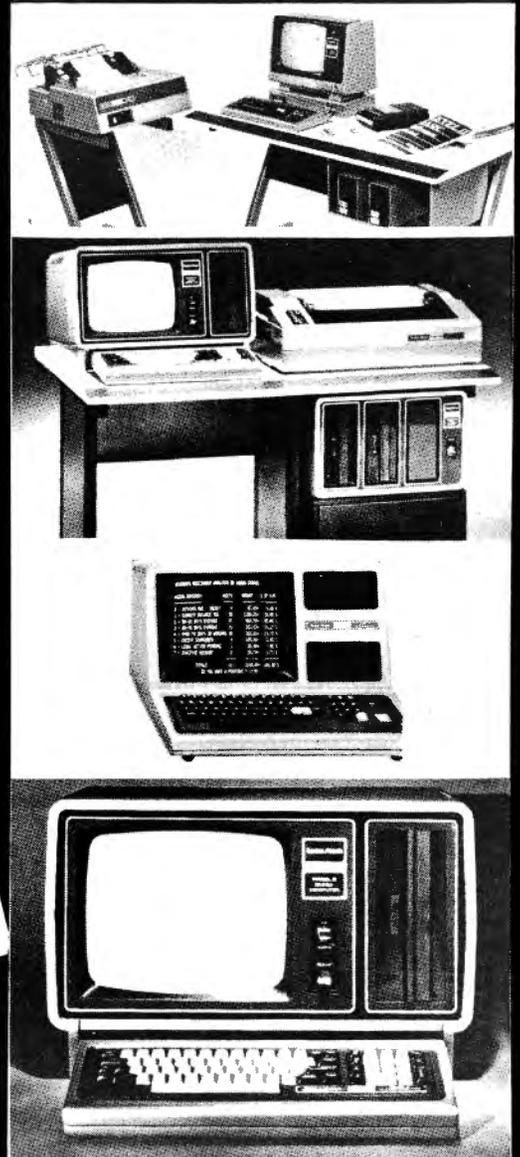


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## **BITS AND PIECES**

by  
HOWARD Y. GOSMAN

### **THE NEW LOOK AT RADIO SHACK**

We would like to encourage anyone who has not yet done so to look carefully at the August and September, 1980 issues (Volume 2, Issues 6 and 7) of Radio Shack's **TRS-80 Microcomputer NEWS**. If you have them, compare these to some of the earliest issues of the same Newsletter. What a change! Radio Shack is finally looking and sounding like a completely professional microcomputer company. It's about time, for they have become one of the largest in the United States!

From our perspective, the most significant change is in RS's attitude towards customers and software. Jon Shirley, Vice President of the Computer Division, goes to great lengths to refute the misconception that RS just wants to sell to you and forget about you. He also states that RS is now seeking software written by outside programmers and software houses. We believe that it is primarily because of this outside software that RS now enjoys such a commanding lead in the microcomputing field. Think about it: RS could never have developed such an extensive line of software, for every purpose from entertainment to business, on its own.

What RS did was to develop and mass-produce the least-expensive high quality microcomputer, supported with a good Basic programming language, that was purchased by all kinds of people who wanted to use it for all different kinds of applications. The users have written most of the software. The fact that RS wants to buy and market some of this software shows that their people are aware of its potential.

This will be tougher, but we think that RS should also take a similar position on some of the TRS-80-compatible hardware that is presently available from other companies. Why should it be impossible for somebody to use his brand-X printer with SCRIPSIT? There are many other peripherals that RS will probably never offer, because they won't have enough appeal to the broad customer base that RS wants. RS's own new hardware, including both computers and peripherals, is nevertheless very impressive. We think that the new Model III will be a real winner, and readers have already been writing letters to us in support of RS's new daisy wheel printer (see below in this issue).

According to a recent article in THE WALL STREET JOURNAL (September 24, 1980), the new computer line seeks to alter Radio Shack's image from that of a low-cost electronics store to a more flashy operation. John Roach, a Tandy Corporation vice president, is quoted as saying, "When we were small, we sold mostly 'me-too' products. Now we're looking to bring new technology from the laboratory to the living room." Experts quoted in the article

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believe that the Model III "will probably sell like hot cakes". In the future, you may see products ranging from cheaper types of electronic burglar alarms to affordable home-sattelite receivers for television signals.

## COPIES OF PROGRAMS PUBLISHED IN COMPUTRONICS

We are considering starting a service consisting of making copies of programs published in the magazine for readers who would rather not have to type them in. We would not aim to make a profit in this venture, but we would have to charge enough to pay for the cassette or diskette, the labor involved in copying, and postage -- perhaps \$3 for cassettes and \$6 for diskettes. We would be interested in hearing from readers about this possibility.

## DISKETTE SALE CONTINUES

We are continuing our sale of **WABASH** diskettes at the price of \$29.95 for a box of 10. We have found these to be the most reliable diskettes on the market, and you can't beat this price. We can't be sure how much longer we can hold this price.

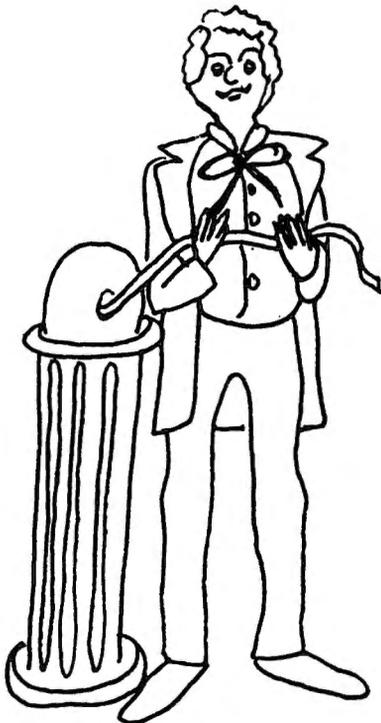
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## LETTERS TO THE EDITOR

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### RS's New Daisy Wheel Printer

---

Gentlemen:

I would like to let you know more about the Daisy Wheel Printer II. For the \$2000 price tag, I think that some sacrifices are in order. The print quality is excellent, and the daisy wheel (it comes with "Courier") supports many characters from foreign languages. The printer has underlining, but it cannot be supported by the ELECTRIC PENCIL. (The underline itself appears below the line it should print on.) Bold face is not supported, but then again, neither SCRIPSIT nor PENCIL (version 1) have that capability.

Features that I really enjoy are: 1) It has 10 pitch, 12 pitch, and proportional spacing, all hardware and software selectable. 2) It has a built-in self test that prints all the characters on the daisy wheel. This means that you don't have to boot up the system to test it. 3) It has a built-in optimizer that automatically increases throughout when printing tabular material by eliminating preceding blanks (i.e., it won't activate a carriage return to print any material with a greater tab on successive lines). 4) Reverse half and half line feeds are supported so that superscripts and subscripts are possible, but not with PENCIL I or SCRIPSIT.

According to a local RS Computer Center, the printer is made by Qume. It carries a full 90-day warranty and has an optional tractor feed attachment for \$289.95.

If you would like to know anything more, just drop me a letter and I'd be happy to answer any questions you might have.

Sincerely,

Marc Ausman  
125 Arbor Court  
Woodside, CA 94062

---

### Praise for SCRIPSIT

---

Dear Sir:

It was with great interest that I read your review of Radio Shack's new word processor, "Scripsit". While some of the comments you made were valid, some were a bum rap against this really remarkable program. Rest assured, by the way, that my only connection with the Shack is that I own a TRS-80.

The first comment that was really misleading was that one has to sit and listen to six hours of audio tapes before using the program. This is not so. The instructions say that it is "advisable" to spend about an hour per lesson, but that certainly is not mandatory. The tapes take about twenty minutes per side of actual listening time. The rest of the hour is spent loading the program, trying the exercises, and generally playing with the thing to get used to it. Getting through all the training sessions quickly can take as little as two hours, not the six you said were required. I certainly agree that the program would have been easier to learn if RS had provided a complete manual and thrown in the audio tapes as an embellishment.

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You didn't mention that there is a pamphlet with the package, and it contains all the commands necessary to use the program. Frankly, anyone who has ever had even minimal contact with any sort of word processing needn't even use the audio tapes. I myself listened only to the first four sides and found that I could use the program to my satisfaction by referring to the pamphlet.

Another reason for not listening to all the audio tapes is that the last lessons have some very fancy formatting instructions (e.g., how to center everything on a title page and things like that) which I will probably never use. If I ever need that information, I know where I can find it. But till then....

Credit is due for many of the features of SCRIPSIT. How frustrating and time-wasting it is to have to go back and retype letters lost in the wraparound process! As opposed to some programs, SCRIPSIT does not drop letters. For this feature alone I think it is a good deal. The program is in assembly language. I type as fast as I possibly can, but I have never out-run the processing.

SCRIPSIT sells for \$69 (cassette) and \$99 (diskette) as opposed to \$250 or \$350. The program also requires less memory than others -- 16K for cassette and 32K for diskette (as opposed to some that require 48K for diskette and are not even available on cassette). With SCRIPSIT an expansion interface is not necessary, nor is a CP/M modification.

The commands are easy to remember, and most require simply holding down the control key and striking the required function key, while some

other word processing programs require as many as five keystrokes just to get into, say, the delete mode. It would have been nice for RS to add a menu, but with the pamphlet mentioned, one has everything needed anyway.

In short, the SCRIPSIT program is a honey, and while the half-manual, half-tape instructions are a partial pain, the program can be run very nicely, thank you, without the six hours of listening recommended.

By the way, Tandy-Claus arrived early at my house this year, and this letter is being run on my new Daisy Wheel Printer II from the Shack. It is really a beaut. [Agreed - Ed.] I'd be happy to supply a review of same, and some little tricks I accidentally discovered.

Yours,

Wm. Bauknecht  
1641 Glen Road  
Green Bay, WI 54304

---

## Using a Selectric Printer

---

Gentlemen:

I wrote to you last May requesting your help in an effort to locate a program that would make my Selectric type printer work with the Radio Shack SCRIPSIT word processing program. You were kind enough to reply to my letter but were unable to help. In the June issue of COMPUTRONICS I see that I was not alone, and that many others are having similar problems with this program and a Selectric type printer.

You requested that if anyone knew of

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a patch that would make the printer work to let you know. I am pleased to say that I was fortunate to locate

David Kjell  
200 Timberlane Terras  
Euless, TX 76039  
1-817-267-3849

He had worked out a patch for his own needs and which, I am very pleased to say, works extremely well with my equipment.

Trusting that this information will be of some help to your readers, I remain,

Very truly yours,

David W. Casgrain  
565 Victoria Avenue  
Westmount, Quebec  
Canada H3Y 2R7

H & E Computronics welcomes letters on any subject. If you wish a personal reply, please enclose a self-addressed, stamped envelope.

H & E Computronics also welcomes readers to submit programs, articles, and reviews for consideration for publication. Please address correspondence to The Editor, H & E Computronics, 50 North Pascack Road, Spring Valley, NY 10977. Please submit programs on media (cassettes or diskettes).

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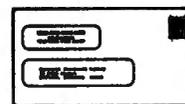
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**WARNING...** THE INFORMATION FOUND IN OUR CRYSTAL BALL DEPARTMENT DOES NOT REPRESENT VERIFIABLE FACT. WHAT FOLLOWS ARE RUMORS FROM WHAT WE CONSIDER TO BE RELIABLE SOURCES (unless otherwise stated).

Did you read the latest **TRS-80 MICROCOMPUTER NEWS** (Volume 2 Issue 7 published by Radio Shack)? For those readers who missed it, here's what Jon Shirley of RS had to say about a certain publication:

"Last month I talked about misconceptions and this month I would like to go after rumors. About 99% of all the hot news published about us (RS) is simply not true. I often believe some magazines and user group publications feel that publishing garbage is the only way to keep up readership. There have been many rumors for many months about a TRS-90, the Model I being dropped, etc., etc. Next month we will show you our new product line but here is a quick look and you can compare the facts to the rumors.

First of all the Model I is not being dropped, it is in the 1981 Radio Shack Annual catalog and the price is unchanged..."

Well, its obvious that many of the rumors that Jon Shirley is referring to were originally published in the **H & E COMPUTRONICS, INC. NEWSMAGAZINE**. But how mad are our rumors? We stated that RS is no longer producing the **TRS-80 MODEL-I**. This is fact and not rumor. Yes, RS is still selling the Model-I, but it is no longer producing the Model-I. We did not see RS state this in their Newsletter. Secondly, yes we admit that RS did not come out with a **TRS-90**, but all of our information has been fairly accurate. The machine that we announced several months prior to the RS announcement has been released. It may not be called the TRS-90, but we did tell our readers about it a long time ago.

Why rumors? There is no other alternative. RS keeps all of its future projects top secret. Since RS does not keep the public informed of its new projects (neither does IBM, Hewlett Packard, Texas Instruments or any other similar company), rumors are bound to be spread. Where do we get our information? Indirectly from Radio Shack. It is impossible for RS to keep all of its projects top secret. The employees working on projects let their closest friends in on new projects. These people in turn tell their friends, and so on. We get many calls from "friends" of RS employees who call and volunteer information. When we hear the same rumor from many sources, we know that a product will soon be released.

Publishing "garbage." We don't think so. We own 12 Radio Shack computers. RS computers completely run the corporation (invoicing, inventory, general ledger payroll, etc.). Our employees are as eager to hear new rumors as are our readers. If RS wants all the rumors to stop, then RS should publish a

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list of all of its future projects a make it a matter of general knowledge. We would certainly end our **CRYSTAL BALL DEPARTMENT** if RS agrees to publish a list of all of its planned new products for the upcoming year.

(1) Anyhow, we don't have too many new RS rumors this month. We stand by our rumors of last month: RS has a MODEL-IV and MODEL-V on the way.

(2) RS is working on a printer for its very popular **POCKET COMPUTER**. It should be available within 3-6 months.

(3) **MOD-II** owners should be very happy with the new 2.0 operating system. The system has many enhancements, including a spooler. We do suggest that present 1.2 owners not transfer their data and programs to 2.0 until they are sure that the 2.0 system is thoroughly debugged.

(4) **PANASONIC** has an extraordinary pocket computer. The computer is now available (but almost impossible to get). The new pocket computer will sell for \$400 to \$500. Unlike the **TRS-80 POCKET COMPUTER**, the **PANASONIC** version is closer to a full computer. The new pocket computer is about 2 inches longer than the RS version. It can be interfaced with a printer, cassette record, disk drives, TV, telephone modem, and just about anything else you can think of.

We believe that the new **PANASONIC POCKET COMPUTER** has the potential of becoming the biggest selling computer ever. It can be expanded to 72K (and possibly more). Although we haven't seen the official spec sheets, interested readers can read more about it in the November issue of **POPULAR SCIENCE**. By the way -- yes, the new **PANASONIC POCKET COMPUTER** can also be used as an ordinary calculator.

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## PROGRAM PREVIEWS

By A. A. Wicks

How many times have you been tempted to purchase a program on cassette or on disk, yet hesitated, because you weren't sure that it would provide you with what your were seeking? Or, perhaps as I have been, you were wary because you have been disappointed or even stung outright? There are many programs advertised today that are outrageous deceptions; on the other hand, there are a great many that are extremely useful or entertaining, and which perform as well as or better than expected.

The purpose of this column will be to review factually some of the programs available from your -- the user's -- point of view. No attempt will be made to "dissect" a program (that's for the originators, or persons better qualified than I), but rather to provide information as to what the program claims to do, what it actually does, how well it loads and operates, and any other pertinent facts. In addition to reviewing tape and disk programs, programs appearing as listings in various publications (including this one) will be reviewed for you from time to time. Occasionally, hardware accessories (sound effects, light pens, etc.) which operate with software will be covered.

Any company that may wish to have their program offerings possibly reviewed in this column should contact me directly. But such reviews will be stringent, and tapes should be flawless -- I have a very obstinate CLOAD!

## Microcomputer Flight Simulator

Dynacomp  
P. O. Box 162  
Rochester, NY 14580

Cassette  
TRS-80 Level II BASIC, 16K  
Price - \$17.50

For aviation enthusiasts, or for anyone who might get a kick out of piloting a simulated aircraft flight, in an aircraft of their choice, this program leaves little to be desired. It should be recognized that this is not a game program-- and there is no fun in crashes. The program is designed for the serious user who is interested in the theory of flight and would like to apply such theory through computer simulation. The program simulates these flights for any distance, direction and aircraft-qualified altitude. Banks, turns, ascent and descent are supported, with centrifugal forces having their normal effect on such actions. Complete cockpit report information is provided, including such alarm messages as "Stall", "Landing with Wheels UP", "Loss of Control", etc. Following a landing (good or ill), a complete summary of the preceding flight is provided on the screen.

The original treatise on the subject of flight simulation, and on which this program is based, appeared in BYTE, authored by F. R. Ruckdeschel, and is presently published in SIMULATION, Programming Techniques Volume 2, by the same publisher. (A copy of the article accompanies the cassette program.)

Advertising for the program states that the program is a "three-

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dimensional simulation", which led me to erroneously believe that it would be graphically third dimensional. This is not the case -- there are no graphics whatsoever, but the technical aspects more than compensate for this. In my case, I have mounted an FAA aeronautical chart beside the computer, and I move a small aircraft replica across this map as the flight progresses.

Initially, my attempts to load this tape were fruitless -- at any setting of the recorder. I finally gave up and wrote to Dynacomp. To their credit, I received another tape by return mail, with a letter encouraging me to contact them again if necessary and offering a full refund if I preferred. It was unnecessary. The tape loaded on the first try, and because it is a lengthy load I have now put it on disk.

Upon completion of loading, the display provides an option of taking-off and flying, or starting a flight in the air. If the flying-only option is selected, the flight initiates at an altitude of 15832 feet, and at a distance of 50 miles from the flight center. If the take-off option is selected, the flight commences from standstill at one end of a two-mile long runway-- a length that permits taking off and landing again within its length, if desired. Once airborne, your flight path is up to you. The display then queries you for certain flight characteristics after your choice of flight method. These aircraft specifications, should, of course, be based on some actual aircraft type: a light plane, helicopter, 747 jet, sailplane (glider). The choice is yours. The parameters requested are: aircraft mass (in tons, or fraction

of), fuel mass (also in tons), thrust (a decimal figure which means the push/pull characteristic as a fraction of the plane's mass). For instance, a one-ton aircraft having a thrust of 0.3 would have the push/pull of the propellor (or jet) action exerting a force of 300 pounds on the aircraft. The fourth parameter is the maximum aircraft speed in knots. The fifth entry is the glide angle in degrees, and the sixth input is the time increment in seconds. The latter is an interesting item. If the take-off option is chosen, then this input is the time increment occurring between your commands to the aircraft, but once airborne this time element may be changed to any period. It is not wise to make the time spacing too long, for between commands the aircraft will not necessarily continue exactly on the last command, any more than an actual aircraft would do so. Extraneous forces -- wind, gravity, fuel consumption altering weight, etc. will all change the flight dynamics, and an interval of three minutes may well find your next update showing a dangerous stall, for example.

Seven "cockpit control" letter entries may be given once the aircraft is in motion, only three of these being required during take-off. These provide control for Thrust (or throttle), Elevator, and Flaps. The remaining control functions are Continue (with previous command values), Bank (angle), Time increment, and Trim (angle).

Once these are entered, the computer calculates all factors plus the forces acting upon the plane and displays a cockpit report. This permits you to evaluate your flight situation and control the aircraft

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accordingly. A typical airbaorne "getting used to".  
display would show:

ALT: 15834 FEET  
SPEED: 124 KNOTS  
STALL SPEED: 62 KNOTS  
ENGINE TEMP: 170 DEG  
FUEL: 598 LBS  
FLAPS: 0 DEGREES  
TRIM: 10 DEGREES  
THRUST: 0  
BANK: 0 DEGREES  
ATTACK ANGLE: 3 DEGREES  
HORIZON: -3.3 DEGREES  
HEADING OFF EAST: 45 DEGREES  
LANDING GEAR: UP  
FLIGHT TIME: 10.9 MIN.

Continuing, a "Control Tower Message" is displayed. This provides information as it would appear to an operator at the control center for the field that is "flight following" your aircraft. Typically:

RANGE: 38 MILES  
DESCENT RATE: 20 FEET/SEC  
POSITION OFF RUNWAY: 192 DEGREES  
WIND DIRECTION: 42 DEGREES  
WIND SPEED: 24 KNOTS

This brings us to the navigational aspects of the program. The runway is considered as running in a west-east direction, with the aircraft taking off toward 180 degrees from north (0). A runway such as this is quite common; however, it is somewhat confusing in this simulation, inasmuch as all heading information as subsequently provided relates to degrees "heading off east", and from the tower, degrees "off runway". Normally, an aircraft would use 0 degrees as a basic reference point, and the position off the runway would be a heading of 180 degrees in this instance. This concept of the program takes a little bit of

The documentation accompanying the program is very good. In fact, I would rate it as "excellent", had it been better coordinated and produced. There is some temporary confusion likely, as the instructions and the cassette program appear to have been updated, but this is not always reflected in the text. The BYTE article is also about a year old. There is a minor error in the instructions, where "T" is shown as a "trim angle" command. This should be "R", as "T" has already been used for "thrust".

A complete listing of the North Star Basic version of the program is provided. I feel that for the cost of this program, a TRS-80 listing should be available, although the program Lists easily enough. All of the documentation has been produced by xerographic process, and, because the type size has been reduced considerably, clarity has suffered -- especially in the listing and in the reproduced article. Program producers looking toward future sales would be advised to consider the very favorable reaction that a well-produced and printed document provides.

Recommendation: I recommend this program highly, as entertainment, yes, but more especially as a training aid. Many hours of enjoyment and education may be gained from its invaluable guidance.

A. A. Wicks  
30646 Rigger Road  
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## SIMULATED GOLF GAME

by  
ANDREW S. BRAUNSTEIN

This program simulates an 18-hole golf game. At the start, the computer will ask, "HOW MANY PLAYERS?" Answer the question with 1 to 4, depending on how many people are playing. Next it will ask for each player's name (up to 10 characters). After each name, type your choice for skill levels (0-2). The higher the skill level, the more hazards and the shorter the ranges of the clubs. Each player can have a different skill level, so that less experienced players can play against experienced players.

Play starts with hole #1 and continues through hole #18. There are seven different hole configurations alternated throughout the 18 holes. At the end of each hole, the number of strokes for a player is displayed. At the end of each round, the cumulative score for each player is displayed along with the cumulative par.

In the upper right corner of the screen, "CLUB?" is displayed. In order to hit the ball, type your club choice and press ENTER. The available clubs are as follows:

- '0' look at the list of available clubs.
- '1-14' clubs with which to hit the ball.
- '15' redraw the screen (if ruined by some factor).
- '99' resign from the game.

If you accidentally press ENTER without selecting a club, the list of clubs will automatically be displayed (instead of typing '0', you can just press ENTER to see the list). If the screen is destroyed for any reason, typing '15' as your club choice will restore the video display without affecting play. In order to resign, just type '99' as your club choice. When you resign, cumulative scores are given and you have the chance to play again.

There are five possible hazards: IN THE WATER, IN THE ROUGH, IN THE SAND TRAP, OUT OF BOUNDS, AND IN THE WOODS. The hazards are selected purely randomly. If the ball is hit in the water, there is a one stroke penalty. If the ball is hit in the woods or out of bounds, there is a two stroke penalty. If the ball is hit in the sand trap, it can remain there for several strokes without moving. (Note: due to memory restrictions, hazards are not graphically displayed on the screen. Out of bounds is displayed graphically and is caused when the ball is shot over the green. When the ball goes out of bounds, it is automatically placed within bounds.)

In order to simulate wind conditions (which are random in nature), the ball can be shot further than the preset ranges for headwinds. Similarly, the ball might not go as far as expected to simulate tailwinds. When the

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ball is not hit as far as the predesignated range, the ball can be hit anywhere from one yard to its upper limit in the range. These functions are totally random.

After the computer determines that the ball is on the green, it putts the ball. The number of putts it takes is determined by the distance to the hole. If the ball is not close enough to the hole, you must hit it again. If the ball is shot very close to the hole during normal play, the ball can be sunk -- that is, no putts.

It is possible to get a hole in one, but as in a real golf game, the chance is very slim. In order to get a hole in one, you must hit the ball so that strong headwinds hit it into the cup and sink the shot.

The list of clubs (displayed by selecting club '0') uses up memory each time that it is used. Since this game uses a lot of memory, it is possible to use up all the memory if the game is played by four people and the list of clubs is used frequently by all players on all holes.

The game can be played in either of two ways: against par (against the computer), and against other players.

Golf is an exciting and fun game to play. I hope you have as much fun playing it as I have had in writing it.

```
70 CLEAR 40: RANDOM: DEFINT A-Z: DIM S(4),A(18),P(18),M(4,18),N(4),C$(14),
R(14),V(14),P$(4): T4=5: GOTO 140
100 CLS: PRINT"YOUR CHOICE OF CLUBS--> CLUB 0 = LOOK AT LIST"
110 FOR O=1 TO 14: PRINT O;"FOR A ";C$(O);" :RANGE OF";R(O);"TO";R(O)+
V(O);"YARDS": NEXT O:G=0:GH=1: PRINT@992,"PRESS 'ENTER' TO CONTINUE";:
INPUT A$:PH=9: GOSUB 930
120 GOSUB 130:K=0: FOR W=15456 TO 15487: POKE W,128: NEXT :A3=0: PRINT @
91, "";: INPUT "CLUB";A3: POKE 15513,191: POKE 15488,191: FOR W=15489 TO
15496: POKE W,176: NEXT : POKE 15497,191:G=1: IF A3=0 THEN 100
121 IF A3=15 THEN G=0:GH=1:PH=9: GOSUB 930
122 IF A3<0 THEN 120
123 IF A3=99 THEN J=18:MM=3: GOTO 670
124 IF A3>14 THEN 120
126 GOSUB 1040:G=0: RETURN
130 IF S=0 THEN PH=0: RETURN
132 IF PH=9 THEN PRINT @ 155,"DISTANCE TO THE PIN IS";C;"YARDS";
135 PH=0: RETURN
140 CLS : FOR X=1 TO 64: PRINT "=";: NEXT : PRINT TAB(12);
"SIMULATED GOLF GAME": FOR X=1 TO 64: PRINT "=";: NEXT :
PRINT
145 INPUT "HOW MANY PLAYERS (MAX.=4)";U:U=INT(U): IF U<1 THEN 145
151 IF U>4 THEN 145
160 FOR X=1 TO U: INPUT "PLAYER'S NAME";P$(X):IF P$(X)="" THEN 160
165 INPUT "SKILL LEVEL (0-NOVICE 1-INTERMEDIATE 2-EXPERT) ";S(X):
S(X)=INT(S(X)): IF S(X)>2 OR S(X)<0 THEN 165
```

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```
180 NEXTX:DATA 360,4,585,5,400,4,295,3,415,4,375,4,319,3,450,4,370,4,395,4,63
0,5,330,4,610,5,440,4,365,3,405,4,595,5,325,3
210 FORR=1TO18:READ A(R):READ P(R):NEXTR:E=0:N(1)=0:N(2)=0:N(3)=0:N(4)=0:J=1
265 Q=1:GOSUB780
270 H=A(J):S=0:GOTO930
300 GOSUB3700:GOSUB120:A3=INT(A3):FORW=15514TO15551:POKEW,128:NEXT:FORW=15578
TO15615:POKEW,128:NEXT:FORW=15642TO15679:POKEW,128:NEXT:FORW=15706TO15743:POK
EW,128:NEXT
305 FORW=15624TO15640:POKEW,128:NEXT:FORW=15689TO15704:POKEW,128:NEXT
330 S=S+1:Y=1+(V(A3)*RND(0)+R(A3)):IFRND(0)<.07THEN350
340 IFRND(0)<.07THENY=Y+RND(0)*2*V(A3):GOTO360
345 GOTO360
350 Y=Y-RND(Y)+1
360 PRINT@155,"HIT IS";INT(Y);"YARDS";:C=H-Y:Y=INT(Y):IFABS(C)<20THEN570
390 L=RND(100):C=ABS(H-Y):IFC<80THEN420
405 IF(H-Y)>0THEN420
410 PRINT" OVER THE GREEN";:C=30+RND(100):GOTO 530
420 IFL<3+S(Q)*2THEN440
425 IFL<6+2*S(Q)THEN510
430 IFL<9+2*S(Q)THEN530
435 IFL<13+2*S(Q)THEN520ELSE532
440 PRINT@219,"IN TRAP ** PIN IS ";C;"YARDS";
441 GOSUB 3700
445 L8=RND(3):T=INT(RND(0)*2*S(Q))
490 FORZ4=1TOL8+T:S=S+1:GOSUB120:FORW=15514TO15551:POKEW,128:NEXTW:FORW=15578
TO15615:POKEW,128:NEXTW:FORW=15642TO15679:POKEW,128:NEXTW:FORW=15706TO15743:P
OKEW,128:NEXTW:IFZ4<>L8+TTHENPRINT@155,"STILL IN TRAP";:NEXTZ4
491 Z=155:GOTO540
510 PRINT" IN ROUGH";:GOTO532
520 K=K+1:PRINT@219,"IN THE WOODS OUT OF BOUNDS";:PRINT@265,"IN THE WOODS";:S
=S+2:PRINT@330,"TWO STROKES";:GOTO 532
530 PRINT @265,"IN WATER";:S=S+1:PRINT@330,"ONE STROKE";
532 IFK=0THENZ=219
534 IFK=1THENZ=283
536 IFK=2THENZ=347
540 PRINT@Z,"dISTANCE TO PIN IS";C;"YARDS";:IFC<10THEN570
560 H=C:GOTO300
570 IFABS(C)<3-S(Q)THEN600
575 PRINT" ON THE GREEN";
577 IFS(Q)=0THEN585
580 L=RND(3):IFABS(C)>15-2*S(Q)THEN589
585 L=RND(2)
589 IFL=1:PRINTL;"PUTT";:M(Q,J)=S+L:GOTO620
590 PRINTL;"PUTTS";:M(Q,J)=S+L:GOTO620
600 IFS<>1THEN610ELSEPRINT@346," HOLE IN ONE!";
610 LETM(Q,J)=S:PRINT" YOU SUNK THE SHOT";
620 GOSUB3710:FORB=1TO1500:NEXT:CLS:PRINT:PRINT"*****
*****"
630 PRINT M(Q,J);"STROKES FOR HOLE NUMBER";J;"FOR ";P$(Q)
```

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```
640 PRINT"*****":T4=5:K4=1:I=0:D=5:PRINT:G
OSUB770
650 Q=Q+1:GOSUB780:IFQ>UTHEN670ELSE270
670 CLS:PRINT"***** SCORE FOR";J;"HOLES *****":E=P(J)+E:FORW=1TOU:N
(W)=N(W)+M(W,J):PRINTP$(W);" SHOT";N(W);" PAR IS";E:NEXTW
730 PRINT:PRINT:IFMM<>3GOSUB 770
740 J=J+1:IFJ>18THEN750ELSE265
750 PRINT"***** END OF GAME *****"
757 PRINT:INPUT"TO PLAY AGAIN TYPE '1' ELSE TYPE '0'";A:IFA=1THEN70ELSEEND
770 INPUT"PRESS 'ENTER' TO CONTINUE";S:RETURN
780 C$(1)="1 IRON ":R(1)=170-5*S(Q):V(1)=20
790 C$(2)="2 IRON ":R(2)=160-5*S(Q):V(2)=20
800 C$(3)="3 IRON ":R(3)=150-5*S(Q):V(3)=20
810 C$(4)="4 IRON ":R(4)=140-5*S(Q):V(4)=20
820 C$(5)="5 IRON ":R(5)=120-5*S(Q):V(5)=30
830 C$(6)="6 IRON ":R(6)=100-5*S(Q):V(6)=30
840 C$(7)="7 IRON ":R(7)=70-5*S(Q):V(7)=30
850 C$(8)="8 IRON ":R(8)=60-5*S(Q):V(8)=30
860 C$(9)="9 IRON ":R(9)=30-5*S(Q):V(9)=30
870 C$(10)="PUTTER":R(10)=1:V(10)=29
880 C$(11)="1 WOOD":R(11)=180-15*S(Q):V(11)=90
890 C$(12)="2 WOOD":R(12)=160-10*S(Q):V(12)=70
900 C$(13)="3 WOOD":R(13)=130-5*S(Q):V(13)=60
910 C$(14)="4 WOOD":R(14)=120-5*S(Q):V(14)=50
920 RETURN
930 CLS
940 POKE 15360,191:POKE 15424,191:POKE 15488,191
950 POKE 15369,191:POKE 15433,191:POKE 15497,191
960 FOR W=15361 TO 15368:POKE W,131:NEXT
970 FOR W=15489 TO 15496:POKE W,176:NEXT
980 FOR W=15552 TO 15576:POKE W,140:NEXT
990 FOR W=15385 TO 15705STEP 64:POKE W,191:NEXT
1000 FOR W=15744 TO 15807:POKE W,179:NEXT
1010 FOR W=15745TO15805STEP5:POKEW,187:NEXT
1020 PRINT@11,"HOLE:";J;
1030 PRINT@75,"DISTANCE:";A(J);
1040 PRINT@139,"PAR:";P(J);
1050 PRINT@256,"HAZARD:";
1060 PRINT@320,"PENALTY:";
1070 PRINT@27,"PLAYER: ";P$(Q);
1080 ON J GOSUB2000,2005,2010,2020,2025,2030,2035,2040,2045,2050,2055,2060,20
65,2070,2075,2080,2085,2090
1090 IFG=1:RETURN
1200 ONJGOTO3000,3400,3300,3500,3100,3000,3500,3400,3200,3200,3600,3000,3400,
3100,3200,3300,3600,3500
1205 IFGH=1:GH=0:RETURN
1210 GOTO300
2000 POKE15365,179:POKE 15493,179:POKE 15429,191:RETURN
2005 FOR W=15363 TO 15366:POKE W,179:NEXT:FOR W=15491 TO 15494:POKE W,179:NEXT
```

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```
2006 POKE 15430,143:POKE 15429,140:POKE 15428,140:POKE 15427,188:RETURN
2010 FOR W=15363 TO 15366:POKEW,179:NEXT:FOR W=15491TO15494:POKEW,179:NEXT
2011 POKE 15430,191:FOR W=15427 TO 15429:POKE W,140:NEXT:RETURN
2020 POKE 15363,179:POKE 15366,179:POKE 15494,179
2021 POKE 15427,143:POKE 15428,140:POKE 15429,140:POKE 15430,191:RETURN
2025 FOR W=15363 TO 15366:POKE W,179:NEXT:FOR W=15491TO15494:POKEW,179:NEXT
2026 POKE 15430,188:POKE 15429,140:POKE 15428,140:POKE 15427,143:RETURN
2030 FOR W=15363TO15366:POKEW,179:NEXT:FORW=15491TO15494:POKEW,179:NEXT
2031 POKE 15430,188:POKE 15429,140:POKE 15428,140:POKE 15427,191:RETURN
2035 FOR W=15363TO15366:POKEW,179:NEXT:POKE 15494,179:POKE 15430,191:RETURN
2040 FORW=15363TO15366:POKEW,179:NEXT:FORW=15491TO15494:POKEW,179:NEXT
2041 POKE 15430,191:POKE 15429,140:POKE 15428,140:POKE 15427,191:RETURN
2045 FORW=15363TO15366:POKEW,179:NEXT:FORW=15491TO15494:POKEW,179:NEXT
2046 POKE 15430,191:POKE 15429,140:POKE 15428,140:POKE 15427,143:RETURN
2050 GOSUB 2095:FOR W=15364 TO 15367:POKE W,179:NEXT:FOR W=15492 TO 15495:POK
E W,179:NEXT
2051 POKE 15431,191:POKE 15428,191:RETURN
2055 POKE 15363,179:POKE 15365,179:POKE 15491,179:POKE 15493,179:POKE 15427,191
:POKE 15429,191:RETURN
2060 GOSUB 2095:FORW=15364TO15367:POKEW,179:NEXT:FORW=15492TO15495:POKEW,179:N
EXT
2061 POKE 15431,143:POKE 15430,140:POKE 15429,140:POKE 15428,188:RETURN
2065 GOSUB 2095:FORW=15364TO15367:POKEW,179:NEXT:FORW=15492TO15495:POKEW,179:N
EXT
2066 POKE 15431,191:POKE 15430,140:POKE 15429,140:POKE 15428,140:RETURN
2070 GOSUB 2095:POKE 15364,179:POKE 15367,179:POKE 15495,179:POKE 15431,191:POKE 15
430,140:POKE 15429,140:POKE 15428,143:RETURN
2075 GOSUB 2095:FORW=15364TO15367:POKEW,179:NEXT:FORW=15492TO15495:POKEW,179:N
EXT
2076 POKE 15431,188:POKE 15430,140:POKE 15429,140:POKE 15428,143:RETURN
2080 GOSUB 2095:FORW=15364TO15367:POKEW,179:NEXT:FORW=15492TO15495:POKEW,179:N
EXT
2081 POKE 15428,191:POKE 15429,140:POKE 15430,140:POKE 15431,188:RETURN
2085 GOSUB 2095:FORW=15364TO15367:POKEW,179:NEXT:POKE 15495,179:POKE 15431,191:R
ETURN
2090 GOSUB 2095:FORW=15364TO15367:POKEW,179:NEXT:FORW=15492TO15495:POKEW,179:N
EXT
2091 POKE 15428,191:POKE 15429,140:POKE 15430,140:POKE 15431,191:RETURN
2095 POKE 15362,179:POKE 15426,191:POKE 15490,179:RETURN
3000 PRINT@448,"";:FORZ=1TO32:PRINT"* ";:NEXT
3001 PRINT@524,"";:FORZ=1TO26:PRINT"* ";:NEXT
3002 PRINT@596,"";:FORX=1TO22:PRINT"* ";:NEXT
3003 PRINT@688,"";:FORX=1TO8:PRINT"* ";:NEXT
3004 PRINT@752,"";:FORX=1TO8:PRINT"* ";:NEXT
3005 PRINT@816,"";:FORX=1TO8:PRINT"* ";:NEXT
3006 PRINT@768,"* * * *";:PRINT@814,"";:FORX=1TO9:PRINT"* ";:NEXT
3007 PRINT@832,"";:FORX=1TO32:PRINT"* ";:NEXT
3008 PRINT@896,"";:FORX=1TO32:PRINT"* ";:NEXT
3009 PRINT@959,"";:FORX=1TO32:PRINT" *";:NEXT:PRINT@704,"*";:PRINT@640,"*";:P
RINT@576,"*";:PRINT@512,"*";
```

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```
3010 FORY=24TO32:SET(3,Y):NEXT:FORX=4TO10:SET(X,24):NEXT:FORX=10TO19:SET(X,25):NEXT
3015 FORX=19TO23:SET(X,26):NEXT:FORX=23TO28:SET(X,27):NEXT:FORX=28TO32:SET(X,28):NEXT:FORX=32TO37:SET(X,29):NEXT
3020 FORX=36TO41:SET(X,30):NEXT:FORX=40TO68:SET(X,31):NEXT:FORX=68TO76:SET(X,30):NEXT:FORX=76TO81:SET(X,29):NEXT
3025 FORX=81TO89:SET(X,28):NEXT:FORX=88TO92:SET(X,27):NEXT:FORX=91TO94:SET(X,26):NEXT:FORY=27TO34:SET(94,Y):NEXT
3030 SET(92,34):SET(93,34):FORX=89TO92:SET(X,35):NEXT:FORX=86TO89:SET(X,36):NEXT:FORX=82TO87:SET(X,37):NEXT
3035 FORX=76TO83:SET(X,38):NEXT:FORX=71TO76:SET(X,39):NEXT:FORX=63TO71:SET(X,40):NEXT:FORX=41TO63:SET(X,41):NEXT
3040 FORX=33TO41:SET(X,40):NEXT:FORX=28TO33:SET(X,39):NEXT:FORX=24TO28:SET(X,38):NEXT:FORX=20TO24:SET(X,37):NEXT
3045 FORX=15TO20:SET(X,36):NEXT:FORX=11TO15:SET(X,35):NEXT:FORX=7TO11:SET(X,34):NEXT:FORX=4TO7:SET(X,33):NEXT
3050 U9=16064+INT(A(J)/11):RESET(92,27):GOSUB5000
3099 B7=95:GOTO1210
3100 PRINT@448,"";:FORX=1TO31:PRINT"* ";:NEXT
3101 PRINT@512,"";:FORX=1TO17:PRINT"* ";:NEXT
3102 PRINT@576,"";:FORX=1TO9:PRINT"* ";:NEXT
3103 PRINT@640,"";:FORX=1TO6:PRINT"* ";:NEXT
3104 PRINT@702,"*";:PRINT@506,"* * *";:PRINT@570,"* * *";:PRINT@634,"* * *";:PRINT@698,"* * *";
3105 PRINT@736,"";:FORX=1TO16:PRINT"* ";:NEXT
3106 PRINT@794,"";:FORX=1TO19:PRINT"* ";:NEXT
3107 PRINT@852,"";:FORX=1TO23:PRINT"* ";:NEXT
3108 PRINT@902,"";:FORX=1TO29:PRINT"* ";:NEXT
3109 PRINT@957,"";:FORX=1TO33:PRINT"* ";:NEXT:PRINT@704,"* *";:PRINT@768,"*";:PRINT@832,"*";
3110 FORY=36TO44:SET(3,Y):NEXT:SET(4,36):SET(5,36):SET(6,36):FORX=6TO11:SET(X,35):NEXT:FORX=10TO15:SET(X,34):NEXT
3120 FORX=15TO21:SET(X,33):NEXT:FORX=20TO27:SET(X,32):NEXT:FORX=27TO31:SET(X,31):NEXT:FORX=30TO35:SET(X,30):NEXT
3130 FORX=34TO39:SET(X,29):NEXT:FORX=39TO45:SET(X,28):NEXT:FORX=44TO51:SET(X,27):NEXT:FORX=50TO57:SET(X,26):NEXT
3140 FORX=56TO67:SET(X,25):NEXT:FORX=66TO75:SET(X,24):NEXT:FORX=74TO77:SET(X,23):NEXT:FORX=76TO117:SET(X,22):NEXT
3150 FORY=23TO30:SET(117,Y):NEXT:FORX=78TO116:SET(X,30):NEXT:FORX=68TO79:SET(X,31):NEXT:FORX=64TO69:SET(X,32):NEXT
3160 FORX=59TO65:SET(X,33):NEXT:FORX=56TO60:SET(X,34):NEXT:FORX=51TO57:SET(X,35):NEXT:FORX=46TO52:SET(X,36):NEXT
3170 FORX=42TO47:SET(X,37):NEXT:FORX=36TO43:SET(X,38):NEXT:FORX=32TO37:SET(X,39):NEXT:FORX=26TO33:SET(X,40):NEXT
3180 FORX=18TO27:SET(X,41):NEXT:FORX=12TO19:SET(X,42):NEXT:FORX=6TO13:SET(X,43):NEXT:FORX=3TO7:SET(X,44):NEXT
3190 U9=15875+INT(A(J)/11):GOSUB5000
3199 B7=118:GOTO1210
3200 PRINT@448,"";:FORX=1TO32:PRINT"* ";:NEXT
3201 PRINT@512,"";:FORX=1TO15:PRINT"* ";:NEXT:PRINT@558,"";:FORX=1TO9:PRINT"* "
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":NEXT
3202 PRINT@576,"";:FORX=1TO14:PRINT"* ";:NEXT:PRINT@622,"";:FORX=1TO9:PRINT"*
":NEXT
3203 PRINT@640,"";:FORX=1TO12:PRINT"* ";:NEXT:PRINT@686,"";:FORX=1TO9:PRINT"*
":NEXT
3204 PRINT@704,"";:FORX=1TO11:PRINT"* ";:NEXT:PRINT@740,"";:FORX=1TO14:PRINT"
* ";:NEXT
3205 PRINT@768,"*";:PRINT@800,"";:FORX=1TO16:PRINT"* ";:NEXT
3206 PRINT@832,"*";:PRINT@862,"";:FORX=1TO17:PRINT"* ";:NEXT
3207 PRINT@896,"*";:PRINT@922,"";:FORX=1TO19:PRINT"* ";:NEXT
3208 PRINT@959,"";:FORX=1TO32:PRINT" *";:NEXT
3210 FORY=36TO44:SET(3,Y):NEXT:FORX=4TO33:SET(X,36):NEXT:FORX=32TO43:SET(X,35
):NEXT
3220 X=42:FORY=34TO23STEP-1:FORK=0TO3:SET(X+K,Y):NEXTK:X=X+2:NEXTY
3230 FORX=66TO90:SET(X,22):NEXT:FORY=22TO30:SET(91,Y):NEXT:FORX=76TO90:SET(X,
30):NEXT
3240 X=74:FORY=31TO43:FORK=0TO3:SET(X+K,Y):NEXTK:X=X-2:NEXTY:FORX=4TO51:SET(X
,44):NEXT:U9=15874+INT(A(J)/11):GOSUB5000
3299 B7=92:GOTO1210
3300 PRINT@448,"";:FORX=1TO32:PRINT"* ";:NEXT
3301 PRINT@512,"*";:PRINT@534,"";:FORX=1TO21:PRINT"* ";:NEXT
3302 PRINT@576,"*";:PRINT@602,"";:FORX=1TO6:PRINT"* ";:NEXT:PRINT@620,"";:FOR
X=1TO10:PRINT"* ";:NEXT
3303 PRINT@640,"*";:PRINT@670,"* *";:PRINT@684,"";:FORX=1TO10:PRINT"* ";:NEXT

3304 PRINT@704,"";:FORX=1TO10:PRINT"* ";:NEXT:PRINT@748,"";:FORX=1TO10:PRINT"
* ";:NEXT
3305 PRINT@768,"";:FORX=1TO11:PRINT"* ";:NEXT:PRINT@812,"";:FORX=1TO10:PRINT"
* ";:NEXT
3306 PRINT@832,"";:FORX=1TO12:PRINT"* ";:NEXT:PRINT@874,"";:FORX=1TO11:PRINT"
* ";:NEXT
3307 PRINT@896,"";:FORX=1TO14:PRINT"* ";:NEXT:PRINT@934,"";:FORX=1TO13:PRINT"
* ";:NEXT
3308 PRINT@959,"";:FORX=1TO32:PRINT" *";:NEXT
3310 FORY=24TO32:SET(3,Y):NEXT:SET(4,24):SET(5,24):FORX=5TO13:SET(X,23):NEXT:
FORX=12TO39:SET(X,22):NEXT
3320 X=38:FORY=23TO33:FORK=0TO3:SET(X+K,Y):NEXTK:X=X+2:NEXTY
3330 FORX=60TO66:SET(X,34):NEXT:X=65:FORY=33TO25STEP-1:FORK=0TO3:SET(X+K,Y):N
EXTK:X=X+1:NEXTY
3340 FORX=75TO85:SET(X,24):NEXT:FORY=24TO36:SET(86,Y):NEXT:SET(84,36):SET(85,
36)
3350 X=68:FORY=44TO37STEP-1:FORK=0TO3:SET(X+K,Y):NEXTK:X=X+2:NEXTY
3360 FORX=58TO69:SET(X,45):NEXT:X=32:FORY=32TO44:FORK=0TO3:SET(X+K,Y):NEXTK:X
=X+2:NEXTY
3370 FORX=8TO33:SET(X,31):NEXT:FORX=4TO9:SET(X,32):NEXT:U9=15940+INT(A(J)/11)
:GOSUB5000
3399 B7=87:GOTO1210
3400 PRINT@448,"";:FORX=1TO32:PRINT"* ";:NEXT
3401 PRINT@512,"*";:PRINT@534,"";:FORX=1TO8:PRINT"* ";:NEXT:PRINT@570,"* * *";
```

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```
3402 PRINT@576,"*";:PRINT@602,"";:FORX=1TO4:PRINT"* ";:NEXT
3403 PRINT@640,"*";:PRINT@704,"";:FORX=1TO8:PRINT"* ";:NEXT
3404 PRINT@768,"";:FORX=1TO9:PRINT"* ";:NEXT:PRINT@808,"";:FORX=1TO76:PRINT"*
";:NEXT
3405 PRINT@959,"";:FORX=1TO32:PRINT" *";:NEXT:U9=15936+INT(A(J)/11):GOSUB5000

3410 FORY=22TO30:SET(3,Y):NEXT:FORX=4TO37:SET(X,22):NEXT:X=36:FORY=23TO29:FOR
K=0TO3:SET(X+K,Y):NEXTK:X=X+2:NEXTY
3420 FORX=50TO65:SET(X,30):NEXT:X=64:FORY=29TO23STEP-1:FORK=0TO3:SET(X+K,Y):N
EXTK:X=X+2:NEXTY:FORX=78TO109:SET(X,22):NEXT
3430 X=108:FORY=23TO26:FORK=0TO3:SET(X+K,Y):NEXTK:X=X+2:NEXTY:FORX=116TO124:S
ET(X,27):NEXT:FORY=27TO35:SET(125,Y):NEXT
3440 FORX=110TO124:SET(X,35):NEXT:FORX=108TO111:SET(X,34):NEXT:FORX=84TO109:S
ET(X,33):NEXT:X=82:FORY=34TO39:FORK=0TO3:SET(X+K,Y):NEXTK:X=X-2:NEXTY
3450 FORX=40TO73:SET(X,40):NEXT:X=38:FORY=39TO31STEP-1:FORK=0TO3:SET(X+K,Y):N
EXTK:X=X-2:NEXTY:FORX=4TO23:SET(X,30):NEXT
3499 B7=124:GOTO1210
3500 PRINT@448,"";:FORX=1TO64:PRINT"* ";:NEXT
3501 PRINT@576,"";:FORX=1TO14:PRINT"* ";:NEXT:PRINT@620,"";:FORX=1TO10:PRINT"
* ";:NEXT
3502 PRINT@640,"";:FORX=1TO12:PRINT"* ";:NEXT:PRINT@684,"";:FORX=1TO10:PRINT"
* ";:NEXT
3503 PRINT@704,"";:FORX=1TO12:PRINT"* ";:NEXT:PRINT@742,"";:FORX=1TO13:PRINT"
* ";:NEXT
3504 PRINT@768,"";:FORX=1TO13:PRINT"* ";:NEXT:PRINT@810,"";:FORX=1TO11:PRINT"
* ";:NEXT:PRINT@832,"*";:PRINT@874,"";:FORX=1TO11:PRINT"* ";:NEXT
3505 PRINT@896,"*";:PRINT@936,"";:FORX=1TO12:PRINT"* ";:NEXT
3506 PRINT@959,"";:FORX=1TO32:PRINT" *";:NEXT:U9=15939+INT(A(J)/11)
3507 IFJ=18THENU9=16000+INT(A(J)/11)
3508 IFJ=4THENU9=16000+INT(A(J)/10.5)
3509 GOSUB5000
3510 FORY=39TO47:SET(3,Y):NEXT:FORX=4TO53:SET(X,39):NEXT:X=52:FORY=38TO33STEP
-1:FORK=0TO3:SET(X+K,Y):NEXTK:X=X-2:NEXTY
3520 X=44:FORY=32TO25STEP-1:FORK=0TO3:SET(X+K,Y):NEXTK:X=X+2:NEXTY:FORX=60TO8
6:SET(X,24):NEXT:FORY=24TO32:SET(87,Y):NEXT
3530 FORX=72TO86:SET(X,32):NEXT:X=70:FORY=33TO40:FORK=0TO3:SET(X+K,Y):NEXTK:X
=X+2:NEXTY:X=82:FORY=41TO46:FORK=0TO3:SET(X+K,Y):NEXTK:X=X-2:NEXTY:FORX=4TO73
:SET(X,47):NEXT
3599 B7=89:GOTO1210
3600 PRINT@448,"";:FORX=1TO64:PRINT"* ";:NEXT
3601 PRINT@576,"*";:PRINT@624,"";:FORX=1TO8:PRINT"* ";:NEXT
3602 PRINT@640,"*";:PRINT@690,"";:FORX=1TO7:PRINT"* ";:NEXT
3603 PRINT@704,"";:FORX=1TO19:PRINT"* ";:NEXT:PRINT@758,"";:FORX=1TO5:PRINT"*
";:NEXT
3604 PRINT@768,"";:FORX=1TO20:PRINT"* ";:NEXT:PRINT@824,"";:FORX=1TO4:PRINT"*
";:NEXT
3605 PRINT@832,"";:FORX=1TO23:PRINT"* ";:NEXT:PRINT@892,"* *";
3606 PRINT@896,"";:FORX=1TO24:PRINT"* ";:NEXT
3607 PRINT@959,"";:FORX=1TO32:PRINT" *";:NEXT:U9=16256+INT(A(J)/11):GOSUB5000
```



4205 IFD<49THENG=38: RETURN  
4210 IFD<51THENG=37: RETURN  
4215 IFD<53THENG=36: RETURN  
4220 IFD<55THENG=35: RETURN  
4225 IFD<57THENG=34: RETURN  
4230 IFD<59THENG=33: RETURN  
4235 IFD<61THENG=32: RETURN  
4240 IFD<63THENG=31: RETURN  
4245 IFD<65THENG=30: RETURN  
4250 IFD<67THENG=29: RETURN  
4255 IFD<69THENG=28: RETURN  
4260 IFD<76THENG=27: RETURN  
4265 IFD<80THENG=26: RETURN  
4270 G=25: RETURN  
4300 IFD<32THENG=27: RETURN  
4305 IFD<38THENG=28: RETURN  
4310 IFD<42THENG=29: RETURN  
4315 IFD<46THENG=30: RETURN  
4320 IFD<48THENG=31: RETURN  
4325 IFD<49THENG=32: RETURN  
4330 IFD<50THENG=33: RETURN  
4335 IFD<51THENG=34: RETURN  
4340 IFD<52THENG=35: RETURN  
4345 IFD<56THENG=36: RETURN  
4350 IFD<59THENG=37: RETURN  
4355 IFD<62THENG=38: RETURN  
4360 IFD<66THENG=39: RETURN  
4365 IFD<69THENG=38: RETURN  
4370 IFD<71THENG=37: RETURN  
4373 IFD<73THENG=36: RETURN  
4376 IFD<74THENG=35: RETURN  
4380 IFD<75THENG=34: RETURN  
4382 IFD<77THENG=33: RETURN  
4384 IFD<78THENG=32: RETURN  
4386 IFD<79THENG=31: RETURN  
4388 G=30: RETURN  
4400 IFD<25THENG=26: RETURN  
4405 IFD<32THENG=27: RETURN  
4410 IFD<36THENG=28: RETURN  
4415 IFD<37THENG=29: RETURN  
4420 IFD<38THENG=30: RETURN  
4425 IFD<42THENG=31: RETURN  
4430 IFD<44THENG=32: RETURN  
4435 IFD<46THENG=33: RETURN  
4440 IFD<68THENG=34: RETURN  
4445 IFD<72THENG=33: RETURN  
4450 IFD<74THENG=32: RETURN  
4455 IFD<76THENG=31: RETURN  
4460 IFD<78THENG=30: RETURN  
4465 IFD<82THENG=29: RETURN

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4470 G=28:RETURN  
4500 IFD<56THENG=43:RETURN  
4505 IFD<57THENG=42:RETURN  
4510 IFD<58THENG=41:RETURN  
4515 IFD<59THENG=40:RETURN  
4520 IFD<60THENG=39:RETURN  
4525 IFD<61THENG=38:RETURN  
4530 IFD<62THENG=37:RETURN  
4535 IFD<63THENG=36:RETURN  
4540 IFD<64THENG=35:RETURN  
4545 IFD<65THENG=34:RETURN  
4550 IFD<66THENG=33:RETURN  
4555 IFD<67THENG=32:RETURN  
4560 IFD<68THENG=31:RETURN  
4565 IFD<72THENG=30:RETURN  
4570 IFD<73THENG=29:RETURN  
4575 G=28:RETURN  
4600 IFD<74THENG=28:RETURN  
4605 IFD<78THENG=29:RETURN  
4610 IFD<82THENG=30:RETURN  
4615 IFD<86THENG=31:RETURN  
4620 IFD<88THENG=32:RETURN  
4630 IFD<90THENG=33:RETURN  
4635 IFD<92THENG=34:RETURN  
4640 IFD<94THENG=35:RETURN  
4645 IFD<96THENG=36:RETURN  
4650 IFD<98THENG=37:RETURN  
4655 IFD<100THENG=38:RETURN  
4660 IFD<102THENG=39:RETURN  
4665 IFD<106THENG=40:RETURN  
4670 IFD<109THENG=41:RETURN  
4675 IFD<110THENG=42:RETURN  
4680 G=43:RETURN  
5000 POKEU9,159:POKEU9+1,141:POKEU9+64,129:RETURN

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## FOUR BASIC PROGRAMS

by  
GORDON SPEER

### TEST

There are two ways to use this program. A beginner, or one who does not have access to a printer, can read and answer the questions, which cover some of the basic points of BASIC. The entire program, when run on a system with a printer, produces a copy of the test with the questions in random order. Subsequent runs produce the same test with the questions in a different order. I use this method to produce two or three tests which are then duplicated and distributed alternately to the students in my computer programming class, to discourage cheating.

```
90 ' TEST
100 DIM C(25)
110 LPRINT" Computer Programming Test - Chapter 1
120 LPRINT STRING$(2,138)
130 GOTO 390
140 LPRINT"BASIC is a:
    a) computer
    b) language
    c) statement
    d) terminal":RETURN
150 LPRINT"To PRINT a title, you must enclose it in:
    a) parentheses
    b) apostrophes
    c) quotes
    d) brackets":RETURN
160 LPRINT"A BASIC program is executed in:
    a) statement order
    b) line number order
    c) chronological order
    d) alphabetical order":RETURN
170 LPRINT"Every line of a BASIC program must begin with:
    a) a quote
    b) a variable
    c) a space
    d) a positive integer":RETURN
180 LPRINT"Lines are numbered by tens:
    a) because it is required
    b) to separate data
    c) to prevent error statements
    d) to allow inserting more statements":RETURN
190 LPRINT"In BASIC, the product of A and B is written:
    a) AB
```

- b)  $A \times B$
  - c)  $A * B$
  - d)  $(A)(B) : RETURN$
- 200 LPRINT "What command is used to assign a value to a variable?"
- a) GOTO
  - b) LET
  - c) PRINT
  - d) NEW : RETURN
- 210 LPRINT "Zones, or columns:"
- a) are all 10 spaces wide
  - b) are all 16 spaces wide
  - c) vary with different computers
  - d) may be changed to different widths : RETURN
- 220 LPRINT "Which of the following is performed before the others?"
- a) exponentiation
  - b) subtraction
  - c) multiplication
  - d) division : RETURN
- 230 LPRINT "A READ statement requires which of the following?"
- a) INPUT
  - b) DATA
  - c) LET
  - d) GOTO : RETURN
- 240 LPRINT "DATA, in a BASIC program:"
- a) must be at the beginning
  - b) must be after the READ statement
  - c) must be at the end
  - d) may be anywhere : RETURN
- 250 LPRINT "Large numbers, in a BASIC program:"
- a) must contain commas
  - b) may contain commas
  - c) must not contain commas
  - d) are forbidden : RETURN
- 260 LPRINT "To erase a previous program from the computer, you type:"
- a) NEW
  - b) CLEAR
  - c) RUN
  - d) ENTER : RETURN
- 270 LPRINT "To initialize all variables and begin program execution you type:"
- a) RUN
  - b) BEGIN
  - c) GOTO 1
  - d) START : RETURN
- 280 LPRINT "Which of these is NOT a valid BASIC variable?"
- a) Z2
  - b) X13
  - c) Q
  - d) G6 : RETURN
- 290 LPRINT "When a computer encounters an INPUT statement it:"

- a) prints an error message
  - b) reads a data statement
  - c) starts over
  - d) prints ? and stops":RETURN
- 300 LPRINT"How does a BASIC computer print six billion?"
- a) 6000000000.0
  - b) 6,000,000,000
  - c)  $6 \times 10^9$
  - d) 6.000000E+9":RETURN
- 310 LPRINT"The BASIC statement:        40 LET N=N+1
- a) is invalid
  - b) will cause an error message
  - c) will increase the value of N by 1
  - d) doesn't do anything":RETURN
- 320 LPRINT"A comma, out of quotes, causes the next PRINT to occur:
- a) in the next zone (column)
  - b) on the next line
  - c) immediately following the last one
  - d) 8 spaces to the right":RETURN
- 330 LPRINT"Titles and column headings should be:
- a) written first
  - b) added after you get the program working
  - c) put at the end of the program
  - d) omitted":RETURN
- 340 LPRINT"A semicolon (;) out of quotes:
- a) causes a linefeed
  - b) prevents tab and linefeed
  - c) tabs to the next column (zone)
  - d) tabs over TWO columns":RETURN
- 350 LPRINT"Anything enclosed in quotes is printed as-is except:
- a) another quote
  - b) numerals
  - c) commas
  - d) data":RETURN
- 360 LPRINT"Multiplication in BASIC programming:
- a) requires the \* sign (asterisk)
  - b) is understood between ( )( )
  - c) is done BEFORE division
  - d) is done AFTER division":RETURN
- 370 LPRINT"When your BASIC program runs out of DATA:
- a) an error message is printed
  - b) it goes back to the beginning
  - c) it stops
  - d) it goes on without it":RETURN
- 380 LPRINT"What BASIC statement branches to another point in the program?"
- a) GOTO
  - b) LET
  - c) NEW
  - d) DATA":RETURN
- 390 FOR Q=1 TO 25

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---

```
400 LET N=RND(25)
410 IF C(N)=1 THEN 400
420 LET C(N)=1
430 LPRINT USING"##";Q;
440 LPRINT") ";
450 ON N GOSUB 140 ,150 ,160 ,170 ,180 ,190
,200 ,210 ,220 ,230 ,240 ,250 ,260 ,270 ,280 ,290
,300 ,310 ,320 ,330 ,340 ,350 ,360 ,370 ,380
460 LPRINT
470 NEXT Q
480 'AN ORIGINAL PROGRAM USING
490 'LEVEL-II BASIC FOR TRS-80
500 'BY MR GORDON E. SPEER
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```

## AIR

The atmosphere near the surface of the earth is a mixture of several different gases, most of which are elements. The most abundant element in the atmosphere is nitrogen (78%), with lesser amounts of oxygen (21%), argon (.95%), carbon dioxide (.04%), and traces of many others.

To visualize this mixture, this program prints a symbol of the elements on the screen to represent each air molecule using the random number generator to approximate the ratios of the gases that might be found in an actual sample of air.

```
100 'AIR
110 CLS 'CLEAR SCREEN
120 PRINT CHR$(23)
130 FOR P=0 TO 1020 STEP 2 'POSITION
140 LET N=RND(10000) 'RANDOM NUMBER
150 LET E$="N" 'NITROGEN SYMBOL
160 IF N>7800 THEN LET E$="O" 'OXYGEN
170 IF N>9900 THEN LET E$="A" 'ARGON
180 IF N>9995 THEN LET E$="C" 'CARBON DIOXIDE
190 IF N=10000 THEN LET E$="T" 'TRACE ELEMENT
200 PRINT@P,E$;
210 NEXT P
220 GOTO 220 'FREEZE THE DISPLAY
230 'AN ORIGINAL PROGRAM USING
240 'LEVEL-II BASIC FOR TRS-80
250 'BY: MR GORDON E. SPEER
260 ' 3304 WOODLAWN ROAD
270 ' STERLING, IL 61081
280 ' PHONE(815)625-5251
```

## PLANETS

If you are into astrology, or astronomy, or even just star gazing, try this one. This program looks down on four of the planets of our solar system as they revolve around the sun. It starts with them lined up, and displays their positions month by month as they progress through their orbits. This would be an easy way to keep track of syzygy (one of my favorite words), or retrogressions.

```
100 ' PLANETS
110 LET PI=3.14159
120 FOR M=1 TO 100000 'MONTHS
130 LET R=7:NA$="EARTH":L=M*360/12:GOSUB 220
140 LET R=12:NA$="MARS":L=M*360/24:GOSUB 220
150 LET R=16:NA$="JUPITER":L=M*360/144:GOSUB 220
160 LET R=21:NA$="SATURN":L=M*360/354:GOSUB 220
170 ' R=RADIUS, NA$=NAME, L=LOCATION IN DEGREES FROM START
180 FOR D=1 TO 1000:NEXT 'DELAY
190 CLS
200 NEXT M
210 END
220 'SUBROUTINE TO PRINT AT L,R,NA$
230 PRINT@543,"(S)"; 'SUN'S LOCATION
240 LET A=L*PI/180 'CHANGES DEGREES TO RADIAN
250 LET Y=25-SIN(A)*R 'VERTICAL POSITION
260 LET X=65+COS(A)*2.3*R 'HORIZONTAL POSITION
270 SET(X,Y) 'PLANET'S LOCATION BLOCK
280 LET N=64*FIX(Y/3)+X/2+2 'LOCATION OF PLANET'S NAME
290 PRINT@N,NA$;
300 RETURN
310 'AN ORIGINAL PROGRAM USING
320 'LEVEL-II BASIC FOR TRS-80
330 'BY: MR GORDON E. SPEER
340 ' 3304 WOODLAWN ROAD
350 ' STERLING, IL 61081
360 ' PHONE(815)625-5251
```

## CRAZY EIGHTS

CRAZY EIGHTS is also called Swedish Rummy, but it is neither rummy nor Swedish. An ordinary pack of 52 cards is used. Each player is dealt seven cards. The remainder of the pack is placed face down to form the STOCK. The top card is turned over and placed beside the stock as the STARTER. This begins the TALON, or pile of played cards.

A player must lay on the talon a card of either the same rank or the same suit as the top card. If unable to do this, he must draw from the stock until he is able. (A player may draw from the stock even if he is able to play.) After the stock is exhausted, a player who is unable to play

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passes. Play ends when either the stock is exhausted and neither hand can play.

All EIGHTS are WILD. The player of an eight designates a suit for it, any suit. The other player must then play a card of the designated suit (or another eight).

Scoring is done by counting points for the cards remaining in each hand when play ends. Each eight counts 50 points. Face cards count ten points each, and other cards their index value. The winner is the player with the lower count, and he receives the DIFFERENCE in count between the hands. The first player to reach a total of 100 or more points wins a GAME. He scores 100 for the game, plus the difference in the final point totals.

```

100 'CRAZY EIGHTS - SPEER
110 CLEAR 2000                                'STRING SPACE
120 DEFINT I-N,T,W                            'INT REQUIRES LESS MEMORY
130 DEFSTR C,R,S                              'RANK AND SUIT NAMES
140 DIM C(52),R(13),P(13),CA(52),VA(52),L(52)
150 CLS:PRINT CHR$(23)                        'CLEAR SCREEN-DOUBLE WIDE
160 FOR Z=1 TO 70
170 PRINT @RND(1020),"8";
180 PRINT@RND(1010)," ";
190 NEXT
200 PRINT@450," C R A Z Y E I G H T S "
210 '
        DEFINE THE CARDS
220 LET S(1)="S":S(2)="H":S(3)="D":S(4)="C" 'SUITS
230 FOR I=1 TO 13                              'RANKS
240 READ R(I),P(I)                            'CARD RANK, POINTS
250 DATAA,1,2,2,3,3,4,4,5,5,6,6,7,7,8,50,9,9,10,10,J,10,Q,10,K,10
260 NEXT I
270 '
        GENERATE CARD NAMES AND POINT VALUES
280 FOR I=1 TO 4                              'SUITS
290 FOR J=1 TO 13                              'RANKS
300 LET CA((I-1)*13+J)=R(J)+S(I) 'CARD NAMES
310 LET VA((I-1)*13+J)=P(J) 'POINT VALUES
320 NEXT J,I
330 '
        DEAL THE CARDS
340 LET N=52                                  'CARDS IN THE STOCK =LOCATION #0
350 FOR I=1 TO 7                              'DEAL SEVEN CARDS EACH
360 GOSUB 1480                                'DEAL
370 LET L(D)=1                                'PLAYER'S HAND =LOCATION #1
380 GOSUB 1480                                'DEAL
390 LET L(D)=2                                'COMPUTER'S HAND =LOCATION #2
400 IF D-13*FIX(D/13)=8 THEN LET N8=N8+1 'NO OF 8'S-COMPUTER
410 NEXT I
420 LET NP=7                                  'NUMBER OF CARDS-PLAYER'S HAND

```

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---

```
430 LET NC=7           'NUMBER OF CARDS-COMPUTER'S HAND
440 GOSUB 1480         'DEAL
450 LET L(D)=3        'THE DISCARD TALON =LOCATION #3
460 LET T=D           'TOP CARD NUMBER
470 LET C(0)="8-"
480 '

      DIRECTIONS
490 PRINT:PRINT"TO DRAW OR PASS: PRESS <ENTER>"
500 FOR Z=1 TO 2000:NEXT Z      'DELAY
510 CLS:PRINT CHR$(23)        'CLEAR SCREEN-DOUBLE WIDE
520 PRINT@394,"S H U F F L I N G"
530 FOR Z=1 TO 1000:NEXT Z
540 CLS:PRINT CHR$(23)
550 PRINT@526,"D E A L I N G"
560 FOR Z=1 TO 1000:NEXT Z
570 CLS:PRINT CHR$(23)
580 '

      PLAYER'S TURN
590 PRINT"THE TOP OF THE TALON IS THE "C(T);CA(T)
600 PRINT"YOUR HAND CONTAINS THESE CARDS:"
610 PRINT
620 FOR I=1 TO 52
630 IF L(I)=1 THEN PRINT CA(I);" ";
640 NEXT I
650 PRINT           'LINE RETURN
660 PRINT STRING$(31,134) 'DECORATION
670 LET P$=""
680 INPUT"YOUR PLAY";P$
690 IF P$>"" THEN 780
700 IF N=0 THEN B=B+1:PRINT"STOCK GONE - YOU PASS":IF B<2 THEN 1000 ELSE
1530
710 CLS:PRINT CHR$(23)      'CLEAR SCREEN
720 GOSUB 1480             'DEAL
730 LET L(D)=1            'PLAYER'S HAND
740 LET NP=NP+1           'COUNT IT
750 PRINT"YOU DREW THE "CA(D) 'IDENTIFY THE CARD
760 PRINT
770 GOTO 590
780 FOR I=1 TO 52          'SCAN THE DECK
790 IF CA(I)=P$ THEN 820   'FIND CARD NUMBER
800 NEXT I
810 PRINT"* INVALID CARD NAME":GOTO 590
820 IF L(I)<>1 THEN PRINT"* YOU DON'T HAVE THAT CARD":GOTO590
830 IF LEFT$(CA(I),1)="8" THEN 870
840 IF RIGHT$(CA(I),1)=RIGHT$(CA(T),1) THEN 910 'SAME SUIT
850 IF I-13*(FIX(I/13))=T-13*(FIX(T/13)) THEN 920 'SAME RANK
860 IF I-13*FIX((I-1)/13)<>8 THEN 900 'NOT AN 8
870 INPUT"DECLARE A SUIT FOR THE 8";CA(0)
880 LET T=0               '8 INDICATOR
890 GOTO 930
```

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```
900 PRINT"* INVALID PLAY":GOTO 670
910 LET CA(0)=" " 'RESET DECLARED SUIT
920 LET T=I 'TOP CARD NUMBER
930 LET L(I)=3 'MOVE CARD TO TALON
940 LET NP=NP-1 'NUMBER OF CARDS- PLAYER'S HAND
950 IF NP=0 THEN PRINT:PRINT">> CONGRATULATIONS-YOU WIN! <<":PRINT:GOTO 1540

960 LET B=0 'NO BLOCK
970 FOR Z=1 TO 1000:NEXT Z 'DELAY
980 CLS:PRINT CHR$(23) 'CLEAR SCREEN
990 '

      COMPUTER'S TURN
1000 FOR I=1 TO 52 'SCAN THE DECK
1010 IF L(I)<>2 THEN 1070 'NOT IN COMPUTER'S HAND
1020 IF I-13*(FIX(I/13))=8 THEN 1070 'DON'T PLAY 8 TILL NEEDED
1030 IF T=0 THEN 1060 '8 ON TOP OF TALON
1040 IF I-13*FIX(I/13)=T-13*FIX(T/13) THEN 1180 'SAME RANK
1050 IF RIGHT$(CA$(I),1)=RIGHT$(CA$(T),1) THEN 1180 'SAME SUIT AS TOP CARD
1060 IF RIGHT$(CA$(I),1)=CA(0) THEN 1170 'SAME SUIT AS DECLARED
1070 NEXT I
1080 IF N8=0 THEN 1100 'NO 8'S IN COMPUTER'S HAND
1090 GOTO 1210 'PLAY AN 8
1100 IF N>0 THEN GOSUB 1480 ELSE PRINT"STOCK IS GONE
COMPUTER PASSES":LET B=B+1:IF B<2 THEN 590 ELSE GOTO 1530
1110 PRINT"COMPUTER DRAWS A CARD"
1120 LET NC=NC+1 'COUNTS COMPUTER'S CARDS
1130 PRINT TAB(14-NC/2)STRING$(NC,138) 'SHOWS COMPUTER'S CARDS
1140 LET L(D)=2 'ASSIGN CARD TO COMPUTER'S HAND
1150 IF D-13*FIX(D/13)=8 THEN LET N8=N8+1
1160 GOTO 1000
1170 LET CA(0)=" " 'RESET DECLARED SUIT
1180 LET T=I 'TOP CARD NUMBER
1190 PRINT"THE COMPUTER PLAYS THE "CA(I)
1200 GOTO 1410
1210 FOR I=1 TO 4 'SUITS
1220 LET N(I)=0 'RESET SUIT COUNTER
1230 FOR J=1 TO 13 'RANKS
1240 IF L(J+13*(I-1))<>2 THEN 1260 'CARD NOT IN COMPUTER'S HAND
1250 LET N(I)=N(I)+1 'SUIT COUNTER
1260 NEXT J
1270 IF K>N(I) THEN 1300 'SMALL SUIT
1280 LET K=N(I) 'SET COMPARATOR UP
1290 LET W=I 'WEALTHY SUIT
1300 NEXT I
1310 LET K=0 'RESET SUIT COMPARATOR
1320 FOR I=8 TO 47 STEP 13 'FIND THE 8
1330 IF L(I)=2 THEN 1350 'HAS THAT EIGHT
1340 NEXT I
1350 PRINT "THE COMPUTER PLAYS THE "CA(I)
1360 PRINT "AND DECLARES IT THE 8"S(W) •
```

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---

```
1370 LET N8=N8-1           'NUMBER OF 8'S
1380 LET L(I)=3           'MOVE CARD TO TALON
1390 LET T=0             '8 INDICATOR
1400 LET CA(0)=S(W)      'DECLARED SUIT
1410 LET L(I)=3           'MOVE CARD TO TALON
1420 LET NC=NC-1         'COUNTS COMPUTER'S CARDS
1430 IF NC=0 THEN PRINT"COMPUTER IS OUT OF CARDS":GOTO 1550
1440 PRINT TAB(14-NC/2)STRING$(NC,138) 'SHOWS COMPUTER'S CARDS
1450 LET B=0             'RESET BLOCK COUNTER
1460 GOTO 600            'PLAYER'S TURN
1470 '

      DEAL A CARD - SUBROUTINE
1480 LET D=RND(52)       'DEAL A RANDOM CARD
1490 IF L(D)<>0 THEN 1480 'THAT CARD IS NOT IN THE STOCK
1500 LET N=N-1           'STOCK CARD COUNTER
1510 RETURN
1520 '

      END OF THE GAME
1530 PRINT"PLAY HAS BEEN BLOCKED"
1540 PRINT"COMPUTER HOLDS THE FOLLOWING:"
1550 FOR I=1 TO 52
1560 IF L(I)=1 THEN LET TP=TP+VA(I) 'PLAYER'S CARDS
1570 IF L(I)=2 THEN PRINT CA(I)" "":LET TC=TC+VA(I) 'COMPUTER'S CARDS
1580 NEXT I
1590 PRINT:PRINT
1600 PRINT"POINTS: PLAYER"TP"- COMPUTER"TC:PRINT
1610 ON SGN(TP-TC)+2 GOTO 1620 ,1640 ,1660
1620 PRINT" SCORE: YOU GET"TC-TP"POINTS"
1630 GOTO 1670
1640 PRINT" TIE GAME - NO SCORE"
1650 GOTO 1670
1660 PRINT"SCORE: COMPUTER GETS"TP-TC"POINTS"
1670 FOR D=1 TO 5000:NEXT:RUN 'DELAY AND RESTART
1680 '
1690 'AN ORIGINAL PROGRAM USING
1700 'LEVEL-II BASIC FOR TRS-80
1710 'BY: MR GORDON E. SPEER
1720 ' 3304 WOODLAWN ROAD
1730 ' STERLING, IL 61081
1740 ' PHONE(815)625-5251
```

## GETTING IT TOGETHER IN ASSEMBLY (ASSEMBLY LANGUAGE FOR BEGINNERS)

### COLUMN #19: DISK FILES (PART I)

by

Dr. Hubert S. Howe, Jr.

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#### The Disk Directory

The disk directory, normally placed on track 17 unless that track is locked out, is the key to understanding the entire file structure on the diskette. Unfortunately, Radio Shack has never released many details about these technical matters, but much useful information is contained in the documentation for Apparat's NEWDOS and NEWDOS80, and in H.C. Pennington's TRS-80 DISK & OTHER MYSTERIES.

The first two sectors of the directory track contain the Granule Allocation Table (GAT) and Hash Index Table (HIT). The remaining eight tracks contain directory entries, either primary entries ("FPDE" for "File Primary Directory Entry") or extension entries ("FXDE" for "File Extension Directory Entry"). Each entry is 32 bytes long. There is thus a maximum of eight entries per sector and 64 entries (which may mean less than 64 files) on the diskette. (Why the DOS allows a maximum of 50 files on a formatted diskette and 60 on a system diskette is unknown.) All of this data is quite straightforward to interpret if you know how.

#### The GAT Sector

The GAT sector contains two tables indicating the space available for files on the disk and whether any tracks are locked out. In addition, it contains the hash code for the diskette's password, the diskette name and date, and the AUTO command file that is to be called on power on or reset. All passwords are encoded in a "hash code" which will be explained in a later column.

The first 96 bytes of the GAT sector (bytes 00 to 5FH) contain the Granule Allocation Table itself. Since the Radio Shack disk drives use only 35 tracks, only the first 35 bytes (00 to 22H) are actually used, although the DOS contains provision for expansion up to 96 tracks on the disk. Each byte simply indicates whether one or both granules on the track is free or already allocated to a file, according to the following table:

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<u>binary</u>	<u>hexadecimal</u>	<u>meaning</u>
11111100	FC	both granules (sectors 0-9) free
11111101	FD	only first granule (sectors 0-4) allocated
11111110	FE	only second granule (sectors 5-9) allocated
11111111	FF	both granules (sectors 0-9) allocated

The next 96 bytes contain the Track Lock Out Table. This table is exactly the same as the GAT, only its function is to tell the DOS whether a track can be used at all. The purpose of these tables is to make it simple for the DOS to know how much space it has available and where the space is.

Why would a track be locked out? There are several reasons. It can be locked out because the track could not be verified during a FORMAT or BACKUP operation. You may also want to use special software, such as that described in our previous column, to write certain tracks and therefore not make them available for the DOS.

The final 64 bytes of the GAT sector contain a variety of miscellaneous information. The password hash code is in bytes CE-CFH. The diskette name and date are in bytes D0 to DF; each of these requires exactly eight bytes. Finally, the AUTO command file is in E0-FF, indicated simply as a command followed by a carriage return. The absence of a command is indicated by placing a carriage return in byte E0. The remaining bytes are filled with FF. A map of the entire GAT sector is shown below.

"GAT" Sector Map (Track 17, sector 0)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	←-----GRANULE ALLOCATION TABLE-----															
10	-----															
20	----->															
30	(unused)															
40	(unused)															
50	(unused)															
60	←-----TRACK LOCK OUT TABLE-----															
70	-----															
80	----->															
90	(unused)															
A0	(unused)															
B0	(unused)															
C0	←------(UNKNOWN)-----><PSW>															
D0	←-----DISKETTE NAME AND DATE----->															
E0	←-----"AUTO" COMMAND FILE----->															
F0	----->															

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## The "HIT" Sector

The HIT sector (sector 1 of the directory track) contains information concerning each file name in the directory. Only the first eight bytes of each 32-byte segment of the sector are used. Each file name in the directory has a single byte of hash code in the table. The POSITION of the byte in the table relates to its address in the directory. The last hexadecimal digit (0-7) plus 2 gives the sector number in the directory track where the file entry is stored, and the first digit (only even values from 0 to E) times 16 gives the relative byte where the entry starts within the sector. The following map shows the correspondence between the HIT sector and the directory entries:

	0	1	2	3	4	5	6	7	
00	200	300	400	500	600	700	800	900	+ 2 = sector
20	220	320	420	520	620	720	820	920	(bytes 8-F unused)
40	240	340	440	540	640	740	840	940	
60	260	360	460	560	660	760	860	960	
80	280	380	480	580	680	780	880	980	
A0	2A0	3A0	4A0	5A0	6A0	7A0	8A0	9A0	
C0	2C0	3C0	4C0	5C0	6C0	7C0	8C0	9C0	
E0	2E0	3E0	4E0	5E0	6E0	7E0	8E0	9E0	

\*16 = byte

In this map, a number like "280" means "sector 2, byte 80H" of the directory track. Each directory entry is 32 bytes long.

If you look at a listing of a HIT sector for a particular diskette, you may notice that some of the codes for different files are identical. This is perfectly normal, and simply means that the number produced must correspond to the code derived from the name of the file. It does not mean that all codes must be unique. The purpose of the HIT sector is to tell the DOS where active entries are located within the directory, and then to verify that these entries correspond to the files specified. A zero in the HIT byte means that no entry is stored in the directory.

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## HELPFUL HINTS

### LINE FEEDS ON THE LINE PRINTER III

Here are some ways to get the Line Printer III to generate multiple line feeds and feed to the top of the next page: To make multiple line feeds, use this statement:

```
LPRINT STRING$(N,CHR$(10))
```

where N is the number of line feeds desired. N can be either a constant or a variable.

To generate a feed to the top of the next page, let the TRS-80 do the work for you. A sample program follows.

```
1 POKE 16425,0           ^SET LINE COUNTER TO 0
2 POKE 16424,N           ^N=NO. OF LINES TO THE PAGE
3                         ^OMIT IF USING 11 INCH PAPER
5 LPRINT "YOUR PROGRAM"
6 LPRINT "YOUR NEXT LINE"
7                         ^LOOPING YOUR PRINTING IS OK
8 I=PEEK(16424)-PEEK(16425) ^KEEPS TRACK OF LINES LEFT TO FILL PAGE
9 C=C+1                   ^INSERT THIS AFTER LPRINT STATEMENTS
12 IF PEEK(16425)=PEEK(16424) THEN LPRINT CHR$(10)
13                         ^GENERATE TOP OF PAGE
14 IF C<>3 THEN 5
15 LPRINT STRING$(I,CHR$(10)) ^SURPRISE! THE TRS-80 KNOWS HOW MANY
16                         ^LINES TO FEED
17 CI=CI+1
18 IF CI=4 THEN END ELSE GOTO 5
```

Line 9 shows how many times to go through the LPRINT routine. Line 15 is the top of page command, and line 17 counts the number of pages printed.

(Thanks to Paul Robinson, 1515 North 17th Street, Arlington, VA 22209.)

### CHANGING ZEROS TO O'S

The following routine in BASIC will change all zeros to letter O's, so that the slashes in the zeros won't confuse the mail people. It makes mailing labels look super-neat:

```
990 LET PS$=""
1000 LET PR$= [whatever you are about to print]
1010 FOR C=1 TO LEN(PR$)
1020 LET CH$=MID$(PR$,C,1)
1030 IF CH$="0" THEN LET CH$="O"
1040 LET PS$=PS$+CH$
1050 NEXT C
1060 LPRINT PS$
```

(Since our printer doesn't print slashes through the zeros, let us just emphasize that in line 1030, the first CH\$ is set equal to zero and the second to letter O.)

(Thanks to Gordon Speer, 3304 Woodlawn Road, Sterling, IL 61081.)

## VARIABLE RECORD LENGTHS WITH TRSDOS

I have just been reading the current issue of COMPUTRONICS (issue #26), and I find on page 743 that you have published my tip on variable record lengths. You have also requested that someone, perhaps me, send you further documentation. I have just run across some very good documentation in the CINTUG newsletter, which I append with this note. The author has done a fine job of explaining the procedure, I feel. The article follows:

LOGICAL LENGTH RECORDS IN RADIO SHACK 2.2 DISK BASIC by Syd Kahn, CINTUG newsletter.

To use logical records answer the "FILES?" with "XX V". The space is mandatory, and the V tells Basic that you want to use variable record lengths.

1) OPEN procedure: to open a logical random access file, use OPEN "R",BUFFER#,FILENAME\$,LOGICALRECORDLENGTH. If this command generates a new file the file control block will show the LRL when you do a "DIR (A)". However, be warned that it does not pick up this value on subsequent OPENS. To get a LRL of 256 bytes, specify a length at open time of zero.

2) CLOSE procedure: to close a previously opened logical file, you must use CLOSE BUFFER#. If the buffer number is not specified you will get an internal error.

3) GET and PUT: to GET or PUT logical records, use:  
GET BUFFER#,LR#  
PUT BUFFER#,LR#

You must specify the LR# on all GETs and PUTs. Basic will not increment to the next logical record.

4) FIELDing: you don't FIELD normally, but since you are only FIELDing one buffer you don't have to calculate the relative sector and use a dummy field to get to the right place in the record. If you try to FIELD more space than the LRL you will get a field overflow error.

5) Disk space allocation: The DOS does not handle the last record properly. In fact, in some cases it does not write the last record at all. For instance, if you write logical record 100 and then close the file and attempt to read the record back you will get an internal error. To use the logical record properly try to do a PUT 1,MAX, MAX being one more than the largest number of records that you will use.

6) LOF(BUFFER#): This function works exactly as in TRSDOS, that is, it returns the length of the file in sectors, not the number of logical records. To approximate the length of the file, try: LOF(BUFFER#)\*256/LRL. This will give the maximum number of records the file will hold.

7) If the foregoing procedures are not strictly followed, you will get a lot of "internal errors". A program follows:

```
1 ^PROGRAM TO DEMONSTRATE LOGICAL RECORD LENGTH RECORDS
5 CLEAR 2000
10 F$="TEST1"
20 LRL=213 ^SET UP LRL
30 OPEN"R",1,F$,LRL
40 FIELD 1,(LRL)ASA$ ^SET UP FIELD
50 FOR I=19 TO 1 STEP -1 ^MAKE SURE WE HAVE ENOUGH SPACE
55 GET 1,I ^MUST SPECIFY LR#
60 LSET A$=STRING$(LRL,CHR$(I+32)) ^ GENERATE DATA
65 OUT 1,I ^MUST SPECIFY LR#
70 NEXT I
80 CLOSE 1 ^MUST SPECIFY BUFFER#
90 OPEN"R",1,F$,LRL ^MUST SPECIFY THE SAME LRL
100 FIELD 1,(LRL)AS A$
110 FOR I=1 TO LOF(1)
120 GET 1,I ^MUST SPECIFY LR#
140 PRINT A$
150 INPUT Y$ ^PAUSE
160 NEXT I
170 CLOSE 1
180 END
```

Note: after running the program, print out the resulting data file from DOS to see the sector spanning. If you are writing to a file opened as a logical file and you write 20 records and then close the file, the highest record is not recoverable. This is probably the fault of the DOS-Basic interface. To overcome this problem, always make sure that the file is 1 record larger than you intend to use.

(Above thanks to Alan Abrahamson, Editor, Fairfield County TRS-80 User's Group, 10 Richlee Road, Norwalk, CT 06851.)

## **MOD II ADVENTURES**

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## BEGINNER'S CORNER

### EXPLORING THE RAM

by

A. DOUGLAS WERBECK

Here we are at gathering #3, our Turkey Season Beginner's Corner! Last column we discussed the ROM and RAM memory contained in your keyboard. We studied the system used for numbering the individual byte locations. To refresh the human memory, we found the factory installed ROM bytes to reside in locations 0 to 16383. RAM memory locations start at 16384, but the first group of RAM bytes are reserved for use by the ROM as a workbench area for calculations and storage. Our user available RAM for program storage starts at location 17128.

For this issue we promised some serious RAM exploration and that you will get! RAM bytes are "empty" when the computer is turned on, and they wait for you, the user, to load in a number which will represent (in code) an instruction for the computer's microprocessor (called a Z-80). Ever wonder where the "80" came from in TRS (Tandy Radio Shack) 80? As mentioned in previous columns, all references will be to the TRS-80 Model I, Level II 16K systems since it is the most commonly owned system by readers.

In Level II BASIC we have a real nifty special function command (see page 8/5 of the BASIC Reference Manual) called "PEEK." PEEK allows you to name a specific byte location in memory and have the number being stored there displayed on the video screen. Since our program starts at location 17128 I have put together a short program that examines byte locations beginning at the first line of the program itself! Type in the following program and make sure to observe all the spacing and do not forget the comma at the end of line 40.

```
10 PRINT "HELLO!"
20 A = 17128
30 FOR B = 1 TO 16
40 PRINT "LOCATION"; A;"HOLDS # ";PEEK(A),
50 A = A + 1
60 NEXT B
70 END
```

Now you can RUN it. As you see, it simply begins by printing a HELLO! and then goes on to the memory exploration section. On the screen you see all the memory locations that are being used to store line 10 and only line 10. The same pattern we are about to study will be used over and over again by the computer to store each of the remaining lines of the program.

1st byte of RAM will always be the line introduction 0. I have also included in this display, the line introduction 0 for line 20 of the

program, see it at 17143?

2nd and 3rd bytes of program line RAM.... these are a little tricky. This following explanation would apply to the beginning of any line of the program, starting with the first byte of a line, the 0. After the 0, the next two bytes, in the case of our program here, bytes 17129 and 17130, will contain a coded number that will point to where the following line of our program (line 20) begins, in our case, location 17144. To crack this far-out code, take the number stored at the 3rd byte position (66) and multiply it by the magic number 256. Then, go back and get the number stored at the 2nd byte position (248) and add it to the above. Worked out:  $66 \times 256 = 16896 + 248$  which equals, PRESTO, 17144!

4th byte is current line number, here, 10.

5th byte is a 0 representing a space.

6th byte - take a look at the number.... if it is between 32 and 127 it will be a single keyboard character called an ASCII (as-key) character. At this point why not open your BASIC Reference Manual to page C/2 in the back of the book. Here you will see the ASCII code numbers and what they represent. If the 6th byte number is between 128 and 250 it is a shorthand command word which causes the computer to go do a task such as LIST, GOTO, LPRINT or COS (perform the mathematical calculation to determine an angle's cosine.)

7th byte and thereafter is the rest of the program line.

Let's take a look at how the program works:

1. Line 10 is encountered and the computer faithfully obeys and prints HELLO!

2. Line 20 sets the variable A to have the value of 17128.

3. Line 30 starts a programming technique called a loop. It is a very common programming practice consisting of two parts, each part being a separate program statement, generally each statement having its own line. And, most times you will find other program lines between the two loop lines. Line 30 is saying that B will equal numbers 1 to 16, starting with B = 1. The second part of the loop statement is a NEXT statement, here found on line 60. This 2nd line of the loop, NEXT B will bounce the computer back to the first line of the loop, line 30, for as many times as the first line of the loop specifies, in this case, 16 times. After the loop has executed lines, 30, 40, 50, 60 and back to 30 16 times the loop will "open" and allow the computer to go on to the next program line outside and following the loop, in this case line 70, which ENDS the program.

Each time the computer executes line 40 it will print our memory exploration instructions. This tells the computer, using the PEEK command,

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to print whatever number is being stored at the location that A happens to stand for at that pass of the loop.

During the first loop the value of A is still 17128, as set by line number 20. After the first screen printout of location 17128, line 50 makes A equal to A + 1, or 17129. On the second pass of the loop A will equal 17130 and so on, all the way up until the loop exhausts itself, leaving A, at that time equal to 17143.

Ok, now let's take a look at the program's line 10 and what was found in the first 16 RAM addresses:

```
1 0 P R I N T " H E L L O ! "
```

We find that all the numbers held at addresses 17129 to 17142 are in the 32-127 range making them keyboard ASCII characters, except for location 17133 which holds the number 178 making it a shorthand command code. 178 stands for PRINT. These shorthand codes are stored in ROM locations 5712 to 6175. These shorthand command codes are not listed in the BASIC Reference Manual. If you would like to see the full set of shorthand codes held in the ROM, I have worked up a short program that will dig into the ROM of your keyboard and place the decoded information on your video. Of course, if you have a printer you can just change all the PRINT statements in the following program to LPRINT statements (lines 20, 60 and 70) and you will get a neat listing on paper.

```
10 C = 5712 : D = 128
20 PRINT "SHORTHAND CODE #";D" IS ";
30 E = PEEK(C)
40 IF E > 128 then L = E -128 ELSE L = E
50 IF PEEK (C+1) > 128 THEN 70
60 PRINT CHR$(L);" "; : C = C + 1 : GOTO 30
70 PRINT CHR$(L) : D = D + 1 : IF D = 251 END ELSE C = C + 1 : GOTO 20
```

If you are not using a printer and the screen scrolling is making you crazy, don't forget about the little trick to freeze the screen described on page 2/6 of the Reference Manual.

If I have intrigued you in this RAM exploration why not take a step off on your own and change the loop counter in the first program to 25 or 50! Then the program will go on past line 10 and look at the remainder of itself, lines 20 through 70! Remember that storage pattern is repeated over and over, line begins with a 0 and then the coded next line location pointers and so on. To get the original program to output onto your printer (since if you increase the loop counter you will be reading more locations that the screen can hold) you can change line 40 to:

```
40 LPRINT "LOCATION ";A;"HOLDS # ";PEEK(A)
```

Note that we omitted the ending comma.

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I ran out of space in this issue to get into "Keyboard Thunder and Lightning," but promise it for next issue.

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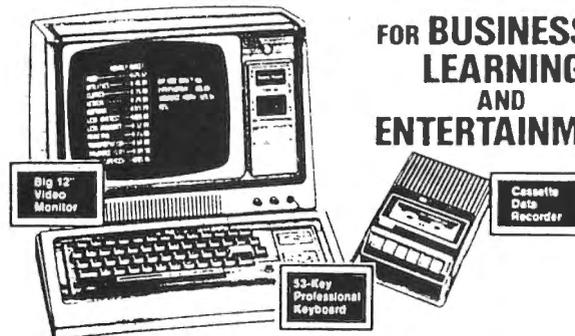
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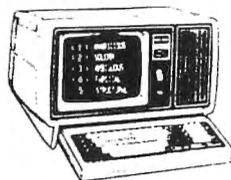


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## QUESTIONS AND ANSWERS

Conducted by Hubert S. Howe, Jr.

**QUESTION** from Thomas A. Primosch, 11247 Park Street, Cerritos, CA 90701:  
I have a 48K Level II system with one disk drive. I also have and occasionally use one of the earlier models of the CTR-80 cassette recorder. I am unable to "CLOAD" tapes using RS's DOS 2.3. The programs will load with the Expansion Interface on or off. I realize that the most critical concern is the volume setting on the cassette recorder. I have spent many hours experimenting with this setting and have concluded that the resolution to my problem is not the volume setting.

### ANSWER

It sounds very much as if the problem is that you have forgotten to disable interrupts by the CMD"T" command, which must be done before you type CLOAD (or SYSTEM for machine language tapes). There is nothing else in the DOS that should interfere with the operation of the cassette.

**QUESTION** from John Wilson, c/o David Wilson, RR #1, Lindsay, Ontario K9V 4R1: I am looking for a way to find a random number and store it in the accumulator. This must all be done in machine language. The possible values of the random number do not matter.

### ANSWER

There are two random number functions contained in the Level II ROM: the RND(0) function, where the result is a single precision number between 0 and 1, and the RND(J) function, where J is a nonzero integer between 1 (one) and J, inclusive.

To call the RND(0) function, CALL 14FOH (no input variable is necessary). The result (in single precision format) is stored in locations 4121H - 4124H.

To call the RND(J) function, load the value of J into the HL register pair. Then CALL 14CCH and CALL 0A7FH. The result (in integer format) is stored in both the HL register pair and in locations 4121H and 4122H. (The CALL to 0A7FH converts the single precision result to an integer.)

This and much more helpful information is contained in the book Inside Level II: A Programmer's Guide to the TRS-80 ROMS by John Blatner and Bryan Mumford, published by Mumford Micro Systems, Box 435, Summerland, CA 93067, telephone (805) 969-4557.

**QUESTION** from Russell Marzolf, 1012 Nutwood, Fullerton, CA 92631:  
I read my latest issue of COMPUTRONICS (issue 25) and came across one of the "letters to the Editor" entitled USE OF TRSDOS. The letter was about embedding hidden "signatures" on a disk. Can you tell me what the code is

and how this is done? (a hint maybe?!). I have NEWDOS+ and a beginning knowledge of machine language -- both of which have gotten me nowhere!

## ANSWER

There are two kinds of hidden "signatures" on disks. (These are on system disks only, and would not exist on data disks unless you put them into your own files.) The first is in the "BOOT" file, where a copyright message will be displayed if you type the unlikely sequence "BOOT/SYS.WHO" and simultaneously hold down the "2" and "6" keys while waiting for it to be displayed. This must have been some kind of joke played on Radio Shack by Randolph Cook, the original author of TRSDOS, who put in a "secret" message that says that the system belongs to him rather than Radio Shack. This was the subject of the letter in the previous issue. For Radio Shack, it was fortunate that "Randy Cook" and "Tandy Corp" have the same number and so many of the same letters.

The other kind of hidden "signatures" occur at the beginnings of system files (those named "SYS1.SYS", etc.). These are simply copyright notices that are physically in the files but are not read into memory because they are preceded by a special code. You can see these messages by using the excellent SUPERZAP program on your NEWDOS+ diskette. Just look at the beginning of track 0, sector 5 and you'll see an example.

Got a question about the TRS-80? Send it to **QUESTIONS**, H & E COMPUTRONICS, 50 North Pascack Road, Spring Valley, New York 10977. If you wish a personal reply, please enclose a self-addressed, stamped envelope. Representative questions will be answered each month.

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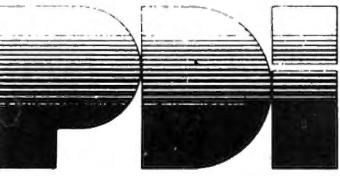
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- FEATURES:**
- 1 Up to ten user defined fields or categories
  - 2 Up to 40 characters per field
  - 3 Up to 200 characters total per record
  - 4 Handles disk or cassette files
  - 5 Programmable printouts for rolodex cards, mailing labels, etc.
  - 6 Will identify all records that contain a group of characters you've entered even if that group is in the middle of a line
  - 7 Sort data base by any field

**INFORMATION SYSTEM (TAPE) \$39.50**  
**INFORMATION SYSTEM (DISK) \$49.95**

### DATA MANAGER

**HARDWARE REQUIREMENTS:** 32K and one (1) Disk Drive

**SOFTWARE REQUIREMENTS:** TRSDOS 2.3

**SUPPORTS:** Printer (parallel or serial), up to four (4) Disk Drives, 48K of memory

**PURPOSE:** Data base manager (disk based). Similar to Information System.

**USES:** Medium sized mail list, inventories, personnel records, sale prospects, etc.

- FEATURES:**
- 1 Uses up to four disk drives on line as memory, or as much as 320K of memory storage.
  - 2 Up to ten user defined fields
  - 3 Up to 40 characters per field
  - 4 Up to 255 characters total per record.
  - 5 Programmable printouts for rolodex cards, etc.
  - 6 Will identify all records that contain a group of characters you've entered even if that group is in the middle of a line
  - 7 Sort data base by any field
  - 8 Maintain up to 5 changeable presorted "key" files.
  - 9 Accepts Information System files
  - 10 Variable length random records, the smaller the record you define, the more records you can store.

**DATA MANAGER \$74.95**

### BUSINESS MAIL SYSTEM

**HARDWARE REQUIREMENTS:** 32K and two (2) Disk Drives

**SOFTWARE REQUIREMENTS:** TRSDOS 2.2 or 2.3

**SUPPORTS:** Printer (parallel or serial), two (2) Disk Drives, 48K

**PURPOSE:** To handle large mailing lists, (up to 150,000 names)

- FEATURES:**
- 1 Supports 3 or 4 line addresses
  - 2 Alternate Last Name/First Name with Company/Attention by pressing shift/@
  - 3 29 characters for each Name field and Address line, 11 characters for City, 6 for State or Country, 9 for ZIP Code, 10 for Phone Number
  - 4 Three (3) Numeric code fields of 4 digits each and one Alpha code field of 3 characters.
  - 5 Files automatically in zip code order, alphabetical within zip code. Only sort mode available (in machine language).
  - 6 Handles up to 150,000 names by bumping and moving files to new data disks. For instance, using two (2) disk drives, you may have one file with 30 diskettes.
  - 7 Programmable label formatting for 1 to 4 up labels with input for spaces between labels.
  - 8 Printout of records selectable by any of ten simultaneous search parameters.
  - 9 Supports abbreviated or full listing printouts of data file or a screen summary listing.
  - 10 List editing enabling you to predefine up to 99 items for editing in one session.
  - 11 Supports quick disk location of single or multiple names.
  - 12 Program has been designed with the aid of a professional mailing list company. Meets all industry standards.

**BUSINESS MAIL SYSTEM \$150.00**

### TEXT MERGE

**HARDWARE REQUIREMENTS:** 32K, one (1) Disk Drive and printer.

**SOFTWARE REQUIREMENTS:** TRSDOS 2.2 or 2.3, Electric Pencil and Data Manager, Info System or Business Mail System. Program will support Radio Shack's word processing program when available.

**SUPPORTS:** 48K, four (4) Disk Drives, Line or Serial Printer.

**PURPOSE:** Merge data files from Information System, Data Manager or Business Mail System with files created by the Electric Pencil from Michael Shroyer.

**USES:** Creates large number of personalized "form" letters, contracts, statements, etc., automatically

### FEATURES:

- 1 Define in your Electric Pencil File where you want data to be inserted
- 2 Coding of text is simple. Just enter the field name with a shift/up arrow before and after and data from that field will be inserted in its place
- 3 Search for every occurrence of a group of characters (even within a line)
- 4 Multiple parameters of search. You can find all the people with the name "Smith" within a certain zip code range and having phone numbers beginning with numbers between 993 and 995
- 5 Set left, top, and bottom margins, number of characters per line, number of spaces between line, right justification, block indentation
- 6 Paging operations include ability to place page number anywhere on page with note attached, such as "XYZ REPORT-1"
- 7 Review your paging configuration anytime
- 8 Save and reuse the printout configuration you create

**TEXT MERGE \$49.50**

### ANALYSIS PAD

**HARDWARE REQUIREMENTS:** 48K and one (1) Disk Drive

**SOFTWARE REQUIREMENTS:** TRSDOS 2.2 or 2.3

**SUPPORTS:** Printer (parallel or serial), four (4) Disk Drives

**PURPOSE:** Columnar Calculator

**USES:** Financial Analysis, Line Item Budgeting, Cost Analysis, Sales Analysis, almost any financial function and some statistical functions

- FEATURES:**
- 1 Create matrixes of 29\*39
  - 2 Enter your own labels for columns and rows
  - 3 Enter the number of decimal points, (0-4)
  - 4 Make all your entries at one time either by row or column
  - 5 Add, delete, move or swap columns or rows
  - 6 Edit any data from full screen display
  - 7 Add, subtract, multiply and divide one column by another and put results in designated column. Up to six calculations can be made and placed in designated column
  - 8 Define columns as constants and avoid repetitious entries
  - 9 Define all calculations in advance and save them on disk
  - 10 Three levels of subtotals are supported
  - 11 Zero out meaningless totals for columns that are constants, percentages, etc
  - 12 Strip out relevant data from previous pads to create new pads, i.e. labels, row totals, column totals
  - 13 Resulting pads can be printed out in four column segments producing excellent looking reports

**ANALYSIS PADS \$99.95**

### CHECK REGISTER

#### ACCOUNTING SYSTEM

**HARDWARE REQUIREMENTS:** 32K, two (2) Disk Drives, and printer

**SOFTWARE REQUIREMENTS:** TRSDOS 2.2 or 2.3

**SUPPORTS:** 48K of memory, Printer (parallel or serial)

**PURPOSE:** Check Register Accounting

- FEATURES:**
- 1 Set and define up to 60 accounts with as many income accounts as you choose
  - 2 Complete checkbook balancing and reconciliation
  - 3 Single entry input where transaction can be dispersed over several accounts
  - 4 Enables user to make a 64-character note on each transaction
  - 5 Print out your own checks after data entry.
  - 6 Printed monthly summaries of each account with month and year-to-date totals
  - 7 Create a suspense file to remind you of coming expenses

**REPORTS GENERATED:**

- 1 Check Register for any month
- 2 Notes to Check Register
- 3 Income/Expense Distribution report.
- 4 Statement of Selected Accounts.
- 5 Bank Reconcile Statement.
- 6 Suspense File
- 7 Full Account Distribution Statement.

**CHECK REGISTER ACCOUNTING SYSTEM \$74.95**

### CHECKBOOK II

**HARDWARE REQUIREMENTS:** Cassette Based, 16K Level II, Disk Based, 32K and one (1) Disk Drive

**SOFTWARE REQUIREMENTS:** For Disk, TRSDOS 2.2 or 2.3

**SUPPORTS:** Parallel Printer, Disk files on tape version.

**PURPOSE:** Checkbook balancing and reconciliation.

- FEATURES:**
- 1 Five column keyboard input with 5 characters for check number, 16 for payee, 4 for code and will handle amounts up to \$100,000.
  - 2 Complete editing mode allowing changes in any or all columns plus a deletion module.
  - 3 Graphic listing of all checks in memory starting at any given check number.
  - 4 Checkbook balancing with balance brought forward always in memory and saved to tape

Note:

THE BOTTOM SHELF HAS REMOVED ALL SECURITY FROM DISK PROGRAMS. NOW YOU CAN LIST AND BACKUP ALL BOTTOM SHELF PROGRAMS.

- or disk
- 5 Handles balances up to \$1,000,000
  - 6 Bank reconcile with listing of all outstanding checks. Cleared checks are deleted from file if checkbook balances
  - 7 Search and total from all checks in memory or an entire month by all fields but amount.
  8. Numeric sort routine. Automatic after keyboard entry
  - 9 Files can be saved to tape or disk from any given check number. You don't have to save the entire file
  - 10 16K tape holds 75 transactions, 32K tape holds 350, 32K disk holds 150 at one time

**CHECKBOOK II (TAPE) \$39.50**  
**CHECKBOOK II (DISK) \$49.50**

### SYSTEM DOCTOR

**HARDWARE REQUIREMENTS:** Cassette Based, 16K Level II, Disk Based, 32K and one (1) Disk Drive

**SOFTWARE REQUIREMENTS:** For Disk, TRSDOS 2.2 or 2.3

**SUPPORTS:** Printer (parallel), four (4) Disk Drives, 48K memory

**PURPOSE:** Complete diagnostic check of entire computer system

- FEATURES:**
- 1 Checks the ROM to ensure that every bit is functional
  - 2 Checks the RAM six different ways to ensure that all memory locations are functional
  - 3 Checks all disk drives in a variety of ways to ensure reliability
  - 4 Checks the video memory and display
  - 5 Checks the cassette recorder for speed, distortion and volume control
  - 6 Checks the line printer for all ASCII characters
  - 7 Does a complete automatic check (12 hrs.) of the entire system, sending results to printer, screen, cassette or disk
  - 8 Disk Head Cleaner program included. Cleaning cards can be obtained free from TBS (one time only).

**SYSTEM DOCTOR (TAPE) \$28.50**  
**SYSTEM DOCTOR (DISK) \$38.50**

### LINE PRINTER

**HARDWARE REQUIREMENTS:** 32K one (1) Disk Drive, Line Printer

**SOFTWARE REQUIREMENTS:** TRSDOS 2.2 or 2.3

**SUPPORTS:** Buffered parallel or port line printers 48K of memory

**PURPOSE:** To accelerate the speed of BASIC programs using LPRINT statements as well as providing user convenience in operating the printer.

**USERS:** Forms control, enhancement of BASIC programs, easing of Basic program development

- FEATURES:**
- 1 Set the number of characters per line, the number of lines per page, the spaces between lines, the left, top and bottom margins
  - 2 Insert page numbers starting at any page number placed anywhere on the first line
  - 3 LLIST your programs and have multiple statement lines printed out with one statement per line
  - 4 Set aside up to 16K of memory as buffer enabling the computer to printout as a background task
  - 5 Program is resident in high memory and interfaces with most BASIC programs. Easily accessed by hitting shift/down arrow.
  - 6 Print out whatever is on the screen by hitting shift/break

**LINE PRINTER \$49.50**

### BASIC TOOLKIT

**HARDWARE REQUIREMENTS:** Cassette Based, 16K Level; Disk Based, 32K and one (1) Disk Drive

**SOFTWARE REQUIREMENTS:** For Disk, TRSDOS 2.2 or 2.3

**SUPPORTS:** 48K of memory, Line Printer (parallel) Disk Drive

**PURPOSE:** To aid the programmer in the development of BASIC programs

- FEATURES:**
- 1 Search a BASIC program, and print out to screen or printer, an alphabetized listing of the variables used in the program and the line numbers in which they are found
  - 2 Search and print to screen or printer, a listing of all GOTTOs and GOSUBs and the line numbers in which they appear
  - 3 Restore BASIC programs that have been accidentally lost by typing NEW or going to DOS.
  - 4 Will check bad memory in 15 seconds.
  - 5 Will merge programs on a cassette based system and will merge disk programs without saving them in ASCII.
  - 6 Will search memory for all occurrences of any specific two-byte combination and list the locations where it appeared
  - 7 Program is resident in high memory and is easily accessed at any time by hitting shift/break

**BASIC TOOLKIT (TAPE) \$19.90**  
**BASIC TOOLKIT (DISK) \$29.90**

### LIBRARY 100

**HARDWARE REQUIREMENTS:** 4K Level II cassette

**SUPPORTS:** 16K (some programs require this memory)

**PURPOSE:** To provide a basic computer library of 100 programs on a broad range of topics

**USES:** Finance, Education, Graphics, Home Use, Games

**PROGRAMS INCLUDED:**

- 1 FINANCE Present Value of Future Sum, Simple Interest for Days Future Value of Present Sum, Amortization Schedule, Interest Rate-Instalment Loan, Days Between Dates, Term of Instalment Loan, Present Value of Series of Payments, Real Estate Investment Analysis, Nominal-Effective Interest, Internal Rate of Return, Future Value of Regular Deposits, Regular Deposits for Future Value, Depreciation (Amount, Rate, Salvage Value, Schedule), Bond Present Value, Bond Yield to Maturity, Sale-Cost-Margin-Day of Week, Moving Ad
- 2 EDUCATION Multiplication & Division, Addition, Subtraction, Fraction & Decimal, States and Capitals, States and Order of Entry, States and Date of Entry, States and Abbreviations, Inventors and Inventions, World Capitals & Countries, Urban Areas and Population, Authors & Books, Presidents and Order, States & Largest City, Base Numbers, Tiny Pilot
- 3 GRAPHICS Front Cover, Weird, Rat Race Random Ad, Fireside, Left-Right Ad, Blocks, Herring, Launch, Blinker, Snoopy, Snow Step Ad, Step Ad Two, Graphic Words, War Games
- 4 HOME Bartender, Nutrition, Conversion, Perpetual Calendar, Base Conversion, Calculator, Vacation Check-off List, Expense Account, Babysitter, Drunkometer, Remember, Christmas List, Mileage, Telecode
- 5 GAMES Jumble, Search, Memory Quiz Letters, Sting Ray, Russian Roulette, Wheel of Fortune, Towers, Decision, Memory Quiz Numbers, Doomsday, Star Trek Sketch, Flipper, Life, Fifteen, Speedy, Count, Road Race, Stars, Odd One, Spy Ship, Horse Race Scissors, Craps, Star Blazer, Tiger Shark, Unjumble, Mind Reader, Roach Race, Jumble 2, Gypsy

**LIBRARY 100 \$49.50**

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(2) **GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL, INVOICING AND PAYROLL** (Small Business Systems Group)...an extensive business system for the serious user...can be used one module at a time or as a coordinated system...\$225...per module...\$1299 for the complete system.

(3) **GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL AND PAYROLL** (Compumax)...a complete user oriented business system...can be used one module at a time or as a coordinated system...\$140 per module...\$995 for the complete system.

(4) **MOD-II UTILITY PACKAGE** (Racet Computes)... adds important utilities to TRSDOS...copy files selectively...faster and more accurate file copying... repair bad directories...displays sorted directory of all files on 1 to 4 disk drives...SUPERZAP...change disk ID...and more...\$150.

(5) **ADVENTURE #1-#9** (Scott Adams - Adventure International)...a series of games formally only available on the large computers...your goal is to work your way through a maze of obstacles in order to recover a secret treasure or complete a mission...the package includes all 9 Adventures written by Scott Adams...\$99.95.

(6) **GSF** (Racet Computes)...Generalized Subroutine Facility...a series of super fast machine language utilities that can be called from a BASIC program (no machine language knowledge required)...sorts 1000 items in under 5 seconds...allows PEEK and POKE statements...move data blocks...compress and uncompress data...works under TRSDOS...\$50.

(7) **DSM** (Racet Computes)...Disk Sort Merge...sorts and merges large multiple diskette files on a 1 to 4 drive system...NOT AN IN MEMORY SORT...can actually alphabetize (or any other type of sort) 4 disk drives worth of data...sorts one complete disk of information in 10 minutes...information is provided to use DSM with the RS MAILING PROGRAM...works under TRSDOS...\$150.

(8) **RSM** (Small Systems Software)...a machine language monitor and disassembler...can be used to see and modify memory or disk sectors...contains all the commands found on the Model-I version plus some additional commands for the MOD-II...works under TRSDOS...\$39.95.

(9) **BLINK BASIC LINK FACILITY** (Racet Computes)... Link from one BASIC program to another saving all variables...chain programs without losing variables...\$50.

(10) **BASIC CROSS REFERENCE UTILITY** (Racet Computes)...lists all variables and strings used in a program (with the line numbers in which they appear)...lists all GOTO's and GOSUB's (with the line numbers in which they appear)...searches for any specific variables or strings (with the line number in which they appear)...\$50.

(11) **DEVELOPMENT PACKAGE** (Racet Computes)... SUPERZAP (to see, print or change any byte on a diskette)...Disassembler and MOD-II interface to the

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(20) **EDITOR ASSEMBLER** (Galactic Software Ltd.)... the first user oriented Editor Assembler for the MODEL II and was designed to utilize all the features of the MODEL II. It includes innovative features for ease of coding and debugging and complete documentation (over 120 pages)...works under TRSDOS...\$229.00.

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(22) **MAIL/FILE SYSTEM** from Galactic Software Ltd. stores 2,500 names per disk. No sorting time is required since the file is automatically sorted by first and last name plus Zip Code on input. Retrieve by any combination of 19 user codes. Supports an 11 digit alphanumeric Zip. Supports a message file. Comes complete with user-oriented documentation (100-page manual). Allows for company name and individual of a company and complete phone number (and extension)...works under TRSDOS...\$199.00.

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(2) **CP/M HANDBOOK**... (Sybex)...a step-by-step guide to CP/M...takes the reader through each of the CP/M commands...numerous sample programs... practical hints...reference tables...\$13.95.

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