIAN KEITH
Who authored the 'MIKE HAMMER' novels? ,MICKEY SPILLANE
Name the comedian who 'GETS NO RESPECT'? , RODNEY DANGERFIELD
Who sang the hit song 'WHOLE LOTTA SHAKING GOING ON'? ,JERRY LEE LEWIS
What rock group wrote the soundtrack to the movie 'FLASH GORDON'? ,QUEEN
Who sang the hit song 'RAINY NIGHT IN GEORGIA'? , BROOK BENTON
Name the leader of the former 'TONIGHT SHOW' band? ,DOC SEVERINSEN
Who played the martian in the TV show 'MY FAVORITE MARTIAN'? ,RAY WALSTON
Who starred in the movie 'CHINATOWN'? ,JACK NICHOLSON

Who played Sgt. Friday in the TV show 'DRAGNET'? , JACK WEBB
The TV show 'ONE DAY AT A TIME' took place in what city? ,INDIANAPOLIS
Name the star of the TV show 'HAWAII FIVE-O'? ,JACK LORD
Name the male star of the TV show 'DYNASTY'? ,JOHN FORSYTHE
In the TV show 'HAPPY DAYS' - what is Ritchie's last name? ,CUNNINGHAM
The TV show 'HAPPY DAYS' took place in what city? ,MILWAUKEE
Sherlock Holmes has a brother - what is his first name? , MYCROFT
In 'LAVERNE AND SHIRLEY' - what was Shirley's last name? ,FEENEY
Who wrote the song 'IN THE GHETTO'? ,MAC DAVIS
Who recorded the hit song 'MISTY'? ,JOHNNY MATHIS
What is 'THE SHADOW's' real name? ,LAMONT CRANSTON
Name of comedienne who usually subbed for Johhny Carson? ,JOAN RIVERS
Who played Minnesota Fats in the movie 'THE HUSTLER'? ,JACKIE GLEASON
Who sang the hit song 'I LEFT MY HEART IN SAN FRANCISCO'? ,TONY BENNETT

GENERAL/QIZ

100
In what country did the 'JONESTOWN MASS SUICIDE' occur? ,GUYANA
Montezuma ruled what country? ,MEXICO
What frontiersman is famous for helping settling Kentucky? ,DANIEL BOONE
How many years are 'FOUR SCORE AND SEVEN'? ,87
Who was vice-president under Gerald Ford? ,NELSON ROCKEFELLER
What was the first name of George Washington's wife? , MARTHA
Who hosted the 'THE ORIGINAL AMATEUR HOUR'? , TED MACK
Who starred in 'TRUE GRIT'? ,JOHN WAYNE
What name is associated with 'GOLIATH'? ,DAVID
Who did Jesus raise from the dead in Bethany?, LAZARUS
Name the Roman goddess of love? ,VENUS
Who uttered the secret words 'OPEN SESAME'? ,ALI BABA
What color are emeralds? ,GREEN
In what city is 'NASA' Located? ,HOUSTON
Who was the magician in King Arthur's court? ,MERLIN
Who said 'A PENNY SAVED IS A PENNY EARNED'? , BENJAMIN FRANKLIN
What is 'SODIUM CHLORIDE'? ,SALT
What foreign phrase describes one's school or college? , ALMA MATER
What chipmunk always sang out of key? ,ALVIN
Richard Starkey is famous using this name.....? ,RINGO STARR
Name the largest planet in our solar system? ,JUPITER
L is the Roman numeral for what Arabic number? ,50
Who was the famous leader of the Apaches? ,COCHISE
What is the most expensive property in 'MONOPOLY'? , BOARDWALK
What was Lady Bird Johnson's real first name? , CLAUDIA
What country has the world's oldest flag? ,DENMARK
What is the official language of the United Nations? , FRENCH
What is the national airline of the former Soviet Union? , AEROFLOT
Name the smallest planet in our solar system? , MERCURY
What planet takes 687 days to orbit the Sun? ,MARS
What mineral is a diamond made of? ,CARBON
What is the birth of four babies called? ,QUADRUPLETS
What is the study of human behavior called? , PSYCHOLOGY
What is the study of religion called? ,THEOLOGY
On what day of the week is 'MARDI GRAS' celebrated? , TUESDAY
Bastille Day is 14th of what month? ,JULY
What is the name for the character '&'? ,AMPERSAND
How many months have 28 days in them? ,12
By what name is 'Dino Crocetti' famous? ,DEAN MARTIN
By what name is 'Joseph Levitch' famous? ,JERRY LEWIS
Name the man who tries to rescue the girl in 'DONKEY KONG'? ,MARIO
Who was the husband of Xanthippe? ,SOCRATES
Who created Daylight Savings Time? ,BENJAMIN FRANKLIN
Virginia Hill was the girlfriend of what gangster? , BUGSY SIEGEL
Who is called the 'GODFATHER OF SOUL'? ,JAMES BROWN
Jim Dougherty was the first husband of what Hollywood actress? ,MARILYN MONROE
Who was the first king of Israel? ,SAUL
Who commanded the 'GREEN MOUNTAIN BOYS'? , ETHAN ALLEN
Who was the first christian emperor of Rome? , CONSTANTINE
St. Andrews is the patron saint of what country? , SCOTLAND
Who was Socrates' best student? ,PLATO
What instrumeny did 'FATS DOMINO' play? ,PIANO
Who authored 'CHITTY CHITTY BANG BANG'? ,IAN FLEMING
What is the only crime mentioned in the Constitution? , TREASON
What is a 'GEOCOCCYX CALIFORNIANUS? , ROADRUNNER
In what year did Christmas become a national holiday? , 1890
'S' is the United States' mint mark for what city? ,SAN FRANCISCO
Who is the Roman god of love? ,CUPID
What is the 'DRINK OF THE GODS'? ,NECTAR
Name the home of the Nordic gods? ,VALHALLA
Name the Norse thundergod? ,THOR
Name the chief Nordic god? ,ODIN
In what year was the U.S Postal Service established? , 1707
Who is the chief Greek god? ,ZEUS
What was the last name of the telegraph's inventor? , MORSE
How many years is a millennium? ,1000

What is the wild dog of Australia called? ,DINGO
What color are the stripes on a Zebra? ,BLACK
What is the only animal that cannot jump? ,ELEPHANT
What is the last name of 'PLAYBOY'S' founder? , HEFNER
How many men signed the Declaration of Independence? ,56
In what country does '1984' take place? ,OCEANA
What was the name of 'THE LAST MOHICAN'? ,UNCAS
Name the video game that first had a cereal named after it? ,PAC MAN
Name Atari's first video game? ,PONG
What is the highest number shown on a dart board? ,20
What is the oldest organized sport in America? , LACROSSE
The opposite sides of a die always add up to what number? ,7
Who recorded 'THE TWIST' originally? ,HANK BALLARD
The 'CIRCUS HALL OF FAME' is located in what Florida city? ,SARASOTA
In what year will Hong Kong revert to communist China's rule? ,1998
Who drafted the Treaty of Paris? ,JOHN ADAMS
Name America's first woman into space... ,SALLY RIDE
What was Paul Revere's occupation? ,SILVERSMITH
What patriot said 'GIVE ME LIBERTY OR GIVE ME DEATH'? ,PATRICK HENRY
Joseph McCarthy was a senator from what state? , WISCONSIN
Lake Lucerne is located in what country? , SWITZERLAND
The Topaz is the birthstone for what month? , NOVEMBER
The Sapphire is the birthstone for what month? , SEPTEMBER
Johns Hopkins Hospital is located in what state? , MARYLAND
What was the name of Paul Bunyon's blue ox? ,BABE
The Pied Piper chased the mice from this town...? , HAMLIN
Last name of president succeededing Gerald Ford? , CARTER
Last name of president succeededing Dwight Eisenhower? ,KENNEDY
Last name of president succeeding Jimmy Carter? , REAGAN
Last name of president preceeding Gerald Ford? ,NIXON
What city is also known as 'THE MILE HIGH CITY'? , DENVER
What city is also known as 'MOTOWN'? ,DETROIT
What state is famous for 'CUSTER'S LAST STAND'? , MONTANA
Last name of 1995 Republican Speaker of the House? , GINGRICH

GEOGRAPH/QIZ

100
What is the capital of New York? ,ALBANY
What is the capital of Florida? ,TALLAHASSEE
What is the capital of North Dakota? ,BISMARCK
What is the capital of Iowa? ,DES MOINES
Name Florida's largest city? ,JACKSONVILLE
What is the capital of Ohio? ,COLUMBUS
Name the legendary 'LOST CONTINENT'? ,ATLANTIS
What do the FINNS call their country? ,SUOMI
Name the capital of Alaska? ,JUNEAU
Name the capital of Missouri? ,JEFFERSON CITY
On what island is 'DIAMOND HEAD' located? ,OAHU
What is the combined name of Spain and Portugal? , IBERIA
Which is the largest of the 50 U.S states? ,ALASKA
Which is the smallest of the 50 U.S. states? ,RHODE ISLAND
What is the former name of SRI LANKA? ,CEYLON
What is the former name of ISTANBUL? , CONSTANTINOBLE
The PRIME MERIDIAN passes through what country? , ENGLAND
What state is called 'THE LAND OF LAKES'? , MINNESOTA
In what state is the 'GREAT SALT LAKE'? ,UTAH
Last name of explorer who had a river and a bay named after him? ,HUDSON
In what state are the FINGER LAKES located? ,NEW YORK
In what country is this city.....LIVERPOOL? ,ENGLAND
In what country is this city.....BUENOS AIRES? , ARGENTINA
In what country is this city.....BUDAPEST? ,HUNGARY
In what country is this city.....BARCELONA? ,SPAIN
In what country is this city.....BANGKOK? ,THAILAND
In what country is this city.....LE MANS? ,FRANCE
Name the capital of AUSTRALIA? ,CANBERRA
Name the capital of AUSTRIA? ,VIENNA
Name the largest city in UTAH? ,SALT LAKE CITY
Name the capital of ALABAMA? ,MONTGOMERY
What state is known as the 'VOLUNTEER STATE'? , TENNESSEE
What state is known as the 'SHOW ME STATE'? , MISSOURI
What is the capital of CUBA? ,HAVANA
What is the capital of IRAN? ,TEHRAN
What is the capital of BELGIUM? ,BRUSSELS
What is the capital of INDIA? ,NEW DELHI
What is the capital of POLAND? ,WARSAW
What is the capital of CANADA? ,OTTAWA
What state is known as the 'BUCKEYE STATE'? ,OHIO
Whay state is the home of the ALAMO? ,TEXAS
What state is famous for potatoes? ,IDAHO
What state is known as the 'SOONER STATE'? , OKLAHOMA
What state is known as the 'SILVER STATE'? ,NEVADA
What state is known as the 'GARDEN STATE'? ,NEW JERSEY
What state is known as the 'PELICAN STATE'? , LOUISIANA
What state has this motto 'LIVE FREE OR DIE'? ,NEW HAMPSHIRE
What state is known as the 'MAGNOLIA STATE'? , MISSISSIPPI
What large Ohio city borders on Kentucky? CINCINATTI
What large Kentucky city borders on Indiana? , LOUISVILLE
Name the largest city in 'UPPER' Michigan? , MARQUETTE
What is CANADA's official name? ,DOMINION OF CANADA
What is the largest city south of the Equator? ,BUENOS

AIRES
What city is called the 'ETERNAL CITY'? ,ROME
What city is called the 'CITY OF LIGHTS'? ,PARIS
What city is known as the 'MUSIC CITY'? ,NASHVILLE
What city is known as the 'WINDY CITY'? ,CHICAGO
Northwestern University is located in what state? , ILLINOIS
Harvard University is located in what state? , MASSACHUSSETTS
What was IRAN's former name? ,PERSIA
What was THAILAND's former name? ,SIAM
What is the Argentine name for the Falkland Islands? , MALVINAS
What island was Napoleon exiled to in 1814? ,ELBA
On what island was Napoleon born in 1769? ,CORSICA
Name the large lake on the California-Nevada border? , LAKE TAHOE
Mount Blanc is the largest mountain in what country? , FRANCE
Mount Logan is the highest mountain in what country? , CANADA
What major city was once known as 'FORT DEARBORN'? ,CHICAGO
What major Canadian city was once known as 'FORT YORK'? ,TORONTO
Name the longest river in Europe? ,VOLGA
Name the river that runs through the city of London? , THAMES
What state name is common to the former Soviet Union and U.S? ,GEORGIA
What is the native language of Brazil? ,PORTUGUESE
What is Austarlia's largest city? ,SYDNEY
What state was formerly known as 'DESERET'? ,UTAH
What state has the longest coast line? ,ALASKA
What state has the second longest coast line? ,FLORIDA
What state was formerly knows as 'NEW CONNECTICUT'? ,VERMONT
What state was formerly known as 'FRANKLIN' ? , TENNESSEE
Name the only state that borders on just one other state? ,MAINE
What is the chief export of Brazil? ,COFFEE
What river runs through Liverpool in England? , MERSEY
What river runs through Budapest in Hungary? , DANUBE
What city is called 'CITY OF BROTHERLY LOVE'? , PHILADELPHIA
What city is served by O'Hare Airport? ,CHICAGO
What city is served by Logan International Airport? , BOSTON
What city is served by Stapleton Airport? ,DENVER
What is the largest sea in the world?, MEDITERRANEAN
What country touches both the Pacific and Atlantic oceans? ,CHILE
Which U.S. state capitol is closest to the Equator? ,HONOLULU
Name the capitol of the former West Germany? ,BONN
The oldest city in the U.S. is located in what state? , FLORIDA
Name the largest oil-producing country in South America? ,VENEZUELA
What river runs through ROME in Italy? ,TIBER
NEW YORK CITY was formerly known by what name? , NEW AMSTERDAM
Name the europeam capitol formerly known as CHRISTIANA? ,OSLO
What river carries more water than any other in the world? ,AMAZON
Name the capitol of BRAZIL? ,BRASILIA
Name the capitol of MEXICO? ,MEXICO CITY
What state is knowns as the 'BLUEGRASS STATE'? , KENTUCKY

SPORTS/QIZ

100
What sporting event starts with a 'TIP OFF'? , BASKETBALL
RABBIT RUN is a novel dealing with what major sport? , BASKETBALL
What winter sport begins with a 'FACE OFF'? ,ICE HOCKEY
In what sport is it illegal to 'PALM - TRAVEL OR GOALTEND'? ,BASKETBALL
How many players on a Polo team? ,4
The NIT is always played at what site? ,MADISON SQUARE GARDEN
From which city did the 'BRAVES' move to Atlanta? , MILWAUKEE
From which city did the 'BRAVES' move to Milwaukee? , BOSTON
From which city did the 'ATHLETICS' move to Oakland? ,KANSAS CITY
From which city did the 'ATHLETICS' move to Kansas City? ,PHILADELPHIA
In what sport will you find 'SHORT RACK GAMES'? , BILLIARDS
What was the last year the AFL played an All Star Game? ,1970
In what game can a player be 'PICKED OFF'? , BASEBALL
By what name does the world know EDSON ARANTES DO NASCIMENTO? ,PELE
In the NBA - from which state do the PACERS hail? , INDIANA
In the NBA - from which state do the ROCKETS hail? , TEXAS
In the NBA - from which state do the CLIPPERS hail? , CALIFORNIA
In the NBA - from which state do the TRAILBLAZERS hail? ,OREGON
In the NBA - from which state do the KINGS hail? , CALIFORNIA
In the NBA - from which state do the NETS hail? ,NEW JERSEY
In the NFL - from which city do the PACKERS hail? , GREEN BAY
In the NFL - from which city do the OILERS hail? , HOUSTON
In the NFL - from which city do the SAINTS hail? ,NEW ORLEANS
In the NFL - from which city do the BENGALS hail? , CINCINATTI
In the NHL - from which city do the MIGHTY DUCKS hail? ,ANAHEIM
How many periods in an Ice Hockey game? ,3
In which city is the SUGAR BOWL played? ,NEW

ORLEANS
In which city is CHURCHILL DOWNS located? , LOUISVILLE
A BROOKLYN and a JERSEY is found in what game? , BOWLING
In what sport is a 'REUTHER BOARD' used? , GYMNASTICS
In the NHL - from which city do the SHARKS hail? ,SAN JOSE
In the NHL - from which state do the LIGHTNING hail? ,FLORIDA
How many players are on the ice for a PENALTY SHOT? ,2
In which city was the first BASEBALL ALL STAR GAME played? ,CHICAGO
In the NBA - the MAGIC play their home games in what city? ,ORLANDO
What famous entertainer fought under the name PACKEY EAST? ,BOB HOPE
What nickname was given to Detroit pitcher Mark Fidrych? ,THE BIRD
What letter on a score card represents a Strike-out? ,K
In the NHL - from which state do the PANTHERS hail? ,FLORIDA
In the NBA - in which city do the HEAT play their home games? ,MIAMI
The WILSON WINGATE TROPHY is awarded in which sport? ,LACROSSE
How many members are there on a WATER POLO team? ,7
Snoopy plays what position on Charlie Brown's baseball team? ,SHORTSTOP
What is the nickname of pro-golfer LEE TREVINO? , SUPER MEX
In baseball - who was the 'UGLY DUCKLING'? ,YOGI BERRA
In what Ohio did the SOAP BOX DERBY originate? , DAYTON
Pele played for which NASL team? ,COSMOS
What was the nickname of Babe Ruth's bat? ,BLACK BETSY
In what sport is the participant judged for 'TUBE RIDES'? ,SURFING
In what sport is the team judged on CANOPY DISPLAY EVENTS? ,PARACHUTING
What year was the first modern Olympics held? ,1896
What city hosted the 1956 Summer Olympics? , STOCKHOLM
What city hosted the 1980 Summer Olympics? , MOSCOW
What was BABE RUTH's full name? ,GEORGE HERMAN RUTH
Who is known as CHARLIE HUSTLE? ,PETE ROSE
What country won the soccer gold medal in the 1984 Olympics? ,FRANCE
The Yankees won how many games in the 1976 World Series? ,0
Who is known as 'THE BIG O'? ,OSCAR ROBERTSON
How many home runs did Babe Ruth hit? ,714
In what city is the 'GREEN MONSTER' located? , BOSTON
In which park do the BOSTON RED SOX play their home games? ,FENWAY PARK
In the NHL - in which city do the JETS play their home games? ,WINNIPEG
Which sport uses the term 'LOVE'? ,TENNIS
Which sport is played in a FRONTON? ,JAI ALAI
Who said 'NICE GUYS FINISH LAST'? ,LEO DUROCHER
The NFL's RAIDERS moved to Los Angeles from which city? ,OAKLAND
The NFL's COLTS moved to INDIANAPOLIS from which city? ,BALTIMORE
Which baseball franchise became the MINNESOTA TWINS? ,WASHINGTON SENATORS
In what sport can you encounter a 'HALF NELSON'? , WRESTLING
How many players on an outdoor soccer team? ,11
How many goals does it take to make a 'HAT TRICK'? ,3
In bowling - what is a perfect score? ,300
In which city is the GATOR BOWL played? , JACKSONVILLE
In which city is the ROSE BOWL played? ,PASADENA
How many points is scored on a SAFETY? ,2
In the NFL - in which city do the JAGUARS play their home games? ,JACKSONVILLE
A 'FUMBLE' can occur in which sport SPORT? , FOOTBALL
CROSS-CHECKING occurs in which sport? ,ICE HOCKEY
What was the NASL championship game called? ,SOCCER BOWL
The play 'DAMN YANKEES' is about what sport? ,BASEBALL
In the NHL - in what city do the OILERS play at home? , EDMONTON
In the NHL - in what city do the BLACK HAWKS play at home? , CHICAGO
In the NHL - in what city do the RED WINGS play at home? , DETROIT
In the NHL - in what city do the CANADIANS play at home? , MONTREAL
In the NHL - in what city do the BRUINS play at home? , BOSTON
In the NHL - in what city do the MAPLE LEAFS play at home? , TORONTO
In the NHL - in what city do the KINGS play at home? ,LOS ANGELES
What was the smallest city in the NASL? ,TULSA
Name the Cincinatti Red's first string catcher in 1975? ,JOHNNY BENCH
Who hit the 'SHOT HEARD AROUND THE WORLD'? ,BOBBY THOMPSON
What is Casey Stengel's full name? ,CHARLES DILLON STENGEL
What city was the site of the first modern olympics? ,ATHENS
Pro Football Hall of Fame is located in which Ohio city? , CANTON
Who did Sonny Werblin sign in 1965 for $400.000? ,JOE NAMATH
Who said 'WIN ONE FOR THE GIPPER'? ,KNUTE ROCKNE
The move 'THE HUSTLER' was about what game? ,POOL
Who said 'WINNING ISN'T EVERYTHING - IT'S THE ONLY THING'? ,VINCE LOMBARDI
In the NFL - in what city do the FALCONS play their home games? ,ATLANTA
Who pitched the only World Series perfect game? ,DON LARSEN
The NBA's CAVALIERS play their home games in what city? , CLEVELAND

BEAT THE GAME

By Daniel Myers

STRANGE ODYSSEY
The Scott Adams Adventures

Good old outer space! There's nothing else quite like it! This time around, you're on a strange planet, with no fuel and no apparent way to get back to the mother ship. However, appearances can be deceiving!

From the control room, go down and get the space suit, phaser and shovel. Set the phaser to destroy, then go back up to the control room. Push the red button, which opens the inner airlock door, then go out the door. Wear the suit, then push the red button in the airlock. The outer door will now open. Go out the door, and jump. Don't worry, you'll land safely!

Go North twice, which will bring you to a cave. Enter the cave, where you find a large boulder with strange writing on it. There is no way of finding out what it says, and you have other things to do, anyway. So, shoot the boulder, which will reveal a shimmering curtain of light (shades of Zork II!).

Go curtain, and you will be in a strange hexagonal room with some odd machinery inside. The first thing to do is remove the suit. This will help to conserve the oxygen in the suit for when you really need it. The air in this room is quite breathable. Now drop the phaser, because you won't be using it for awhile.

Most of the rest of the game centers on the machine. It is a portal to other worlds (or dimensions). The basic operation is to pull the rod, then push it, which will cause the plastic panel to glow. Touching the panel, then walking through the curtain, takes you to some other world. Which one depends on how many times you make the panel glow.

Now that you know that, pull and push the rod until the panel glows 6 times. Touch the plastic (becoming momentarily disoriented, which happens whenever you do this), then wear the spacesuit and go through the curtain. You are now in an alien museum of some sort.

Once in the museum, pick up the painting and the sculpture, and return through the curtain. Remove the suit, then wear the goggles and look at the painting. Now drop the painting and the goggles, and get the belt from the statue. Push and pull the rod again. This time, the plastic should glow seven times. Touch the plastic. Wear the belt, and now drop everything but the belt and the suit. Twist the buckle (aha! anti-gravity!), wear the space suit, and go through the curtain again. This time, you have been transported to a deserted Jovian mining the colony, pick up the remaining item, and once more walk through the curtain to the Hex room. Remove the suit, then twist the buckle and drop the belt. Also drop whatever it was you just brought back from the colony. Now pick up the shovel and the phaser. Make sure the phaser is set to stun.

Now things get a tiny bit tricky, because you have to "reset" the machine. Pull the rod, then touch the plastic, then push the rod. The panel glows once. Now, pull the rod, and push the rod. The panel glows twice. Touch the panel, then go through the curtain. You are standing at the edge of a jungle.

This is an Earth-like area, so you don't need to wear the suit. Dig right where you are standing, and you will find an ice pick, of all things! Get that and drop the shovel. Go jungle, and from there go East into the ruins of a zoo. Shoot the ice-hound that's there, then pick him up. Go South into the jungle, then West to the curtain, and through it back to the room.

Returning to the room, pull and push the rod. The panel should glow three times. Touch the panel, wear the suit, and go through the curtain. This time, you are in the middle of a methane snowstorm. Drop the hound, then wake him up. He will burrow off out of sight, but don't worry! Just go west, and you will come to a large ice mound.

Aha! Now you know what the pick is for! Pick mound (really!), which will bring you inside to where the hound is, as well as a treasure. Shoot phaser. Pick up all 5 treasures. Pull the rod, touch the plastic, push the rod, and touch the plastic again. Wear the suit and go through the curtain. Now you are back in the cave.

Go up, then go West and enter the ship. Push the red button, then remove the suit. Drop all the

treasures here, then wear the suit and push the button again. There are still a couple of things you need yet, so make your way back to the Hexagonal room. Once there, get the metal, and then (alas!) break the rod, for that will be your power supply. Now return to the ship.

Once inside, remove the suit. Go to the control room, and then down to where the maintenance hatch is. Open the hatch (the metal helps!), then go hatch to where the power supply is. Put rod, then return to the control room.

Drop the hatch and the metal, then push the blue button. When the ship stops, go to the airlock, pick up all the treasures, wear the suit, then push the red button. Go out to the hold of the mother ship, and drop your treasures. When they've all been dropped, say "Score". How about that! You won the game!!

PYRAMID OF DOOM

The Scott Adams Adventures

Ahhh, the desert! A nice place to visit, but you really don't want to stick around here too long. Looking around, you notice an oasis and a pole in the sand. Get the pole, then take inventory. Aha! The pole was actually a shovel. You also notice you are carrying a flashlight and an empty canteen. Might be a good idea to fill it, so get water. Now, before you head on to bigger and better things, take a quick dip with "Go Pool." Look at that! There's a big key here. Get the key, then leave the pool by going East.

Feeling more refreshed, you trudge through the desert sands North, then Hmmmm, there's the pyramid, but there doesn't seem to be any door. Reading the sign isn't helpful, but what about that stone? Get the stone and voila! The door to the pyramid appears. Don't go running off to open it just yet, though. Those old pharaohs were pretty tricky, and the entrance might be trapped. Dig again, and go into the hole you just made. Aha! A tiny door with a tiny lock. "Unlock Door," and then get out of the hole. Now it's safe to open the door (you didn't really want to get squashed flat by a huge stone slab, did you?).

You can drop the shovel, by the way. You won't need it any more and there's a limit to how much you can carry. Now, it's going to be dark in there (no electricity), so "Light Flash" then "Go Door," and there you are, inside the pyramid. The first thing you notice is a pistol. It might come in handy, so get it. (At some point in the game, a desert nomad will appear and follow you wherever you go. Most of the time he is harmless, but sometimes he has been known to turn vicious and attack you. If it makes you feel safer, you can shoot him whenever he appears -- there are four bullets in the gun.) You can also drop the two keys here. You will need them later, but for now you don't have to carry them around with you.

Now, which way to go? Well, head North into the dining room, then East. Hmmmm, there's a rather large oyster here, and at the moment he isn't about to let you pass through the archway. So, just get the flute, then go West and South, then South again to the sitting room. Look at the ashes, then the fireplace. Aha! A lump of coal and a gold necklace! The treasure hunt is getting off to a good start! Things are not always what they seem, however, so "Wash Coal," then take inventory. The coal is actually a ruby! But, although it looks like a treasure, it is really something far more important, so hang on to it.

Okay, let the musician in your soul loose with "Play Flute." A cobra slithers out of the basket, and into the fireplace, revealing a secret passage. At this point, you should save the game. In the passage are rats! Eight times out of ten, you can pass them safely, but that other twenty percent of the time they will kill you (it's a random thing). With the game saved, drop the flute (which you won't need anymore), then "Go Passage," then head North and East to the hieroglyphics room. Reading the hieroglyphics tells you to store your treasures here, so drop the necklace. You can also drop the stone; you only needed it to read the message here. Now get the camel jerky and go West, then North, which will bring you to the oyster.

Feed the oyster, and get the pearl. From now on, you can pass through the archway instead of having to go through the passage and being eaten by the rats. It's time for more treasure, so head West, then South, and you're back at the entrance. Open the sarcophagus, then "Go Sarcophagus." Gosh! It's actually a stairway down. Go down, and come face to face with a fierce mummy. Fortunately, that's no problem. Burning tana leaves are nearby, so just "Pour Water," putting them out and the mummy to sleep. Drop canteen (no more use for it), and get the tapestry, which reveals an alcove. "Go Alcove," and you will find a box and a skull. Get the skull, then look at it. Aha! Gold teeth! Get the teeth, then look at the box twice. Ignore the bones and get the glove. Well, you're getting kind of overloaded, so go West, then back upstairs to the entrance. Go West to leave the sarcophagus, then North, East, and through the archway, and East again. Drop off the tapestry,

teeth and pearl. Then it's back West, North, West, South, and down the sarcophagus again (get used to this you'll be doing it again!).

This time, go North of the burial room to a passage with a bricked-up doorway. Wear the glove, then smash the door. Remove the glove and drop it. Now, "Go Door." This is the mirror room, and you won't be able to keep the light on. No matter. "Feel Floor" and you will discover a coin. Get it, then go East (yes, in the dark). Now, "Light Flash," and you find yourself in a dressing room. Get the scarab, then go West (back in the dark again). Go West once more, and light the flash. Whew! You're in the passage. Now head South twice, and you're in a tall room with a skeleton. Drop the skull. The skeleton comes alive and pulls a lever that exposes a ladder up. "Go Ladder," which takes you to the revolving cavern. Go South to the ledge, and pick up the sapphire. Now, throw the ruby. It flies over the ledge and into the acid pool below. You have just taken care of a nasty obstacle, but more about that later.

Go South to the prison cell. Look at the dead explorer and also the rubbish. Get the pin and the carving, but under no circumstances should you open the door (unless you like being a purple worm's dinner!). From here, go West, then down again and North to the burial room. Go up and make a trip to drop off your treasures. On the way back to the sarcophagus, pick up the two keys (you will be needing them). Now go down, and from the burial room, first go North and get the rope and the glove, then back South twice to the ladder. Get the saw, then go up.

Back in the revolving cavern, you go South to the ledge. "Throw rope," which mysteriously attaches itself to something in the hole allowing you to "Go Rope." This is the throne room, where you find a chain, a chest, and a pile of metal. The metal used to be a statue of a pharaoh, which would have done nasty things to you had you not destroyed the ruby (which was its heart). Open the chest and get the crown, then pull the chain, revealing a spiral staircase. "Go Stairs" to the treasure room. Now, wear the glove and unlock the chest. You need both keys to do it, and the glove protects you from the poison needle (sneaky, huh?). Okay, drop the keys and the glove, then get the bracelet.

There's still a little more to do here, so "Saw Bars," and then you go to the window, get the platinum bar, and return West to the treasure room. It's time to drop off the goodies again, so go down the staircase, then down the rope, West to the cavern and down the stairs. I think you can find your way to the treasure room by now, so just head along over there and leave the treasures. Now, there's still one more to get. So, head West, then North, then West again (hmmmm, haven't you gone this way before?) into the dining room. Bet you've been wondering about that table! Well, just saw it, and out comes the final treasure! Grab hold of it, go back to the treasure room, drop it and then "Score." TA DA! A perfect 100 points! The game is over! (You can now relax and soak your feet after all that running around!!)