DECEMBER 1978

$1.50

SoftSide™

"your BASIC software magazine"

SANTA PARAVIA EN FIUMACCIO

MICRO TEXT EDITOR

This program makes text composition and editing on the TRS-80 a breeze. It features a non-destructible cursor, versatile editing options, graphics capability, and interfaces with cassette tape or either TRS-80 printer. Commands include:

DELETE	Deletes one or any number of spaces
INSERT	Inserts one of any number of characters into existing text
ASCII CODE	Allows insertion of any character or graphic character into the text
REPEAT	Allows any character to be printed repeatedly in the text
PRINT	Contents of screen will be copied onto TRS-80 line printer
SAVE	Contents of screen will be saved on the cassette tape
LOAD	Allows date on tape to be reloaded onto the screen
CLEAR	Clears the screen and moves cursor to starting position
END	Clears end-of-text of trailing blanks

MICRO TEXT EDITER

Available on Digital Cassette for Level II 4K or 16K — $9.95

TRS-80 Software Exchange

17 Briar Cliff Drive

Milford, New Hampshire 03055

SoftSide™

December 1978

"your BASIC software magazine"

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For uniformity, we have adopted the Radio Shack TRS-80 Level II BASIC as the BASIC dialect used within the pages of this magazine. It was chosen because it stands to become the most commonly used dialect among microcomputer users and because it shares a common heritage with the many microcomputer languages produced by Microsoft.

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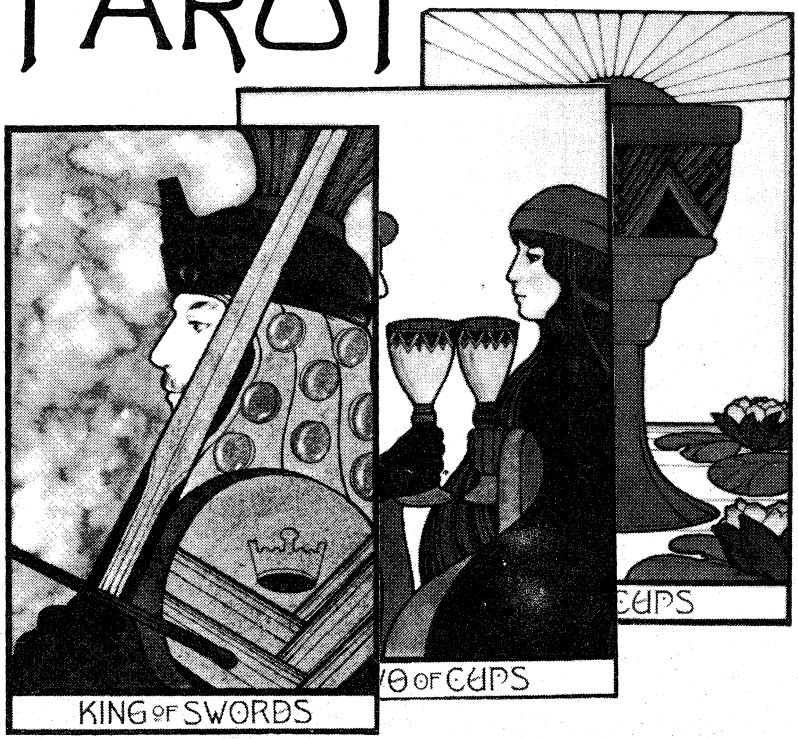
The game of life.

The word "game" conjures up a wide variety of images from one person to another. Were you to ask ten different people what games mean to them, you shouldn't be surprised at receiving ten different answers. According to Webster's, games are amusement or diversion, a scheme or project, even a profession, or line of work. The truth is that games of varying natures and purposes are so much a part of all of our lives, that in the broadest sense of the term, they are the very fabric of life itself. When we see children tossing rocks on a neatly chalked hopscotch court, we know that they're playing a game, but what are the men with notepads doing, as they hover around a two million dollar flight simulator ? You guessed it, they're playing the "game" for all it's worth.

Some games allow us to put ourselves in situations that would be impossible for us to experience outside their own rigidly defined world. Businessmen have been wheeling and dealing in millions of dollars for decades, while others have sat and played Monopoly. Of course, games like Monopoly can only approximate those subjects which they represent. But considering the stakes, how many of us would be willing to play the "real game", using the "real gamepieces" — "real dollars" ?

TAROT



Since the dawn of civilization man has sought a better explanation of the mysterious forces that seem to govern our lives. Learn the secrets of ancient Egypt. Benefit from the special knowledge once reserved for High Priests and Conquering Kings. Or better yet, if you don't believe in any of that, just bring it out the next time someone you know says, "Gee, it's a nice-looking computer. What does it do?"

Available on prerecorded Audio Cassette for the Level I or II 16K TRS-80 Microcomputer — $9.95

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With the advent of computers, and the software to run them, games are reaching new levels of sophistication. The businessman improves his game by using his computer to perform a "Break-Even Analysis". The hobbyist can use his computer to figure his tax return, take a peek into the future, or as in the case of this month's feature program Santa Paravia en Fiumaccio, to look into the past.

Santa Paravia is an economic capsule simulation of life in a 15th century Italian city-state, and as with anything but the "real game", it can only be a shadow of that situation which it portrays. In feudal times, serfs and nobility, woolen mills, outrageous justice, and rats eating grain reserves were more than just words on a computer screen, more than just a "game". For the inhabitants of Santa Paravia, it was the only game in town — the "game of life" — if you will.

We hope you enjoy Santa Paravia, and we hope you gain some insight as to what life in those times might have been like. And, as you're playing, imagine a time maybe 100 years into the future, when advanced technology is capable of producing games so lifelike and so accurate in detail that they become increasingly difficult to distinguish from the real thing. What will they think of our "games" ? It's something to think about.

Now, if you'll excuse me, I've got work to do.

Season's Greetings

and Best Wishes for the New Year from everyone at SoftSide™

```
50 REM CHRISTMAS GRAPHIC
100 CLS
110 SET(55,13):SET(56,12):SET(57,11)
120 FORX=58TO64STEP2
130 Y=(78-X)/2
140 SET(X,Y):SET(X+1,Y)
150 NEXTX
160 FORX=66TO74
170 SET(X,6):NEXTX
175 SET(74,7):SET(75,7)
180 SET(76,7):SET(75,8):SET(76,8)
190 FORX=74TO77:FORY=9TO10:SET(X,Y)
200 NEXTY:NEXTX
210 SET(70,7):SET(71,7):SET(69,8)
220 FORX=68TO72:SET(X,X-59)
230 NEXTX
240 FORX=54TO73:SET(X,14):SET(X,15)
250 NEXTX:FORY=16TO19:SET(56,Y)
255 SET(71,Y):NEXTY
260 SET(58,17):SET(59,17)
270 SET(68,17):SET(69,17):SET(63,18)
280 SET(64,18):FORX=53TO74:SET(X,20)
290 NEXTX
300 FORX=57TO70:FORY=21TO25:SET(X,Y)
310 NEXTY:NEXTX
320 FORX=59TO68:SET(X,26):NEXTX
330 FORX=61TO66:SET(X,27):NEXTX
340 SET(63,28):SET(64,28)
345 FORT=1TO1000:NEXTT
350 SET(73,22):SET(74,23):SET(75,23)
360 SET(75,22):SET(76,21):SET(77,20)
370 SET(77,19):SET(77,18):SET(78,17)
375 SET(78,17)
380 FORX=79TO97:SET(X,16):NEXTX
390 SET(98,17):SET(99,18)
395 SET(99,19):SET(98,20)
400 FORX=97TO79STEP-1
410 SET(X,21):NEXTX:SET(78,22)
420 SET(77,23):SET(76,23):SET(75,23)
425 FORZ=424TO430STEP3
430 RESET(63,21):RESET(64,21):RESET(62,21)
440 RESET(65,21):PRINT@Z,"HO";
450 FORT=1TO180:NEXTT
460 SET(65,21):SET(62,21):SET(64,21)
470 SET(63,21):FORT=1TO70:NEXTT
480 NEXTZ
490 FORT=1TO500:NEXTT:
    PRINT@424,"          ";
500 FORT=1TO500:NEXTT:GOTO425
1000 INPUT"ANY";A:LPRINT" ":GOTO1000
```

SPECIAL THANKS to Santa's designer:
FREDERICK CRANE
Iowa City, Iowa

Santa Paravia en Fiumaccio

by Rev. George Blank

SANTA PARAVIA AND FIUMACCIO is a game for one to six players where the object is to build your tiny Italian state into a kingdom. Scoring is accomplished by promotion to higher titles of nobility: Sir, Baron, Count, Marquis, Duke, Grand Duke, Prince, and King for men, with corresponding titles for women. If anyone becomes a king or queen, the game is over, and they win. However, life for many was often fleeting in the Fifteenth Century, so death can end even the most promising career. If all players die before anyone becomes king or queen, the first player to reach the highest rank obtained wins. If only one person plays, the attempt is to be crowned before death.

There are four levels of difficulty: Apprentice, Journeyman, Master, and Grand Master. The only difference is that the titles are more difficult to earn. Since life expectancy is the same (20 to 25 years after beginning to rule), the advanced games are definitely harder.

Players alternate turns, with each full turn representing one year of play. Each turn consists of four phases: 1. Harvest Phase 2. Tax Phase 3. Map Phase and 4. Public Works Phase.

HARVEST PHASE

Rats may eat from one to fifty percent of your grain reserves during the winter.

HELP WANTED: Progressive-thinking Italian city-state looking for strong leadership. Must have the cunning of a Machiavelli, instincts of a Borgia, and endurance of Attila the Hun. We guarantee to turn ability into nobility. Apply across from Town Hall.

Weather ranges from drought to excellent, and each field in production produces from one half to four and one half steres of grain per hectare, depending on the weather. To put 10 hectares of land into production requires two serfs (not including any working in the woolen mills) and five steres of grain.

The Grain Steward reports the **Harvest** for the year, the grain **Demand** (the minimum amount to feed your people without some starvation) and the market price of grain and land, which varies with the weather, the ratio of the Harvest to the Demand, and at random. At this time you may **buy grain, sell grain, buy land,** or **sell land**. You can buy and sell to make your state grow and meet its needs, or you may speculate: buying when prices are low and selling when prices are high. Fortunes have been made (and lost!) by speculating. After you have made your deals, type 0 to continue.

How much grain will you release for consumption? the computer will ask. You must release at least 20 percent of your reserves, and you may not release more than 80 percent. If you release more than the Demand, most of the time your population will grow , more or less in proportion to the surplus. If you release less, you will have a high death rate as many of your serfs suffer from malnutrition. Only the

serfs are announced, but food distribution affects all classes of the society, and the growth of your economy as well. Substantial grain surpluses (35 percent or more) lead to in-migration as serfs come to serve you instead of more parsimonious lords.

At the end of the Harvest Phase, the computer calculates the changes in your population during the year, calculates your rents (at 75 Florins per market) and profits (at a fluctuating rate per mill), and pays your soldiers (3 Florins per year each). The computer also checks to see if you have enough soldiers to defend your land. If you have at least one soldier per 500 hectares, you are safe. If you have less than one soldier per 1000 hectares, you will be invaded. If you have between one soldier per 500 hectares and one soldier per 1000 hectarees, you are safe unless one of the other players has about 2 and a half times as many soldiers as you have. An invasion is a real disaster, so keep your defenses up!

THE TAX PHASE

CUSTOMS DUTY, SALES TAX, and **WEALTH** (or income) **TAX** rates are set by you up to the maximum the computer will accept. The taxes are interrelated, and raising one may decrease the yield from the others, sometimes by more than the amount raised. The taxes are based on many different factors, and a good tax policy at one stage of the game may be a poor one a few moves later. Your tax rates also affect your economic growth. If taxes are too high, merchants will move away, trade will collapse, and people will find ways to avoid their taxes. At the same time, tax money is a prime source for income to build the economy through public works projects. It is your job to find the right tax level.

JUSTICE ranges from very fair (and that kind of justice costs money but is marvelous for the economy) to outrageous (the taking of bribes, or selling justice to the highest bidder). You decide how much justice you need. Sometimes taking bribes generates much-needed income, especially when there is a famine and you are broke. But if your instincts tend toward Attila the Hun, you will notice each year that some of your serfs pack up and run away.

You may change your tax rates as often as you wish, experimenting to get the best yield. While the computer calculates the yield each time, it does not credit you with the money until the end of this phase.

Borrowing money is possible on any purchase. Your credit is good, as the head of a state, and the computer will let you spend as much as you want. However, if there is a negative balance after taxes are collected, the computer (without informing you) charges you 50 percent interest. After that, if your balance owed is more than 10,000 Florins times the number of titles you have earned, you go bankrupt, and that is very bad !

MAP PHASE

Next the computer draws a map of your kingdom-to-be. The size of the area enclosed by the **Wall** indicates the amount of land you have. At the upper left hand corner of the wall is a **Castle**, unless your defenses are woefully inadequate. You get a large castle if you have at least one soldier per 500 hectares, and a small tower if you have at least one soldier per 1000 hectares. If you have just a bare wall, you are in trouble.

The mysterious figure on the right hand side of your display is a **horse**

pulling a plow, with a man walking behind. If the horse's head is touching the top wall, you have enough serfs to farm all your land. (Time to buy more land.) If the horse is below the wall, you need more serfs. (Try being more generous with the grain distribution.) You should have your land and serfs balanced for best production, unless you are speculating in land, in which case you want unoccupied land for speculation.

Your woolen mill is located in the lower right hand corner, if you have one, and it will grow as you add to it. At the next level up, only touching the left wall of your kingdom, you will find your **markets**, which also grow as you add to them. Directly above your markets is the site for your **palace**, which grows in five increments. If you start to build a palace before giving enough thought to the amount of land it takes to support a palatial lifestyle, it may grow right through your wall. Above and to the right of your palace is the site for your **cathedral**, built in six increments. Any money spent on your palace and cathedral after the first five or six installments is still just as useful; altarpieces and thrones cost money, too ! The money equips the inside, and makes your economy and your population grow just as fast.

During the Map phase, check your defenses by examining your fort, check your agriculture by the position of the ploughman, and keep your investments balanced for faster promotions. You might become a Baron on the strength of markets alone, but you won't go much further.

PUBLIC WORKS PHASE

You have six options during the public works phase. You may **compare your statistics** with everyone else, if you have a mind for figures. People with a mind for figures sometimes do pretty good as rulers ! You may purchase weapons and armor to equip twenty of your husky young serfs as **soldiers**. You may build a **market** and lure more merchants and more trade to your state. You may build a **woolen mill** and put one hundred of your serfs to work earning you hard cash instead of food for rats. This is an excellent approach to an unemployment problem if your population growns faster than you buy land. If you are really flush, and ready to move up in the world, you may start (or continue) to build a **palace** or even a **cathedral**.

At the end of the Public Works phase, the computer calculates your new title, if you have earned one. To do this, the computer gives you one point for each building, for each five nobles, ten clergy, fifty soldiers, fifty merchants, two thousand serfs, five thousand Florins, six thousand hectares of land, or each of the economic points that work behind the scenes to build your economy. The computer divides the sum by six to ten, depending on the skill level of the game, and subtracts from one to four points for your justice level. This calculation determines your title, and if you have earned a new one, the computer changes it.

OBITUARY

Right after you give your name to the computer, the year of your death is selected in a random calculation. Each year the computer checks to see if "the fullness of time" has arrived. If it has, the computer will print an obituary, stating the cause of your death, and then display your state map. After that, the computer will no longer allow your turn, although it will keep a record of the final statistics of your reign in the comparison table. It is very possible

WANTED

For EVASION of Subscription and WANTON NEGLECT of Home Computers

It's a crime the way some people treat their computers. Or, should we say don't treat their computers. Imagine, there are still some TRS-80 users who are depriving their computers - and themselves - by not subscribing to the leading magazine for the TRS-80. It's not that these people are withholding intentionally, it's just that they don't know any better, and that's our fault.

REWARD

In an effort to bring these unfortunate souls into the light of reason, **SoftSide** is offering a **reward of $1.00 towards the purchase of any software in the TRS-80 Software Exchange Market Basket Catalog** for each TRS-80 owner's name that you submit to our sheriff for justice.

So, inform on a friend today.

He'll love you for it, and you'll get a software discount as well as help to build a bigger and better **SoftSide**.

Contact:
The Sheriff's Office
PO Box 68
Milford, NH 03055

Santa Paravia continued

that another player could live several years longer and not do as well. It is not age, but highest title reached, which determines the winner. In the event of a tie, the first person to reach the title wins. This gives a slight advantage to the first player, but subsequent players make up for it by being able to cover the most successful person's strategy.

STRATEGY

Economic development is vital in the early part of the game. A combination of outrageous justice and high customs duties generates cash fast. Some of this money should be channeled into markets or mills to provide cash income and trigger economic growth. Markets do more for the economy, mills bring in more

Continued, page 13

TRS-80 PROGRAMMING HINT

If you are using a disk system and have the double letter problem, be especially careful listing a program. If the **L** is doubled, you will have **LLIST** which will cause the computer to lock up. The only way to save your program will be to connect a line printer — most inconvenient if you have to go down to the local Radio Shack, order one and wait several months. Of course, you could simply turn the computer off and on and lose your program.

Santa Paravia continued

income. But the most vital part of early game strategy is buying land. Since land prices are based on the ratio of your grain harvest to your grain demand, overpopulation raises the price of land, and that slows your growth. In addition, if you have surplus land when a famine hits, and the price of land skyrockets, you may be able to make a financial killing. But don't sell too much, or the price will never be reasonable. Land prices are high when crops are good, but also when grain is scarce. Average weather is more likely than either famine or outstanding crops; the weather is closer to a standard distribution than to random chance.

End game strategy calls for diversification. Since no factor can contribute more than ten points to the title routine, you should examine your statistics during the public works phase and determine the easiest points to get that will still be useful. In the last couple of turns, sudden high prices for land may make it worthwhile to sell a lot of land and buy items that contribute points. That may be enough to give you the crown!

Line list begins page 14

TRS-80 HOTLINE

If you ever find yourself in need of some fast answers, an easy solution, or just a sympathetic ear, call **SoftSide's TRS-80 Hotline.**

From 7:00 to 8:00 on Tuesday nights, our resident software editor will be "on line" to offer BASIC programming assistance to TRS-80 Level I and II users in need of a fix.

HOTLINE 603-673-5144 □

ANSWER TO LAST MONTH'S PUZZLE: "BAD CODE"

The problem with last month's BAD CODE was that line 520 gave a FOR without NEXT error. Probably, your next step was to reverse the NEXT Y in line 500 with NEXT X in 520. Nice try, but no, that didn't fix it either.

Here's the problem. It's okay to leave a FOR-NEXT loop before it's completed, as I did in line 400. But there is a catch. Any time you restart a FOR-NEXT loop, you also kill any loops that were running inside it.

The first Y-loop in line 320 has an X-loop inside it at lines 340 to 380. This X-loop always finishes. If line 400 jumps to line 440, then the computer thinks that we have another X-loop inside the Y-loop. Now comes line 460, which reset the Y-loop which never completed. It also resets any loops previously running within Y. since it thinks the X-loop at 440 is inside the old Y-loop, the X-loop at 440 gets killed. So, now the computer thinks the only thing running is a new Y-loop.

So far, everybody's happy. The computer starts looping away through line 500, humming and singing. When the Y-loop finishes, it drops to line 520 and CRUNCH. What X-loop ? It says, we killed that when you started your new Y-loop in line 460.

If you'd like to fix this little program, delete line 400. Now change line 320 to read: FOR Y=0 TO N. The program will now run correctly.

STILL NOT A SUBSCRIBER ?

Check page 51 and see what's in store for next month !

Send in your subscription so you won't miss a single issue!

MATRIX VARIABLES

A-Markets **B**-Palaces **C**-Cathedrals **D**-Woolen Mills
G-Customs Tax Rate **H**-Sales Tax Rate **I**-Wealth Tax Rate
J-Justice Level **K**-Treasury **L**-Land **M**-Merchants **N**-Nobles
O-Year of Death **P**-Soldiers **Q**-Clergy **R**-Grain Reserves **S**-Serfs
T-Title **U**-Economic Value **V**-Sex **T!**-Title **N$**-Name and City

In each of the above, the number in parenthesis is the number of the player. U(0) is the skill level for the game, and Y(0) is the current year.

NON-MATRIX VARIABLES

A,B-FOR Loops, Set and Reset **X,Y,Z,X%,Z%**-Temporary Use
J-Income from Justice **I!**-Income from Wealth Tax
C!-Income from Customs **S**-Income from Sales Tax **R**-Rat Damage
W,W$-Weather **H!**-Harvest **D!**-Grain Demand **L**-Price of Land
G-Price of Grain **F**-Number of Players

ROUTINE: **INITIALIZE**
LINES: 10-160
PURPOSE: Allot String Space, Define Integer Variables, Initialize Year.

```
10 'SANTA PARAVIA AND FIUMACCIO  VERSION 6.2
20 ' COPYRIGHT 1978 REV. GEORGE BLANK LEECHBURG, PA 15656
30 ' OCTOBER 16
100 CLEAR 700
150 DEFINT A-J,M-Q,T,V,W
160 Y(0)=1400
```

ROUTINE: **INPUT**
LINES: 200-580
PURPOSE: Assign titles and cities to each player, and allot population and resources. Set number of players, skill level and provide instructions if necessary.
PROCESS: Lines 320 and 330 initialize a FOR loop with the number of people playing, then lines 330-430 input data. Line 310 sets the data pointer to the first city, and T$(A) is used temporarily to read each city to be combined with the player's name. Then the FOR loop in lines 440-500 assigns T$(A) the appropriate initial title for each sex,

with line 450 setting the data pointer to the beginning of the data each time. Here you could save a few bytes by using the subroutine at 7170 at the price of a little confusion. Then simple input statements ask about instructions and skill level.

```
200 DATA "SIR ","BARON ","COUNT ","MARQUIS ","DUKE ","GRAND DUKE ", "PRINCE ",
   "* H.R.H. KING "
210 DATA "LADY ","BARONESS ","COUNTESS ","MARQUISE ","DUCHESS ", "GRAND DUCHESS ",
   "PRINCESS ","* H.R.H. QUEEN "
220 DATA "SANTA PARAVIA","FIUMACCIO","TORRICELLA","MOLINETTO","FONTANILE","ROMAGNA"
299 ' SET UP MATRICES
300 CLS:PRINT:PRINT"SANTA PARAVIA AND FIUMACCIO"
310 PRINT:FOR A=1TO16: READ A$:NEXT
320 INPUT"HOW MANY PEOPLE WANT TO PLAY (1 TO 6)";F
330 FOR A=1 TO F:READ T$(A)
340  PRINT:PRINT"WHO IS THE RULER OF ";T$(A);
350  INPUT N$(A)
360  N$(A)=N$(A)+" OF "+T$(A)
370  PRINT"IS ";N$(A);" A MAN OR A WOMAN";
380 V(A)=0:INPUT A$
390 IF LEFT$(A$,1)="W"  V(A)=8
400 G(A)=25:H(A)=10:I(A)=5:J(A)=2:O(A)=1420+RND(35)
410 K(A)=1000:L(A)=10000:R(A)=5000:T(A)=1:U(A)=1
420 N(A)=4:P(A)=25:Q(A)=5:M(A)=25:S(A)=2000
430 NEXT
440 FOR A=1 TO F
450  RESTORE
460  B=V(A)+T(A)
470   FOR C=1 TO B
480   READ T$(A)
490  NEXT C
500 NEXT A
510 INPUT"DO YOU WISH INSTRUCTIONS";A$
520 IF LEFT$(A$,1)="N" THEN 540
530 GOSUB 10000
540 PRINT"1. APPRENTICE  2. JOURNEYMAN  3. MASTER  4. GRAND MASTER"
550 INPUT"ENTER LEVEL OF PLAY DESIRED";U(0)
560 IF U(0)<1 U(0)=1
570 IF U(0)>4 U(0)=4
580 U(0)=U(0)+5
```

Continued, page 18

ROBOT!

Chase games have been a favorite among computer hobbyists ever since they first started showing up on time-sharing BASIC machines. Now, you can play at home!

In this version, you'll struggle to keep your wits about you as an army of robots stalk you through a seemingly endless maze with mechanical precision. It's you against them as you seek to avoid, and at the same time, trick them into their own trap.

For the **TRS-80 Level II 4K or 16K Microcomputer** on Digital Cassette - **$4.95.**

TRS-80 Software Exchange
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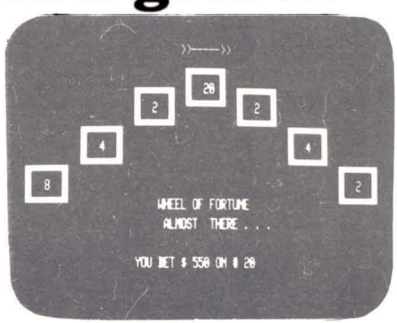
WHEEL OF FORTUNE

Round and round it goes ...

Where it stops, not even the computer knows, in this simulation of a circus-type wheel of fortune. Includes barker, complete with a set of wise remarks — **fun for the whole family !**



Available on Digital Cassette for Level II 4K — $4.95

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Small Business Accounting

This is a program designed to serve the small businessman with few employees. The process begins with the entering of last week's receipts. First, load the tape file. A complete chart of all 42 expenses areas will be on display as you enter your checking activity. After entering, you are given a review of your entries and permitted to change any incorrect data. The activity is then posted to the respective account areas. Reports for the year to date, year to last week, and this week are now available for your review. One of the special features of this program is that it gives the user the ability to customize account areas. If all or some of the areas specified do not suit your business, or if other accounts would be more useful to your particular business, the user can alter a few of the data statements, re-record and everything will function as before. The process ends by transferring the newly-created data file to cassette for use next week.

The program runs in Level I or II 16K, or Level I 4K. Sorry, but there just was not enough room in the Level II 4K to house the information. If you are using Level I 4K, do not post more than 30 checks per batch. Written to run in parallel with the nationally known **Dome Bookkeeping System**, the journal is available when ordering this program for an additional $7.00.

Available on Digital Cassette — $15.00 [$22.00 with Journal]

TRS-80 Software Exchange
17 Briar Cliff Drive
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ROUTINE: **CONTROL**
LINES: 600-990
PURPOSE: Cycle each player in turn through the different game phases, increment the year, test for death of players, or death of all players.
PROCESS: A series of subroutine calls with tests for living players, last player, and death or current player.

```
599 ' CONTROL ROUTINE
600 E=E+1
610 IF T(E)=-1 E=E+1
619 ' TEST FOR END OF GAME AFTER DEATH
620 IF(T(1)<1)AND(T(2)<1)AND(T(3)<1)AND(T(4)<1)AND(T(5)<1)AND(T(6)<1) THEN GOTO 11000
630 IF E>F THEN E=0:Y(0)=Y(0)+1:GOTO 600
640 IF Y(0)>0(E) THEN 600
645 IF Y(0)=0(E) THEN 1100
650 GOSUB 2000
660 GOSUB 2600
670 GOSUB 4000
680 GOSUB 3000
690 GOSUB 5000
700 GOSUB 6000
710 GOSUB 7000
990 GOTO 600
```

ROUTINE: **COMPARISON**
LINES: 1000-1060
PURPOSE: Displays comparative table of resources upon the death of a player, at the end of the game, and upon request during the purchase phase.
PROCESS: A FOR loop cycles through the players, displaying variables. Data is formatted with tab statements.

```
999 ' COMPARISON ROUTINE
1000 CLS
1010 PRINT"NOBLES SOLDIERS CLERGY MERCHANTS SERFS    LAND    TREASURY"
1020 PRINT:FOR A=1TOF:PRINT T$(A);N$(A)
1030 PRINT N(A); TAB(7) P(A); TAB(16) Q(A); TAB(23) M(A); TAB(32) S(A); TAB(40) L(A);
     TAB(50) K(A)
1040 NEXT
1050 PRINT:INPUT"  (PRESS ENTER)";A$
1060 RETURN
```

ROUTINE: **OBITUARY**
LINES: 1100-1290
PURPOSE: Ends one players participation in the game, printing a map of the state and a comparison table, as well as assigning a cause of death.
PROCESS: Cause of death is assigned at random, with different probabilities for different causes; pneumonia is most common

```
1099 ' OBITUARY
1100 CLS:PRINT:PRINT"VERY SAD NEWS":PRINT
1110 PRINT T$(E);N$(E);" HAS JUST DIED"
1120 T(E)=-1:Y=RND(8)
1130 IF Y(0)>1450 PRINT"OF OLD AGE AFTER A LONG REIGN":GOTO 1190
1140 IF Y<4 PRINT"OF PNEUMONIA AFTER A COLD WINTER IN A DRAFTY CASTLE"
1150 IF Y=5 PRINT"IN A SMALLPOX EPIDEMIC"
1160 IF Y=4 PRINT"OF TYPHOID AFTER DRINKING CONTAMINATED WATER"
1170 IF Y=6 PRINT"AFTER BEING ATTACKED BY ROBBERS WHILE TRAVELING"
1180 IF Y>6 PRINT"OF FOOD POISONING"
1190 PRINT
1200 INPUT"(PRESS ENTER)";A$
1210 GOSUB 5000
1220 GOSUB 1000
1290 GOTO 600
```

ROUTINE: **MINOR**
LINES: 1300-1510
PURPOSE: Integer variables, serf population changes
PROCESS: 6 one-line subroutines. It is not good practice to put an INT command after an IF statement on the same line to test for anumber greater than 32767, for the computer will try to compute the INT( ) first and give an OV error. The population routine is called from different places due to grain surpluses or shortages.

```
1299 ' MINOR SUBROUTINES
1300 I!=INT(I!):RETURN
1310 C!=INT(C!):RETURN
1320 S!=INT(S!):RETURN
1330 K(E)=INT(K(E)):RETURN
1500 Z=RND(A)*S(E)/100:Z%=Z:PRINT Z%;"SERFS BORN THIS YEAR":S(E)=S(E)+Z%:RETURN
1510 Z=RND(A)*S(E)/100:Z%=Z:PRINT Z%;"SERFS DIE THIS YEAR":S(E)=S(E)-Z%:RETURN
```

ROUTINE: **AGRICULTURE**
LINES: 2000-2290
PURPOSE: Set weather conditions, crop yield, rat damage, harvest, current reserves, demand for grain, price of grain and price of land for current player only.
PROCESS: Calculations are part random, partially based on population and partially based on the ration of current harvest to current demand. The limiting factors in the grain harvest are: the amount of grain left for seed, the amount of land, and the number of serfs not engaged in the wool industry who can farm the land.

```
1999 ' AGRICULTURAL CALCULATIONS
2000 W=(RND(5)+RND(6))/2
2010 ON W GOTO 2020,2040,2060,2080,2100
2020 W$="DROUGHT    FAMINE THREATENS"
2030 GOTO 2110
2040 W$="BAD WEATHER    POOR HARVEST"
2050 GOTO 2110
2060 W$="NORMAL WEATHER   AVERAGE HARVEST"
2070 GOTO 2110
2080 W$="GOOD WEATHER   FINE HARVEST"
2090 GOTO 2110
2100 W$="EXCELLENT WEATHER  GREAT HARVEST"
2109 'RATS EAT GRAIN
2110 R=RND(50)
2120 R(E)=(R(E)*100-R(E)*R)/100
2129 'GRAIN HARVEST
2130 X=L(E):Y=(S(E)-D(E)*100)*5:IF Y<0 Y=0
2140 IF Y<X THEN X=Y
2150 Y=R(E)*2:IF Y<X THEN X=Y
2160 Y=W-.5:H!=X*Y:R(E)=R(E)+H!
2169 'GRAIN DEMAND
2170 D!=N(E)*100+C(E)*40+M(E)*30+P(E)*10+S(E)*5
2179 'PRICE OF LAND
2180 L=(3*W+RND(6)+RND(6)+10)/10
2190 IF H!<1 Y=2:GOTO 2210
2200 Y=D!/H!:IF Y>2 Y=2
2210 IF Y<.8 Y=.8
2220 L=L*Y:L=INT(L*10):L=L/10
2229 'PRICE OF GRAIN
2230 Z=6-W
```

```
2240 G=(Z*3+RND(5)+RND(5))/5*Y*20
2290 RETURN
```

ROUTINE: **STEWARD**
LINES: 2300-2390
PURPOSE: Print summary of Grain and Market conditions

```
2299 ' DISPLAY HARVEST (ALTERNATE ENTRY - 2340)
2300 PRINT
2310 PRINT"RATS ATE";R;" % OF YOUR GRAIN RESERVES"
2320 PRINT W$;" (";H!;" STERES)"
2340 PRINT:IF K(E)<32766 GOSUB 1330
2350 PRINT"GRAIN       GRAIN      PRICE OF   PRICE OF   TREASURY"
2360 PRINT"RESERVE     DEMAND     GRAIN      LAND"
2370 PRINT R(E);TAB(13) D!;TAB(24) G;TAB(36) L;TAB(48) K(E)
2380 PRINT"STERES      STERES     1000 ST.   HECTARE    GOLD FLORINS"
2390 RETURN
```

ROUTINE: **JUSTICE**
LINES: 2400-2475
PURPOSE: Display level of justice selected by player and calculate court revenue.
PROCESS: Revenue depends on level of justice and title.

```
2399 ' TAXES
2400 J=(J(E)*300-500)*T(E):ON J(E) GOTO 2410,2430,2450,2470
2410 J$="VERY FAIR"
2420 GOTO 2475
2430 J$="MODERATE"
2440 GOTO 2475
2450 J$="HARSH"
2460 GOTO 2475
2470 J$="OUTRAGOUS"
2475 Y=150-G(E)-H(E)-I(E):IF Y<1 Y=1
```

ROUTINE: **TAXES**
LINES: 2480-2590
PURPOSE: Calculate and display tax revenues

PROCESS: Factors in tax yields include the economic factor, U(E), the different classes of population, the tax rate, and the rates on the other sources of state revenue.

```
2479 'CALCULATE TAX YIELD
2480 C!=(N(E)*100+Q(E)*75+M(E)*20)*(Y/100)+U(E)*100
2490 S!=(N(E)*50+M(E)*25+U(E)*10)*(Y/100)*(5-J(E))/2
2500 I!=N(E)*250+U(E)*20+(10*J(E)*N(E))*(Y/100)
2510 C!=C!*G(E)/100:IF C!<32760 GOSUB 1310
2520 S!=S!*M(E)/100:IF S!<32760 GOSUB 1320
2530 I!=I!*I(E)/100:IF I!<32760 GOSUB 1300
2540 PRINT"STATE REVENUES    ";J+C!+S!+I!;"GOLD FLORINS"
2542 PRINT"CUSTOMS DUTY","SALES TAX","INCOME TAX","JUSTICE"
2546 PRINT G(E);"%",M(E);"%",I(E);"%",J$
2550 PRINT C!,S!,I!,J;"FL "
2590 RETURN
```

ROUTINE: **HARVEST TIME**
LINES: 2600-2880
PURPOSE: Buy and Sell Grain and Land
PROCESS: Accept transactions, make changes in resources and treasury

```
2599 ' MANAGE HARVEST
2600 CLS:PRINT:PRINT T$(E);N$(E)
2610 GOSUB 2300
2620 PRINT
2630 PRINT"1 BUY GRAIN  2 SELL GRAIN  3 BUY LAND  4 SELL LAND"
2640 INPUT"(ENTER 0 TO CONTINUE)";I!
2650 IF I!>4 THEN 2630
2660 IF I!<1 THEN RETURN
2670 ON I! GOTO 2700,2750,2800,2850
2700 INPUT"HOW MUCH GRAIN DO YOU WANT TO BUY";I!
2710 K(E)=K(E)-(I!*G/1000):R(E)=R(E)+I!
2720 CLS:PRINT:PRINT T$(E);N$(E):GOSUB 2340
2730 GOTO 2620
2750 INPUT"HOW MUCH GRAIN DO YOU WISH TO SELL";I!
2760 IF I!>R(E) PRINT"YOU DONT HAVE IT":PRINT:GOTO 2750
2770 K(E)=K(E)+(I!*G/1000):R(E)=R(E)-I!
2780 GOTO 2720
2800 INPUT"HOW MANY HECTARES DO YOU WANT TO BUY";I!
2810 L(E)=L(E)+I!:K(E)=K(E)-(I!*L)
2820 GOTO 2720
2850 INPUT"HOW MANY HECTARES DO YOU WANT TO SELL";I!
2860 IF I!>(L(E)-5000) PRINT"YOU CANT SELL THAT MUCH":GOTO 2850
```

```
2870 L(E)=L(E)-I!:K(E)=K(E)+(I!*L)
2880 GOTO 2720
```

ROUTINE: **TAX CHANGE**
LINES: 3000-3190
PURPOSE: Accept changes in tax and justice levels
PROCESS: Accept new rates, go to TAXES routine for new yields.

```
2999 ' DISPLAY TAXES
3000 CLS:PRINT:PRINT T$(E);N$(E)
3010 PRINT:GOSUB 2400
3020 PRINT:PRINT"1. CUSTOMS DUTY  2. SALES TAX  3. WEALTH TAX  4. JUSTICE"
3030 INPUT"(ENTER TAX NUMBER FOR CHANGES, 0 TO CONTINUE)";I
3040 IF I>4 PRINT:GOTO3020
3050 IF I<1 GOTO 3200
3060 ON I GOTO 3070, 3110, 3140, 3170
3070 INPUT"NEW CUSTOMS DUTY (0 TO 100)";I
3080 IF I>100 I=100
3090 IF I<0 I=0
3100 G(E)=I:GOTO 3000
3110 INPUT"NEW SALES TAX (0 TO 50)";I
3120 IF(I>50) OR (I<0) I=5
3130 H(E)=I:GOTO 3000
3140 INPUT"NEW WEALTH TAX (0 TO 25)";I
3150 IF(I<0) OR (I>25) THEN I=0
3160 I(E)=I:GOTO 3000
3170 INPUT"JUSTICE: 1.VERY FAIR  2.MODERATE  3.HARSH  4.OUTRAGOUS";I
3180 IF(I>4) OR (I<1) THEN I=1
3190 J(E)=I:GOTO 3000
```

ROUTINE: **REVENUE**
LINES: 3200-3220
PURPOSE: Credit state with revenue at end of tax changes, test for money owed, assess interest, test for bankruptcy.

```
3200 K(E)=K(E)+C!+S!+I!+J
3209 ' INTEREST CHARGE
3210 IF K(E)<0 THEN K(E)=K(E)*1.5
3219 ' BANKRUPTCY TEST
3220 IF K(E)<(-10000*T(E)) GOTO 8000
```

Continued, page 41

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TRS-80 PROGRAMMING HINT

Here's a question that was recently raised by a caller on our TRS-80 Hotline:

Suppose you have just input the value of A and hit ENTER. And what happens ? CURSES#/&*%!? A line of display has just been wiped off the screen !

You've got a problem. The long and short of it is that you cannot control the cursor's passage to the next line once a reply has been received to its prompt for a keyboard input. Here's the solution:

```
10 PRINT @ 65,"SELECTION?":X$=INKEY$:IF X$=""THEN GOTO
```

This will work if your purpose is just to stop the program, and the input itself is not important. If the value of the input is important, you'll need the help of VAL as well;

```
15 X=VAL(X$)
```

One last note: if an alphabetic input serves your need, line 15 is still unnecessary (when VAL is used and an alpha character is input, X will return a value of 0).

BIORHYTHMS

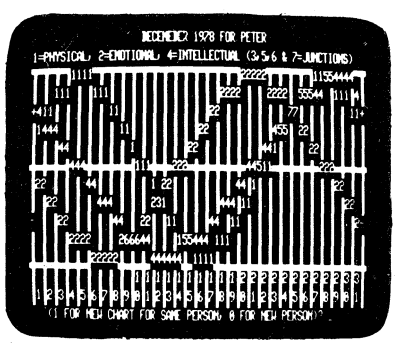
FRANK B. ROWLETT, JR.
300 APPERSON DR. BLACKSBURG, VA 24060

The word "biorhythm" comes from the Greek words, "bios" meaning life and "rhythmos", a regular rhythm. According to the biorhythms theory, which first began in the latter part of the 19th Century and was refined near the middle of the 20th Century, there are three life rhythms that start at birth and continue regularly through life.

The three rhythms are: the Physical rhythm, which is 23 days (ability to do physical labor, vitality, resistance to disease, etc.), the Emotional rhythm, which is 28 days (sensitivity, creativity, the "blues", etc.), and the Intellectual rhythm, which is 33 days (absorption of new knowledge, memory, new ideas, etc.). The first half of the cycle of each rhythm is the high point where energy is expended effectively. The last half of the cycle of each rhythm is the low point where energy is restored. A person in the last half of a cycle of a particular rhythm is less effective in that area.

Biorhythms continued, page 27

```
10 CLS:PRINT@19,"BIORHYTHMS PLOTTING PROGRAM";:PRINT:PRINT:CLEAR200
20 REM BY FRANK B. ROWLETT, JR. (4-21-78)
40 INPUT"NAME";A$:PRINT:INPUT"YEAR BORN";F
60 INPUT"MONTH BORN (JAN=1, FEB=2,...DEC=12)";B:INPUT"DAY OF MONTH BORN";C
70 PRINT:INPUT"YEAR CHART TO BE IN";E:IFE<=FPRINT"(NO 1ST OR MINUS YEARS)":GOTO70
75 INPUT"MONTH YOU WANT CHART FOR (JAN=1, FEB=2,...DEC=12)";J
80 X=F:M=B:D=C:GOSUB1300:L=D:X=E:M=J:D=1:GOSUB1300:D=Y+L
83 IFF+1<>EFORX=F+1TOE-1:GOSUB1100:NEXTX
85 O=2*(D-INT(D/23)*23):R=2*(D-INT(D/28)*28):H=2*(D-INT(D/33)*33)
90 K=31:IF(J=4)+(J=6)+(J=9)+(J=11)K=30
95 IFJ=2K=28:X=E:D=0:GOSUB1100:IFD=366K=29
110 GOSUB2000:GOSUB360:FORG=1TO2*K-1
130 T=O:U=46:GOSUB500:P=N:O=O+1:IFO>460=1
150 T=R:U=56:GOSUB500:S=N:R=R+1:IFR>56R=1
170 T=H:U=66:GOSUB500:I=N:H=H+1:IFH>66H=1
180 V=1:IFP=STHENV=3
190 IFP=ITHENV=V+4
200 PRINT@P,RIGHT$(STR$(V),1);
240 IFV>1THEN300
250 V=2:IFS=ITHENV=6
260 PRINT@S,RIGHT$(STR$(V),1);
```



```
280 IFS=1GOTO320
290 PRINT@1,"4";:GOTO320
300 IFP<>1GOTO290
310 IFP<>SPRINT@S,"2";
320 NEXTG:Y=702:Z=318:W=0:FORX=125TO113STEP-4:IFW=1GOTO340
330 IFPOINT(X,43)THENW=1:PRINT@0,"";:FORS=6TO44:SET(X,S):NEXTS:PRINT@Y,"-";:PRINT@Z,"+";
340 Y=Y-2:Z=Z-2:NEXTX
345 PRINT@963,"(1 FOR NEW CHART FOR SAME PERSON, 0 FOR NEW PERSON)";
350 INPUTX.IFX=0GOTO10
355 CLS:GOTO70
360 RESTORE:FORXX%=1TOM:READC$:NEXT
370 DATAJANUARY,FEBRUARY,MARCH,APRIL,MAY,JUNE,JULY,AUGUST,SEPTEMBER,OCTOBER,
    NOVEMBER,DECEMEBER
490 B$=C$+STR$(E)+" FOR "+A$:L%=INT((64-LEN(B$))/2):IFL%<0THENL%=0
495 PRINT@L%,B$;:RETURN
500 REM * PLOT POINTS *
510 K=T*(360/U)*.0174533
520 N=SIN(K)
530 IFN<0THENN=N-.05
540 IFN>0THENN=N+.05
580 K=-64*INT(5*N):IFK>0K=K-64
590 N=K+G+448:RETURN
1100 REM * DAYS IN A YEAR *
1110 IFX/4-INT(X/4)<>0THEND=D+365:RETURN
1120 IF(X/100-INT(X/100)=0)*(X/400-INT(X/400)<>0)THEND=D+365:RETURN
1130 D=D+366:RETURN
1300 REM * DAYS GONE AND LEFT *
1310 Y=D+30*(M-1):IFM>1THENY=Y+1:IFM>2THENY=Y-2:IFM>3THENY=Y+1:IFM>5THENY=Y+1
1320 IFM>7THENY=Y+1:IFM>8THENY=Y+1:IFM>10THENY=Y+1
1330 D=0:GOSUB1100:IF(D=366)*(M>2)THENY=Y+1
1340 D=D-Y:RETURN
2000 REM * SET SCREEN *
2020 CLS:G=K-INT(K/10)*10:IFG<80=G+10
2023 PRINT@64,"1=PHYSICAL, 2=EMOTIONAL, 4=INTELLECTUAL (3,5,6 & 7=";
2024 PRINT"JUNCTIONS)";
2030 Y=1:FORX=850TO850+K+9STEP2:IFX>869Y=2:IFX>889Y=3
2040 PRINT@X,Y;:NEXTX:Y=0:FORX=896TO895+2*KSTEP2:Y=Y+1:IFY=10Y=0
2050 PRINT@X,Y;:NEXTX:FORX=1TO4*K+1STEP4:FORY=6TO44:SET(X,Y):NEXTY:NEXTX
2060 FORX=0TO4*K+2:SET(X,6):SET(X,22):SET(X,38):NEXTX
2070 PRINT@256,"+";:PRINT@640,"-";:RETURN
```

Biorhythms continued

There are days called "critical" days where a rhythm goes from the first half to the second half of the cycle or from the second half to the first half of the cycle. On critical days a person is likely to have problems caused by poor judgement or co-ordination. Because the three rhythms are not equal in length, there are times when double and triple critical days occur.

In the 1950's, a sine-curve representation was developed for plotting biorhythms. The height of the curve has no bearing on the rhythm except to give a visual representation of the cycle. What counts is which side of the X-axis the curve is on (above or below) and when it crosses the X-axis (critical day).

There are proponents and opponents of the biorhythm theory, but the arguments on either side will not be presented here. There is one thing that should be mentioned: the biorhythms theory is not a "fortune-telling" gimmick. It simply tells when a person may be liable to self-induced problems or highs and lows. It cannot and does not indicate "lucky" or "unlucky" days.

The "Biorhythms Charting Program" for the Radio Shack TRS-80 Microcomputer System will plot the three rhythms (physical, emotional and intellectual) for a specified month in any year **after** the year of birth. The representations of the three rhythms are the classic sine-curve representations around a center X-axis dividing the chart into a plus (+) part on the top and a minus (-) part on the bottom.

Each of the three curves is drawn using numerical digits to indicate which curve is which; the physical curve is represented by 1's, the emotional curve by 2's, and the intellectual curve by 4's. Where two or more curves intersect, the numeric values of the curves are summed. For example, where a physical and an emotional curve intersect a 3 (1 plus 2) is used, where an emotional curve and an intellectual curve intersect a 6 (2 plus 4) is used, and where all three curves intersect a 7 (1 plus 2 plus 4) is used.

Critical days are where a curve crosses the X-axis. This is represented by breaking the X-axis and printing the value of the curve crossing it (or sums of the curves in the case of double or triple critical days).

The information a person is required to give the program is: first and last name; the year, month and day of the month he was born; and the year and month for which he wants his biorhythms charted. The computer will prompt for this information as it is required.

TIC TAC TOE

X O X O
X X O

Everyone knows this game, but how about a 4 x 4 x 4 version?

This program offers three skill levels for computer competition, and the author warns you to practice before you take on the computer's third skill level. You can also play your easy-to-beat friend, of course. For Level I and II, 16K — **$7.95**

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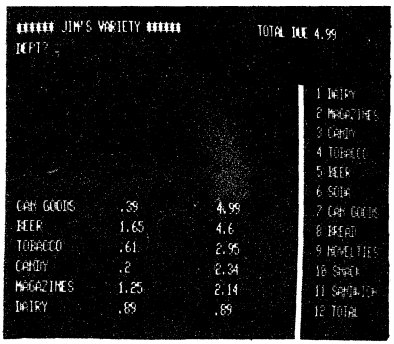

- **Twelve Departments that You Can Customize !**
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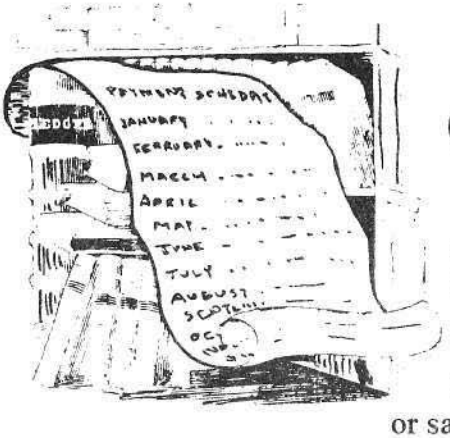
MORTGAGE CALCULATION

by Russell Starkey



Considering a new purchase ?...

like maybe disk drives, or say, a line printer? This loan schedule program can save you some time when it comes to shopping for the loan. Just fill in the information asked for (interest rate, term of loan, etc.) and the computer will display a complete schedule of payments, showing the interest and principal portions of each payment, the accumulated interest and principal at each payment, and the remaining balance.

```
140 CLEAR50:DEFINT X , Y :DEFSTR S : CLS :PRINTCHR$(23) :
S1="$##,###.##":DIM$(12)
160 PRINT@64 ,"
  AMORTIZED LOAN SCHEDULE
DISPLAYS A COMPLETE SCHEDULE OF
PAYMENTS SHOWING THE INTEREST
AND PRINCIPAL PORTIONS OF EACH
PAYMENT, THE ACCUMULATED
INTEREST AND PRINCIPAL AT EACH
PAYMENT, AND THE REMAINING
BALANCE."
```

This program is in TRS-80 Level II BASIC and will run in either 4K or 16K machines.

```
170 PRINT:PRINT"PROGRAM BY RUSSELL STARKEY":PRINT"
    855 EISENHOWER":PRINT"           JASPER IN 47546"
180 FOR X= 1 TO 3000:NEXT
190 PRINT@640,:PRINTCHR$(31):PRINT:PRINT"PRESS ENTER TO CONTINUE
    ":INPUTS9
300 '
          N O T E    A R E A    ! ! ! ! ! ! !
PV = PRESENT VALUE        PMT = PERIODIC PAYMENT
I  = INTEREST / YEAR      IA  = ( I / 100 ) /  N
Y  = NO. OF YEARS         YN  = FLAG 1= BY Y.  2= BY N.
320 '
N  = NO. OF PERIODS / YEAR
IP = INTEREST $ AMT. / PERIOD
IT = INTEREST TOTAL $ AMT.
PP = PRINCIPAL $ AMT. / PERIOD
PT = PRINCIPAL TOTAL $ AMT.
DE = DELAY FOR OUTPUT DISPLAY
520 CLS : PRINT:PRINT
530 INPUT"AMOUNT TO BE BRROWED ------------------ ";PV
535 IF PV<1 THEN530
540 INPUT"INTEREST / YEAR ----------------------- ";I
545 IF I >100 THEN540
550 INPUT"NUMBER OF PERIODS / YEAR --------------- ";N
555 IFN<1THEN550
560 INPUT"NUMBER YEARS TO REPAY THE LOAN --------- ";Y
565 IFY<1 OR Y>1000 THEN 560
570 INPUT"ENTER DISPLAY DELAY IN SEC. ------------ ";DE
575 X2=X2+1:IF X2=1 THEN IF DE>15 PRINT"ARE YOU SURE YOU NEED A ";DE;"
    SEC. DELAY ? ":GOTO 570
577 IF DE>60 PRINT"TOO LONG DELAY    ":GOTO570
578 IF DE<0 DE=0
600 IA=(1/N)/100 : PMT=PV*IA/(1-(1+IA)[-(N*Y))
630 IFN=1 YN=1 : GOTO670
640 PRINT"OUTPUT DISPLAY BY YEAR OR BY PERIOD ? ? ? ?"
650 INPUT"ENTER ----  1 FOR YEAR    2 FOR PERIOD --- ";YN
660 IF YN<>1 AND YN<>2 THEN 640
665 FOR X = 1 TO 12 : READ S4 : S(X)=S4 :NEXT
666 DATAJAN  ,FEB  ,MARCH,APRIL,MAY  ,JUNE ,JULY ,AUG
    ,SEPT ,OCT  ,NOV  ,DEC
```

```
670 CLS:PRINTCHR$(23):PRINT:PRINT:PRINT:INPUT"ENTER STARTING
    YEAR ";RY:CLS:PRINTCHR$(23):IF RY<99 RY=RY+1900
700 '
    M A T H      C O M E  P O I N T - - - - - - - - - - - -
710 IF YN=1 THEN RY=RY+1 : PP=0 :IP=0 : FOR X =1 TO N : IK=IA*(PV-PT) :
    IT=IT+IK : PK=PMT-IK : PT=PT+PK : IP=IP+IK : PP=PP+PK :NEXT
720 IF YN=2 THEN  RM=RM+1:IFRM=N+1 RM=1 : RY=RY+1
730 RP=RP+1 :IF YN=2 THEN IP=IA*(PV-PT) : IT=IT+IP :
    PP=PMT-IP : PT=PT+PP
1000 S2=INKEY$:IF S2<>""THEN DE=VAL(S2)
2000 '
    P R I N T      D A T A      C O M E   P O I N T ////////
2100 IF YN=1 PRINT@10,RY;" DATA     ";RP
2120 IF YN=2 AND N=12 PRINT@2 ,RY;" DATA ";S(RM);
     :PRINT@38,RM:PRINT@48,RP;"TOT";
2140 IF YN=2 AND N<>12 PRINT@0,RY;" DATA FOR PERIOD  # ";RM;"    ";RP;
2160 IF RP>2 THEN 2270
2200 PRINT@128,"AMT. BORROWED ----- ";:PRINTUSING S1;PV
2220 PRINT@192,"INTEREST / YEAR ---      ";I;" %"
2240 PRINT@256,"NUMBER OF YEARS ---      ";Y
2260 PRINT@320,"PAYMENT ---------- ";:PRINTUSING S1;PMT
2270 PRINT@384, : PRINTCHR$(31)
2280 PRINT@512,"INTEREST ---------- ";:PRINTUSING S1;IP
2300 PRINT@576,"INTEREST TOTAL ---- ";:PRINTUSING S1;IT
2320 PRINT@640,"PRINCIPAL --------- ";:PRINTUSING S1;PP
2340 PRINT@704,"PRINCIPAL TOTAL --- ";:PRINTUSING S1;PT
2360 PRINT@768,"PRINCIPAL LEFT ---- ";:PRINTUSING S1;PV-PT
2500 FOR X = 1TODE*500 : NEXT : IF YN=2 THEN 2700
2600 PRINT: IF RP=Y END ELSE GOTO 700
2700 PRINT: IF RP=Y*N END ELSE GOTO 700
```

Although it is our intention to publish programs in line listing form for our readers' transcription, we realize that the actual keyboarding may require more time than some are able to devote.

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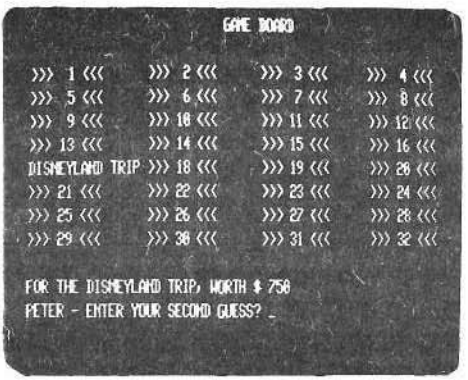
If the "prerecorded" route is best for you, simply use the order form in the TRS-80 Software Exchange Market Basket Catalog section of this magazine.

CONCENTRATION

JUST LIKE THE POPULAR TV GAME SHOW!



Select a square and reveal one half of a fabulous prize !

Find the other half and it's yours (well, not really). Stereos, televisions, Disneyland trips, they're all on the big screen — there's even a TRS-80 !

But don't forget the basic rules: concentrate on what's on the board, or you'll end up helping your opponent more than yourself!

Available on Digital Cassette for the Level I or II 16K Microcomputer — $7.95.

TRS-80 Software Exchange

17 Briar Cliff Drive

Milford, New Hampshire 03055

SPELLING BEE

by Lance Micklus
WINOOSKI, VERMONT

This program gives the early speller a fighting chance, in that it shows the correctly-spelled word then asks the user to type it out on the keyboard. Since it chooses the words to be spelled randomly, the order in which the words are presented will never be the same from session to session. You may want to periodically update the program by changing the words (in the DATA statements) to reflect your pupil's increased ability.

```
20 'SPELLING BEE BY LANCE MICKLUS
40 '
60 CLEAR 50
80 RANDOM : DEFINT A-Z
100 '
SET WRDS EQUAL TO THE NUMBER OF WORDS IN THE DATA STATEMENTS
120 WRDS=27
140 DIM W$(WRDS-1)
160 CLS
180 PRINT CHR$(23)
200 PRINT@320,"HELLO.":INPUT"WHAT'S YOUR NAME";NA$
220 PRINT@320,"HI ";NA$;"!!!"
240 PRINT"I'LL SHOW YOU A WORD. THEN"
260 PRINT"YOU TRY AND SPELL IT."
280 PRINT
300 PRINT"ARE YOUR READY ";NA$;:INPUT A$
320 IF LEFT$(A$,1)="N" END
340 RESTORE
360 FOR N=0 TO WRDS-1
```

```
380 READ W$(N)
400 NEXT
420 FOR GUESS=1 TO 10
440 CLS
460 PRINTCHR$(23)
480 N=RND(WRDS-1)
500 PRINT@320,"WORD";GUESS;"IS ";W$(N);". "
520 FOR TIME=0 TO 4000:NEXT
540 CLS
560 PRINTCHR$(23)
580 PRINT@320,"";
600 INPUT"WHAT'S THE WORD";A$
620 IF A$=W$(N) PRINT"THAT'S RIGHT ";NA$;"!!!":GOTO 760
640 WW=WW+1
660 PRINT"SORRY ";NA$;". "
680 PRINT"THE WORD IS ";W$(N);". "
700 PRINT
720 PRINT"PRESS ''ENTER'' TO CONTINUE. "
740 IF INKEY$="" THEN 740 ELSE 800
760 FOR TIME=0 TO 4000:NEXT
780 CW=CW+1
800 NEXT GUESS
820 CLS:PRINTCHR$(23)
840 PRINT@320,"CORRECT:";CW,"WRONG:";WW
860 PRINT:INPUT"PLAY AGAIN";A$
880 CW=0:WW=0
900 GOTO 320
1000 '
WORD LIST IS BELOW IN THE FORM OF DATA STATEMENTS
1020 DATA SONG,LAMP,BEND,DENT,DUST,DANCE,MAP,MATCH,MAST,FENCE
1040 DATA FLING,FUN,PACK,PATCH,PAN,WILT,WIN,WHIP,SKILL,SICK
1060 DATA SILK,CAMP,CATCH,CAN,BARN,WATCH,WITH
```

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RENUMBER

No, it's not a game, but it can make renumbering your programs seem like child's play!

If you find yourself renumbering your BASIC programs to provide room for additional lines, or just to make things neater, this 1.3K program has got to make your life easier — it can renumber a 12K program like **Treasure Hunt** in just 32 seconds!

The user has complete control over which lines are renumbered and how — including all GOTO's and GOSUB's. You can even renumber the middle of your program and leave the beginning and ending alone. If an undefined line is found, the program will display both the line which caused the error, and the unfound line number, thereby making corrections much easier.

You may have seen other renumbering programs, but none with this many features. No external tables are used. **RENUMBER** runs in 1300 bytes of high memory, regardless of program size, and loads with the SYSTEM command. Versions are available for 4, 16, 32 and 48K machines. Be sure to specify memory size desired, or 16K version will automatically be supplied. Compatible with Disk BASIC.

Available on Digital Cassette for the Level II TRS-80 Microcomputer — **$15.00**

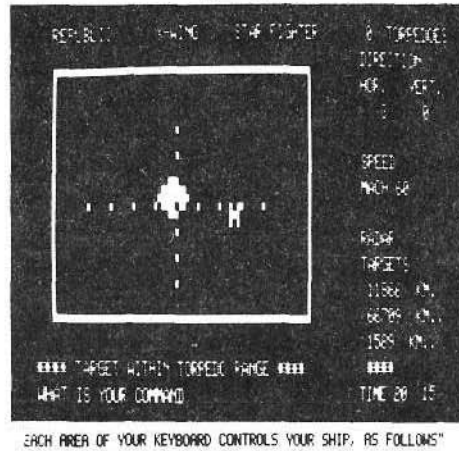
TRS-80 Software Exchange

17 Briar Cliff Dr. Milford, NH 03055

X-WING FIGHTER

The Death Star Space Station, under the command of **Darth Vader**, is the most powerful weapon the universe has ever known. A frontal attack by any other craft would be absolute suicide. However, intelligence delivered to Republic headquarters by the androids R2D2 and C3PO gives a faint hope of a successful attack by a small 1- or 2-passenger X-wing fighter.

There is a small unshielded exhaust port on the surface of the **Death Star** that leads directly to the main reactor. Since it is an emergency thermal port in case the reactor overheats, it could not be shielded. If you can slip your small fighter past the Death Star's defenses and make a direct hit on the thermal exhaust port with a torpedo, there is a chance the torpedo will penetrate the main reactor and start a chain reaction, destroying the Death Star. It is a slim chance, but it is the only one the Republic has. Obi-Wan Kenobi gave his life to get the message here; so he considered it very important.



The X-wing fighter is a small 1- or 2-passenger rocket that is, quite frankly, obsolete. It is armed only with a laser cannon and 3 torpedoes. Use the laser cannon to fight off any imperial fighters, and save the torpedoes for the Death Star.

```
EACH AREA OF YOUR KEYBOARD CONTROLS YOUR SHIP, AS FOLLOWS"
    (SLOWER)                          (FASTER)"
        1  2  3  4  5  6  7  8  9"
                  (UP)"
    Q  W  E      R  T  Y  U        I  O  P"
 (LEFT)       (CANNON) (TORPEDO)    (RIGHT)"
 A  S  D       F  G     H  J        K  L  ,"
    Z  X  C      V  B  N        M  .
                  (DOWN)"
```

The target acquisition radar can detect targets in excess of 100,000 km away, but can only display targets within 20,000 km. Therefore, you will be warned of approaching targets on the right side of your control panel before they are displayed in the radar screen.

Available on Digital Cassette for Level II 16 K — $7.95

TRS-80 Software Exchange

17 Briar Cliff Drive Milford, New Hampshire 03055

SIX MILLION DOLLAR [/10K] CLOCK

By Peter Ashley

As written, this program will run in either Level I or II, provided that Level I users change the @ sign to read AT. However, since themachine's internal function time is a factor in its accuracy as a clock, a few changes are required for Level I users. Most notable is:

200 FOR N=0 TO 374; NEXTN

Also, in line 120, you will find the fine tune loop. Those who want to increase the accuracy of the time piece can increase or decrease the number of FOR NEXT revolutions to optimize its time-keeping accuracy. Actually, additional levels of accuracy can be achieved by building similar FOR NEXT loops in lines 140 and 160.

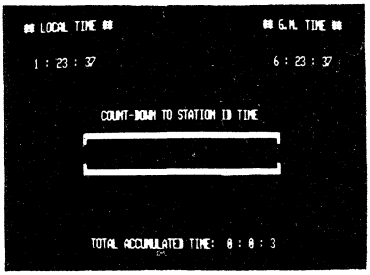
This program was sent to us as an aid to Amatuer Radio enthusiasts. It will keep track of local time, Greenwich Mean Time, elapsed time, as well as flash "Station Identification" prompts at the proper intervals.

While the program functions very well as a "Ham Clock", we felt that some of you might be able to think of some other uses as well, so here it is.

```
10 A=0:B=10:C=0:H=0:I=0:J=0:K=0:L=0:N=0:Y=1
12 CLS:PRINT@340,"HAM RADIO CLOCK"
13 PRINT@704,"FOR INSTRUCTIONS PRESS 1 ELSE 0";:INPUTQ
14 IFQ=1GOSUB1000
15 CLS:PRINT@192,"PRESS ENTER TO SET CLOCK";:INPUTA$
20 CLS
30 PRINT@128,"WHAT IS THE HOUR IN LOCAL TIME (0 TO 23)."
35 INPUT"IF PM, ADD 12 TO THE HOUR (EX. 4PM = 16) ";H:PRINT:PRINT
37 IFH>23GOTO30
40 INPUT"WHAT ARE THE MINUITES IN LOCAL TIME ";M.PRINT:PRINT
50 INPUT"WHAT ARE THE SECONDS IN LOCAL TIME ";C.PRINT:PRINT
60 REM ** LINE 65 ADJUSTS TIMING TO ACCOUNT FOR GRAPHICS
65 CLS.C=C+4:L=2
70 REM ** LINES 74 AND 75 DRAW THE ID BOX **
74 FORX=22TO93:SET(X,22):SET(X,28):NEXTX
```

```
75 SET(22,23):SET(22,27).SET(93,23):SET(93,27)
90 PRINT@64,"** LOCAL TIME **"
95 PRINT@100,"** G.M. TIME **"
96 PRINT@398,"COUNT-DOWN TO STATION ID TIME";
98 PRINT@844,"TOTAL ACCUMULATED TIME:  "
99 REM ** LINES 100 TO 400 SET CLOCK **
100 FORS=0TO60
120 IFS>59M=M+1.C=0:FORZ=1TO20:NEXTZ:GOTO100
140 IFM>59H=H+1:M=0.C=0:GOTO100
160 IFH>23H=0:M=0:C=0:GOTO100
165 A=A-1
170 IFA<0THENB=B-1:A=59
172 IF(B<1)*(A<30)PRINT@529,"ID ..... W A I Y L E ..... ID";
174 REM ** ID SIGN FLASHES FOR 30 SECONDS PER LINE 175 **
175 IF(B=0)*(A=0)THEN B=10
180 L=L+1
182 IFL>59K=K+1:L=0
184 IFK>59J=J+1:K=0
190 PRINT@868,J,":";K;":";L
200 FORN=0TO199:NEXTN
205 REM ** 210 THRU 224 CALCULATE G.M. TIME **
210 G=H+5
220 IFH>18G=H-19
300 PRINT@193,H;":";M;":";S
310 PRINT@237,G;":";M;":";S
370 PRINT@521,"     ";B;" MINUTES       ";A;" SECONDS    ";
400 NEXTS
1000 CLS.PRINT.PRINT
1010 PRINT"WHILE OBSERVING SOME TIME STANDARD SUCH AS WWV OR
1020 PRINT"YOUR WATCH, ENTER THE HOUR AND MINUTES WHEN THE
1030 PRINT"COMPUTER ASKS.  ALL TIMES ARE ENTERED USING THE 24
1040 PRINT"HOUR CLOCK SYSTEM.  DO NOT ENTER HOURS USING DAYLIGHT
1045 PRINT"SAVINGS TIME.":PRINT
1050 PRINT"ENTER SECONDS IN ADVANCE OF THEIR ACTUAL OCCURRENCE.
1060 PRINT"THIS ALLOWS YOU TO PRESS THE ENTER KEY AT THE SAME
1070 PRINT"SECOND AS YOUR TIME STANDARD."
1080 PRINT"THE COMPUTER ADJUSTS FOR ITS OWN DELAY."
1085 PRINT:PRINT"PRESS ENTER TO TURN THE PAGE";:INPUTR$
1090 CLS:PRINT.PRINT
1100 PRINT"THE 'ID COUNT-DOWN' BLOCK IN THE CENTER OF THE SCREEN
```

```
1120 PRINT"WILL FLASH YOUR CALL LETTERS FOR 30 SECONDS EVERY
1130 PRINT"10 MINUTES, REMINDING YOU TO IDENTIFY YOUR STATION.
```




```
1140 PRINT
1150 PRINT"PRINTED AT THE BOTTOM OF YOUR SCREEN IS A TALLY OF
1160 PRINT"YOUR HAM-RADIO TIME.":PRINT
1170 PRINT"THE UPPER RIGHT CORNER SHOWS GREENWICH MEAN TIME.
1180 PRINT:PRINT:PRINT"PRESS ENTER TO BEGIN.";:INPUTA$:RETURN
2000 END
```

CHESS CLOCK

Here's a tournament chess clock program that you can use the next time you feel like getting into some serious playing. Each player is given two hours to win the game, or complete 40 moves. The program is written in Level II BASIC, but will run in Level I machines with the appropriate changes (note REM statements within listing).

```
1900 CLS:Y=7200:Z=7200:T=0
1950 INPUT"PRESS ENTER TO BEGIN THE GAME";A$:CLS:GOSUB2000
1970 H=2:M=0:S=0:GOSUB2300:GOSUB2310
1980 GOTO2100
2000 PRINT@20,"TOURNAMENT CHESS CLOCK":REM LEVEL I SET(127,47)
2005 PRINT@87,"COMPLETE TURNS";T;
2010 PRINT@130,"WHITE TIME REMAINING","BLACK TIME REMAINING"
2020 RETURN
2100 REM WHITE TIMING AREA
2110 Y=Y-1
2115 FORI=1TO240:NEXTI:REM TO460 IF LEVEL I
2116 REM FINE TUNE TIMING FOR WHITE ABOVE
2120 H=INT(Y/3600):M=INT((Y-(H*3600))/60)
2125 S=Y-(H*3600)-(M*60)
```

```
2130 C$=INKEY$:IFC$=""GOSUB2300:GOTO2100
2135 REM IF USING A LEVEL I MACHINE REPLACE 2130 WITH
2136 REM IFPOINT(127,47)GOSUB2300:GOTO2100
2140 GOSUB2000:GOSUB2300
2150 REM IF LEVEL I SET(127,47)
2200 REM BLACK TIMING AREA
2210 Z=Z-1
2215 FORI=1TO240:NEXTI:REM TO460 IF LEVEL I
2216 REM FINE TUNE TIMING ABOVE FOR BLACK
2220 H=INT(Z/3600):M=INT((Z-(H*3600))/60)
2225 S=Z-(H*3600)-(M*60)
2230 C$=INKEY$:IFC$=""GOSUB2310:GOTO2200
2235 REM SEE NOTE LINE 2135
2238 REM IF LEVEL I SET(127,47) HERE
2240 T=T+1:GOSUB2000:GOSUB2310:GOTO2100
2300 PRINT@197,H;":";M;":";S;:RETURN
2310  PRINT@230,H;":";M;":";S;:RETURN
```

TRS-80 PROGRAMMING HINTS For Disk Users

If you are using a disk system and there is no diskette loaded when you try to save a program, the computer will lockup. to save your program, load a diskette, then flip the switch on the back of the disk unit on and off. This should cause your program to be saved instead of returning to the DOS and dumping your program.

If you are developing software on a disk system, protect yourself against a lockup or system crash by making frequent backups on two separate diskettes. Some errors will wipe out an entire diskette. Your frequent backups will then create another problem — which is the latest program ? The solution is to include the date and time in the title when you save the program. For example, SAVE"NO1118CL" might stand for November 11, 1800 hours (6 pm) backup of the program whose title begins with CL. To determine which program is most recent, simply call DIR when the DOS is loaded and read the titles.

ROUTINE: **POPULATION**
LINES: 4000-4280, 4500-4530
PURPOSE: Make changes in population levels based on grain available for consumption
PROCESS: Accepts grain released for consumption, at a minimum of 20 percent of reserves and a maximum of 80 percent of reserves. Serf population depends on grain supply with normal growth at lines 4110 and 4120, bonus for large surplus in 4200 to 4280, and penalties for shortages in lines 4500-4530. Other classes of population increase and decrease with tax levels and grain levels. All calculations are part random.

```
3990 RETURN
3999 ' POPULATION
4000 PRINT
4010 INPUT"HOW MUCH GRAIN WILL YOU RELEASE FOR CONSUMPTION";G!
4020 IF G!<(R(E)/5) PRINT"YOU MUST RELEASE AT LEAST 20% OF YOUR RESERVES":GOTO 4010
4030 IF G!>(R(E)-(R(E)/5)) PRINT"YOU MUST KEEP AT LEAST 20%":GOTO 4010
4035 R(E)=R(E)-G!:CLS:PRINT:PRINT T$(E);N$(E):PRINT
4040 Z=G!/D!-1:IF Z>0 Z=Z/2
4050 IF Z>.25 Z=Z/10+.25
4060 Z%=50-G(E)-H(E)-I(E):IF Z%<0 Z%=Z%*J(E)
4070 Z%=Z%/10:IF Z%>0 Z%=Z%+3-J(E)
4080 Z=Z+(Z%/10):IF Z>.5 Z=.5
4100 IF G!<(D!-1) THEN 4500
4110 A=7:GOSUB 1500
4120 A=3:GOSUB 1510
4130 IF (G(E)+H(E))<35 H(E)=H(E)+RND(4)
4140 IF I(E)<RND(20) N(E)=N(E)+RND(2)-1:Q(E)=Q(E)+RND(3)-1
4190 IF G!<(D!+D!*.3) THEN 4300
4200 Z%=5(E)/1000
4210 Z=(G!-D!)/D!*10
4220 Z=Z*Z%*RND(25)+RND(40):IF Z>32000 Z=32000
4230 Z%=Z:Z=RND(Z%)
4240 PRINT Z;"SERFS MOVE TO THE CITY":S(E)=S(E)+Z
4250 Z%=Z/5:Z=RND(Z%):IF Z>50 Z=50
4260 H(E)=H(E)+Z
4270 N(E)=N(E)+1
4280 Q(E)=Q(E)+2
```

```
4500 X=(D!-G!)/D!*100-9:XZ=X:IF X>65 X=65
4505 IF X<0 XZ=0:X=0
4510 A=3:GOSUB 1500
4520 A=XZ+8:GOSUB 1510
4530 GOTO 4300
```

ROUTINE: **INJUSTICE**
LINES: 4300-4490
PURPOSE: Penalty for harsh or outrageous justice
PROCESS: Serfs flee in random numbers, based on justice level

```
4299 'INJUSTICE PENALTY
4300 IF J(E)<3 THEN 4490
4310 J!=S(E)/100*(J(E)-2)*(J(E)-2)
4320 J!=RND(J!)
4330 S(E)=S(E)-J!
4340 PRINT J!;"SERFS FLEE HARSH JUSTICE"
4490 GOTO 4900
4499 ' FOOD SHORTAGE
```

ROUTINE: **TREASURY**
LINES: 4900-4930
PURPOSE: Pay soldiers, collect income from markets and mills.
PROCESS: Call integer subroutine for serfs.

```
4900 Z=A(E)*75:K(E)=K(E)+Z:IF Z>0 PRINT"YOUR MARKET EARNED";Z;"FLORINS RENT"
4910 IF S(E)<32766 S!=S(E):GOSUB 1320:S(E)=S!
4920 Z=D(E)*(55+RND(250)):IF Z>0 K(E)=K(E)+Z:PRINT"YOUR WOOLEN MILL EARNED";Z;"FLORINS"
4930 Z=P(E)*3:PRINT"YOU PAID YOUR SOLDIERS";Z;" FLORINS":K(E)=K(E)-Z
```

ROUTINE: **INVASION**
LINES: 4940-4990
PURPOSE: Check for inadequate defenses or military imbalance, and call invasion of weakness indicated.
PROCESS: Calculate ratio of soldiers to hectares of land

```
4939 ' INVASION
4940 IF (L(E)/1000)>P(E) THEN 8100
4945 IF (L(E)/500)<P(E) THEN 4980
4950 FOR A=1TOF:IF A=E THEN 4970
4960  IF P(A)>(P(E)*2.4) THEN 8100
4970 NEXT
```

```
4980 INPUT"(PRESS ENTER)";A$
4990 RETURN
```

ROUTINE: **MAP**
LINES: 5000-5990
PURPOSE: Display Resources in graphic form
PROCESS: Calculate upper left corner of wall according to land owned and draw wall. Calculate ratio of soldiers to land and draw large castle, small tower, or no castle. Draw Cathedral in steps, using ON... GOTO... statement. Draw palace in steps, using a for loop and a completion test for the roof. Determine ration of serfs not in the wool industry to land owned and draw ploughman at point indicated by ratio, between top wall and bottom of screen. Draw markets and woolen mills in steps, using for loops. Print Year.

```
4999 ' DRAW MAP
5000 CLS
5010 LZ=(L(E)/1000):IF LZ<10 X=80:Y=27:GOTO 5100
5020 IF LZ<30 X=80:Y=27-(LZ-10):GOTO 5100
5030 IF LZ<50 X=60:Y=27-(LZ-30):GOTO 5100
5040 IF LZ<70 X=40:Y=27-(LZ-50):GOTO 5100
5050 IF LZ<90 X=20:Y=27-(LZ-70):GOTO 5100
5060 IF LZ<110 X=1:Y=27-(LZ-90):GOTO 5100
5070 X=1:Y=7
5100 FOR Z=XTO127:SET(Z,Y):NEXT Z
5110 FOR Z=YTO47:SET(X,Z):NEXT Z
5120 IF(P(E)-5)<(L(E)/1000) THEN 5160
5130 FOR A=X+1TOX+6:FOR B=Y+1TOY+5:SET(A,B):NEXT B:NEXT A:SET(X,Y-1):SET(X+2,Y-1)
     :SET(X+4,Y-1):SET(X+6,Y-1)
5140 IF (P(E)/2)<(L(E)/1000) THEN 5160
5150 FOR A=X+7TOX+10:FOR B=Y+1TOY+5:SET(A,B):NEXT B:NEXT A:SET(X+8,Y-1):SET(X+10,Y-1)
     :RESET(X+3,Y+2):RESET(X+7,Y+4):SET(X+1,Y-1):SET (X+9,Y-1):SET(X,Y-2):SET(X+2,Y-2)
     :SET(X+8,Y-2):SET(X+10,Y-2)
5160 Z=C(E)+1:IF Z>7 THEN Z=7
5170 ON Z GOTO 5250,5240,5230,5220,5210,5200,5100
5180 FOR A=96TO110:SET(A,30):NEXT A:RESET(102,30):RESET(104,30)
5200 FOR A=96TO99:FOR B=24TO29:SET(A,B):NEXT B:NEXT A
5210 FOR A=107TO110:FOR B=24TO29:SET(A,B):NEXT B:NEXT A
5220 FOR B=22TO24:SET(103,B):NEXT B:SET(102,23):SET(104,23)
5230 FOR A=101 TO 105:FOR B=25 TO 26:SET(A,B):NEXT B:NEXT A
```

```
5235 RESET(101,25):RESET(105,25)
5240 FOR A=100TO106:FOR B=27TO29:SET(A,B):NEXT B:NEXT A:RESET(102,29):RESET(104,29)
5250 Z=B(E)*2:IF Z=0 THEN 5300
5255 IF Z>9 SET(73,32):SET(75,32):SET(89,32):SET(91,32):SET(74,31):SET(90,31)
5260 IF Z>8 Z=9:FOR A=80TO84:FOR B=30TO32:SET(A,B):NEXT B:NEXT A:RESET(81,32):
     RESET(83,31):SET(81,29):SET(83,29):SET(82,28)
5270 FOR A=(82-Z)TO(82+Z):FOR B=33TO35:SET(A,B):NEXT B:NEXT A
5280 FOR A=(83-Z)TO(81+Z) STEP 2:RESET(A,34):NEXT A:RESET(82,35)
5300 Z=S(E)-D(E)*100:IF Z<1 THEN Z=1
5305 Z=Z*5/L(E)*10+1:IF Z>10 THEN Z=10
5310 Z=(Z/10)*(45-Y):Z=INT(47-Z)
5320 FOR A=119TO127:SET(A,Z):NEXT A:RESET(122,Z):RESET(123,Z):RESET(125,Z)
5330 FOR A=119TO127 STEP 2:SET(A,Z+1):NEXT A:SET(118,Z-1):SET(127,Z-1)
5400 Z=A(E)*2:IF Z=0 THEN 5500
5410 IF Z>((126-X)-2) Z=((126-X)-2)
5420 FOR A=XTOX+Z STEP 2:SET(A,39):SET(A+1,39):SET(A+1,40):SET(A+1,41):NEXT A
5500 Z=D(E):IF Z=0 THEN 5900
5510 IF Z>(126-X) Z=126-X
5520 FOR A=126-ZTO127:FOR B=45TO47:SET(A,B):NEXT B:NEXT A
5530 FOR A=127-ZTO126 STEP 2:RESET(A,46):NEXT A
5900 PRINT@ 644,"YEAR";
5920 PRINT@ 707,Y(0);
5930 PRINT@ 0,T$(E);N$(E);"
5940 INPUT"(ENTER 0)";A$
5990 RETURN
```

ROUTINE: **INVEST**
LINES: 6000-6550
PURPOSE: Purchase buildings, arm soldiers, call COMPARISON
PROCESS: Print Options, input selection, ON.. GOTO.. Purchases increment item purchased, deduct cost from treasury, buildings increase economic factor. Markets increase merchants, palaces increase nobles, cathedrals increase clergy, soldiers decrease serfs.

```
5999 ' INVESTMENTS
6000 CLS:PRINT:PRINT T$(E);N$(E):PRINT"STATE PURCHASES":PRINT
6010 PRINT"1. MARKETPLACE              1000 FLORINS"
6020 PRINT"2. WOOLEN MILL              2000 FLORINS"
6030 PRINT"3. PALACE (PARTIAL)         3000 FLORINS"
6040 PRINT"4. CATHEDRAL (PARTIAL)      5000 FLORINS"
```

```
6050 PRINT"5. EQUIP ONE PLATOON OF SERFS AS SOLDIERS   500 FLORINS"
6060 PRINT:PRINT"YOU HAVE";K(E);"GOLD FLORINS":PRINT
6070 PRINT"TO CONTINUE, ENTER 0, TO COMPARE STANDINGS, ENTER 6"
6080 INPUT"YOUR CHOICE";I
6090 CLS:IF I<1 RETURN
6100 IF I>5 GOSUB 1000:GOTO 6000
6110 ON I GOTO 6200,6120,6300,6400,6500
6120 D(E)=D(E)+1
6130 K(E)=K(E)-2000
6140 U(E)=U(E)+.25
6150 GOTO 6000
6200 A(E)=A(E)+1
6210 M(E)=M(E)+5
6220 K(E)=K(E)-1000
6230 U(E)=U(E)+.1
6250 GOTO 6000
6300 B(E)=B(E)+1
6310 N(E)=N(E)+RND(2)
6320 K(E)=K(E)-3000
6330 U(E)=U(E)+.5
6350 GOTO 6000
6400 C(E)=C(E)+1
6410 Q(E)=Q(E)+RND(6)
6420 K(E)=K(E)-5000
6430 U(E)=U(E)+1
6450 GOTO 6000
6500 P(E)=P(E)+20
6510 S(E)=S(E)-20
6520 K(E)=K(E)-500
6550 GOTO 6000
```

ROUTINE: **TITLE**
LINES: 7000-7540
PURPOSE: Calculate new title
PROCESS: Each of the significant criteria is examined in turn; markets, palaces, cathedrals, mills, treasury, land, merchants, nobles, soldiers, clergy, serfs, economic factor. Each of them is divided by a equalization factor relative to their importance, then in the subroutine at 7500, their effect on any title is limited so that one factor does not dominate the whole game. The current factor is added to the scores for the previous ones. In

line 7130 the total is divided by the skill level, then the level of justice is subtracted to get the title deserved. Line 7190 tests for the winner of the game.

```
6999 ' CALCULATE NEW TITLE
7000 Z=0
7010 A=A(E):GOSUB 7500
7020 A=B(E):GOSUB 7500
7030 A=C(E):GOSUB 7500
7040 A=D(E):GOSUB 7500
7050 A=K(E)/5000:GOSUB 7500
7060 A=L(E)/6000:GOSUB 7500
7070 A=M(E)/50:GOSUB 7500
7080 A=N(E)/5:GOSUB 7500
7090 A=P(E)/50:GOSUB 7500
7100 A=Q(E)/10:GOSUB 7500
7110 A=S(E)/2000:GOSUB 7500
7120 A=U(E)/5:GOSUB 7500
7130 A=Z/U(0)-J(E):A=INT(A):IF A>8 A=8
7140 IF (Y(0)+2)=O(E) T(E)=T(E)+1
7150 IF T(E)>=A THEN 7490
7160 T(E)=A
7170 RESTORE
7180 FOR B=1 TO (T(E)+Y(E)):READ T$(E):NEXT
7190 IF T(E)=8 THEN 7600
7490 RETURN
7500 IF A>10:A=10
7520 A=INT(A)
7530 Z=Z+A
7540 RETURN
```

ROUTINE: **ROYAL**
LINES: 7600-7610
PROCESS: Announces winner, prints display and comparison, calls END

```
7599 ' KING OR QUEEN
7600 CLS:PRINT:PRINT"GAME OVER ";T$(E);N$(E);" WINS"
7610 GOSUB 5010:GOSUB 1000:GOTO 11010
```

ROUTINE: **BANKRUPT**
LINES: 8000-8050
PURPOSE: Penalizes player who borrows too much money
PROCESS: All buildings are eliminated, all but 6000 hectares of land seized, treasury is set to 100 Florins

```
7999 ' BANKRUPTCY
8000 CLS:PRINT:PRINT T$(E);N$(E);" IS BANKRUPT"
8010 PRINT:PRINT"CREDITORS HAVE SEIZED MUCH OF YOUR ASSETS"
8020 PRINT
8030 INPUT"(PRESS ENTER)";A$
8040 A(E)=0:B(E)=0:C(E)=0:D(E)=0:L(E)=6000:U(E)=1:K(E)=100
8050 RETURN
```

ROUTINE: **INVASION**
LINES: 8100-8290
PURPOSE: Penalty for inadequate defenses
PROCESS: A stronger player invades and seizes land if ratio of soldiers to land falls below 1 to 1000. An invasion is possible with a ratio of less than 1 to 500 if another player is particularly strong. If no other player is stronger, Baron Peppone of Monterana invades. In addition to land lost, some soldiers are killed in battle.

```
8099 ' INVASION (FROM 4940)
8100 Z=0:FOR A=1TOF
8110  IF A=E THEN 8200
8120  IF P(A)<P(E) THEN 8200
8130 IF P(A)<(1.2*(L(A)/1000)) THEN 8200
8140 IF P(A)>P(Z) Z=A
8200 NEXT
8205 IF Z=0 T$(0)=" BARON ":N$(0)="PEPPONE OF MONTERANA":A!=RND(9000)+1000:GOTO 8220
8210 A!=P(Z)*1000-L(Z)/3
8220 IF A!>(L(E)-5000) A!=(L(E)-5000)/2
8230 PRINT T$(Z);N$(Z);" INVADES AND SEIZES";A!
8240 PRINT"HECTARES OF LAND!"
8250 L(Z)=L(Z)+A!:L(E)=L(E)-A!
8260 Z=RND(40):IF Z>(P(E)-15) Z=P(E)-15
8270 PRINT T$(E);N$(E);" LOSES";Z;" SOLDIERS IN BATTLE"
8280 P(E)=P(E)-Z:INPUT"(PRESS ENTER)";A$
8290 RETURN
```

ROUTINE: **INSTRUCTIONS**
LINES: 10000-10170
PURPOSE: Give general idea of game to new player
PROCESS: Material is condensed to fit on screen in one page.

```
9999 'INSTRUCTIONS
10000 CLS:PRINT"SANTA PARAVIA AND FIUMACCIO"
10010 PRINT"  YOU ARE THE RULER OF A 15TH CENTURY ITALIAN CITY-STATE."
10020 PRINT"IF YOU RULE WELL, YOU WILL RECEIVE HIGHER TITLES.  THE"
10030 PRINT"FIRST PLAYER TO BECOME A KING OR QUEEN WINS.  LIFE EXPECTANCY"
10040 PRINT"THEN WAS BRIEF, SO YOU MAY NOT LIVE LONG ENOUGH TO WIN."
10050 PRINT"  THE COMPUTER WILL DRAW A MAP OF YOUR STATE.  THE SIZE"
10060 PRINT"OF THE AREA IN THE WALL GROWS AS YOU BUY MORE LAND.  THE"
10070 PRINT"SIZE OF THE GUARD TOWER IN THE UPPER LEFT CORNER SHOWS"
10080 PRINT"THE ADEQUACY OF YOUR DEFENSES.  IF IT SHRINKS, EQUIP MORE"
10090 PRINT"SOLDIERS!  IF THE HORSE AND PLOWMAN IS TOUCHING THE TOP WALL,"
10100 PRINT"ALL YOUR LAND IS IN PRODUCTION.  OTHERWISE YOU NEED MORE"
10110 PRINT"SERFS, WHO WILL MIGRATE TO YOUR STATE IF YOU DISTRIBUTE"
10120 PRINT"MORE GRAIN THAN THE MINIMUM DEMAND.  IF YOU DISTRIBUTE LESS"
10130 PRINT"GRAIN, SOME OF YOUR PEOPLE WILL STARVE, AND YOU WILL HAVE"
10140 PRINT"A HIGH DEATH RATE.  HIGH TAXES RAISE MONEY, BUT SLOW DOWN"
10150 PRINT"ECONOMIC GROWTH.      (PRESS ENTER TO BEGIN GAME)";
10160 INPUT A$
10170 CLS:RETURN
```

ROUTINE: **END**

```
10999 ' END GAME
11000 GOSUB 5000:GOSUB 1000
11010 PRINT "GAME IS OVER: PRESS ENTER FOR NEW GAME"
11020 INPUT A$
11030 GOTO 10
```

Although it is our intention to publish programs in line listing form for our readers' transcription, we realize that the actual keyboarding may require more time than some are able to devote.

To better serve our readers, prerecorded digital cassettes of this program are being made available for substantially reduced rates from **The TRS-80 Software Exchange**.

If the "prerecorded" route is best for you, simply use the order form in the TRS-80 Software Exchange Market Basket section of this magazine.

Home Financial Management

by M. D. Kelleher

Turn Your Computer Into A Personal Financial Advisor!

If you've been waiting for a personal finance program that's easy to use, yet complete enough to be of real use in your home, check out this list of features:

- **Cost of Borrowing**
- **Balance of Loans Still Owing**
- **Loan Payment Amount**
- **Savings Growth Balance**
- **Growth of Regular Savings Deposits**
- **Dividends and Withdrawals**
- **Earned Interest Rate on Savings and Investments**
- **True Cost of an Automobile**
- **Probability of Obtaining a Loan**
- **Establishment of a Household Budget**

Try doing all that on your household calculator ... or better yet, buy the program — it's cost-effective.

Available on Digital Cassette for Level II 16K — $9.95

TRS-80 Software Exchange

17 Briar Cliff Drive

Milford, New Hampshire 03055

BASIC STATISTICS

This powerful set of procedures is of use to students, instuctors, behavioral and research scientists, statisticians — anyone using these statistical formulas for practical or research applications:

RANK-ORDER DATA A simple program utilizing a Shell-Metzner sorting routine to rank data in an ascending manner.

CENTRAL TENDENCY Given a set of raw data, this program ranks and displays raw data (optional), N, X, X , variance, standard deviation, the Median, and the Mean.

PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT Given N pair (X,Y) of data, the program computes mean, standard deviation for S and Y, and R. An option is available to utilize a regression equation to predict Y given any value of X.

CHI-SQUARE Given raw data for any number of rows and column, the program will optionally display a raw data printout with observed and expected values; row, column, and grand totals; and gives the used CHI and DF.

FISHER T-TEST Given 2 sets of raw data for either equal or unequal N, the program computes and displays N, mean, standard deviation and standard error of the mean for both data samples as well as T and DF.

SIMPLE ANALYSIS OF VARIANCE Given raw data for any number of conditions, the program computes and displays N, Mean and Standard Deviation for each condition as well as SSbg, SSwg, SStot, DFbg, DFwg, DFtot, MSbg, MSwg, and the F.

Z-SCORES AND STANDARD SCORES Given N scores, the program computes a Z-score for each N. The user has an available option to compute a standard score for each N given the desired Population Mean and S.D.

RANDOM NUMBER GENERATOR Given the upper and lower limits, this program produces a list of N random numbers useful in research and experimental design.

NOTE: The basic formulas for these major statistical procedures were derived from the textbook, "Elementary Statistics", by Janet T. Spencer, Benton J. Underwood, Carl P. Duncan, and John W. Cotton. Appleton - Century - Crofts Psychology Series, New York, 1968.

Available on Digital Audio Cassette for the **Level II TRS-80 Microcomputer - $20.00**

TSE TRS-80 Software Exchange

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In the next issue .....

Ten Pin Bowling—superb graphics make this program enjoyable and educational

Kiddy Slot—all the spice without the vice

Graphics Tutorial—because you asked for it

'Round the Horn—a simulated passage from New England to San Francisco — if you're able

Comput-A-Sketch—a TRS-80 drawing program for the whole family

TRS-80 Programming Hints and much more !

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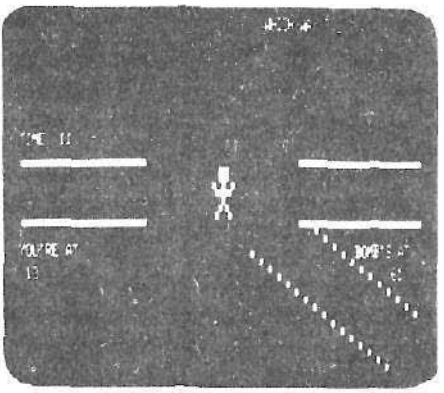
12-78

TIME BOMB

Tick ! Tick ! Tick !



by David Bohlke

Seconds count ... Somewhere deep inside a towering sky-scraper the time bomb is ticking away. Would you be able to *locate and disarm this explosive* device in time to save the building and its inhabitants ? Maybe, but for everyone's sake, you'd better get in a little practice with this computer simulation first !

Available for Level I 4K or Level II 16K — $7.95

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Milford, New Hampshire 03055

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PROGRAM DESCRIPTIONS

RENUMBER -by Lance Micklus
Can renumber a 12K program in just 32 seconds. Complete user control with respect to which lines are renumbered, and how, including all GOSUB's and GOTO's. Runs in 1300 bytes of high memory regardless of program size. Specify 4, 16, 32, or 48K version. Compatible with Disk BASIC. For the Level II TRS-80 Microcomputer.

ACCOUNTS RECEIVABLE -by M.D. Kelleher
Allows for the creation of up to 200 files with account name, invoice number, payment date and balance. Updates files and stores to tape. Offers complete aging data and reveals delinquent accounts. Level II 16K

BREAKAWAY-by Lance Micklus
A challenging "real time" action game of skill and dexterity. All the excitement of the traditional Pinball machine-without the expense! You control the speed and direction of the ball as you try to "Breakaway" the playing field. Easy to play? You bet! Easy to win? Better start practicing.

MOVING SIGNBOARD -by Circle Enterprises
This machine language program is designed to use the TRS-80 as a display device. The user may type-in up to a full screen of text, store it in memory and then cause it to crawl across the screen in the fashion of an electronic marquee.

TRS-80 SLOT MACHINE -by Circle Enterprises
This program simulates (with full graphics) a typical 3-reel casino slot machine with 10 payoff combinations ranging from $2 to $200.

PETALS AROUND THE ROSE -by Circle Enterprises
This is a TRS-80 implementation of the dice game/puzzle described in the Sep/OCT 1977 issue of **Personal Computing Magazine**. The game is both challenging and frustrating for most people.

SCI-FI SAMPLER -by Tim Quinlan
Three science fiction games in one program: Lunar Lander, Star Monster and Space Battle. Instructions are part of the program along with graphic displays.

CONCENTRATION by Lance Micklus
Back in the sixty's, one of the most popular TV game shows in modern history appeared on the air, entertaining millions for years. "Win campers or boxes of nails, win gifts, but take the chance on forfeiting them later in the game." Most of all, concentrate on where these items appear on the play board. This program runs in 16K on either Level I or II ROM, and assures hours of enjoyment—just like you used to!

FILE HANDLING -by Circle Enterprises
A must for file handling in BASIC. Will list names in file, search/edit file, record file on cassette. One use would be to record names and phone numbers, either one callable by the other. Level II 16K

X-WING FIGHTER -by Rev. George Blank
Looking for more realism in "TREK" type programming? Put yourself in the cockpit of this X-wing fighter. Extensive use of the INKEY function puts all of the ship's controls at your ringertips **without** hitting the ENTER key. Long range sensors warn you of approaching aircraft in advance of a visual sighting. When they are close enough to be seen, they will become larger as they get closer. (see advertisement elsewhere in magazine) Level II 16K

THREE D TIC TAC TOE
Everyone knows the game, but how about a 4x4x4 version. This program offers three skill levels for computer competition, and the author warns you to practice before you take on the computer's third skill level. You can also play your easy-to-beat friend, of course. LEVEL I & II 16K.

SMALL BUSINESS BOOKKEEPING-by Roger Robitaille
For scores of years, National Distributing Company has been selling the "Dome Bookkeeping Journal" through stationery and discount stores nationwide. Our Small Business Bookkeeping program is designed to be compatible with that bookkeeping journal. As is appropriate with any business application, we assume no liability whatsoever in regards to the use of this program. The user is expected to assess it based upon its performance as observed. It's not that we don't believe in it, it's just that the conceivable libility for its use (or misuse) is so staggering that you just plain use it at your own risk, or don't use it.

BANKO-by Lance Micklus
Banko is a game similar to Blackjack in principal; however, the game is not conducted in a simple "win/loss" manner. The maximum point is eleven, and the winner wins according to the point difference between the two players. Thus, the game is not over when one player "busts". It is for the other player to maximize his gains by increasing his count toward 11, without going over. Suitable for Level I or II 4K systems.

TIMB BOMB -by David Bohlke
Somewhere inside a towering skyscraper, a time bomb is ticking away. In this game, your mission is to locate the explosive device (no easy task in such a large, maze-like structure) and disarm it within a given time. Level I or II 16K

BLACK JACK-by Milan Chepko
Yes, I know you all have one, but if you are willing to forsake the graphics, many more of the Las Vegas type options are available with this Level I program.

TAROT CARDS-by Frank Rowlett
This is probably the best future gazing type program I have seen. Unlike many programs in the field, whose appeal wear out quickly, the combination of the graphics and the presenation leads to continuing use—try it, you'll like it.

BASIC STATISTICS - by Steve Reisser
This powerful set of procedures is of use to students, instructors, behavioral and research scientist, statisticians — anyone using rand order, central tendency, Pearson product-movement correlation coefficient, chi-square, Fisher T test, sample analysis of variance, Z-scores and standard scores, with a random number generator built in to simulate data.

CRIBBAGE by Roger Robitaille, Sr.
Here it is — the October **SoftSide** feature program on digital cassette. It's a "you vs. computer" Cribbage, played by the standard rules. The computer shuffles, deals, keeps score and wins ...unless you're careful! Suitable for 16K machines.

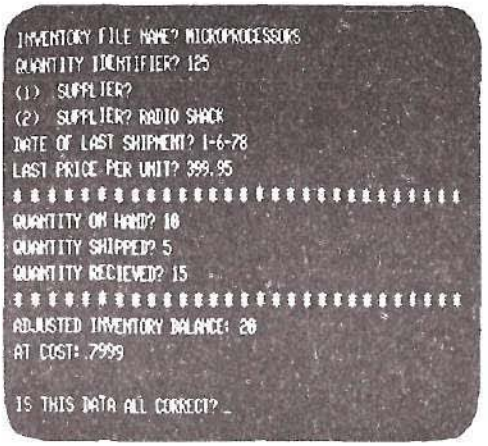
END ZONE - by Roger Robitaille
The October cover program on cassette, to take some of the strain off your fingers. It's 16K TRS-80 football, right down to the 2-minute warning, played in four 15-minute quarters. A 2-player game, Level I or II 16K

STAR TREK III -by Lance Micklus
One of the most advanced Star Trek games ever written. Object is to explore as much of the galaxy as possible, destroy the 20 Klingons and locate the 5 class M planets. Thus, the exploration part of the Enterprise's mission has been added to the game, giving it a whole new dimension. Speaking of dimension, the galaxy is 3 dimensional, not flat like in other versions. Extensive use of graphics is made. During a Klingon battle, you will see the Enterprise fire its phasers, the phasers hit the Klingon and the Klingon explode. And before you go charging off, you must be careful of the large stars and black holes, as well as the pulsar. But there's more; the pulsar makes space noise in adjacent quadrants. The only way to find a Klingon in those quadrants is to explore them. And you never can tell in which one of them a Klingon might be hiding. Also, when you dock at a Star Base, you must control you speed. Otherwise, you'll have a collision but won't dock. At the end of the game, you return to Star Fleet Headquarters, where the data you've been gathering in your ship's computer will be evaluated and your performance rated. 16K Level II only. Takes about 2 hours to play a game.

INVENTORY MANAGEMENT SOFTWARE

INVENTORY FP

This is a Front Panel approach to Inventory management. Available only for Level II machines, it is for those who never want to type LIST. It handles up to 100 stock items with primary and backup vendor and allows for stock on order and date last shipment received information. The major difference between this system and the **Modular** system is that all information including character strings, is contained in subscripts and thus recordable separately from the program.



If your inventory exceeds 100 stock items, it should be a simple matter to segregate stock into logical subdivisions with separate data files. Two programs are included on one cassette (Initialization & Maintenance).

Above, Inventory FP by M. Kelleher

INVENTORY SUPER PAC

This inventory program makes maximum use of available memory. It is especially useful in a real time 'amount on hand' environment, and will yield only the count. If your purposes require such features as automatic reordering and on line supplier information, we suggest that you look at one of the other inventory management programs. A good example of use would be a retail tire business where the ability to quickly determine the stock level of a certain type tire and to change it a sales occur and shipments arrive, is a necessity

VERSION I 1500 items stored in quantities of up to 999
VERSION II 2200 items stored in quantities of up to 99
VERSION III 6000 items stored in quantities of up to 9
VERSION IV 750 items stored in quantities of up to 99 and price information of up to four digits

NOTE: Items are callable by code number. A separate log is required to keep track of what the code calls represent.

INVENTORY [MODULAR]

This inventory program runs on Level I or II TRS-80 Microcomputers. Its construction permits the user to create subroutines customized to his own purpose. One of the main features of this program allows for the inclusion of Alphabetic information and a Data Index Code in the form of data statements within the program. The result is performance and flexibility unmatched by our other Inventory Software. All versions include;

1. **Reports**-user specifies up to three numeric and either or both alpha informations to be listed and can be vendor specific
2. **Cost/value Summary**-searches all stock areas and reports Cost/value Quantity, Total Value by line item and Grand Total
3. **Reorder Search**-compares current stock level against specified reorder point and displays on screen all line items in need of reorder, along with tentative reorder information
4. **Index**-uses arbitrary file numbers reflecting the order in which the data codes are stored. Index will reveal the file names and file numbers in groups of 24 for use in other data calls.
5. **Detailed Rept**-every stock file is callable by file number to reveal all memory information regarding that item
6. **Read and Write File**-stores and reenters data from day to day
7. **Data Change**-updates Data Base

Runs on Level I and II.
REQUIRES 16K (SPECIFY VERSION WHEN ORDERING)

VERSION I 240 stock items can be contained using the full 8 data areas and two pieces of Alpha information

VERSION II 290 stock items can be contained using 6 data areas and two pieces of Alpha information.

VERSION III 450 stock items, Simplified report with no reorder search, allows one piece of Alpha information (description) and three data areas (quantity on hand, cost price, sales history)

SUMMARY

INVENTORY SUPER PAC	**LEVEL I**	**4K**	**$10**
INVENTORY MODULAR	**LEVEL I & II**	**16K**	**$20**
INVENTORY FP	**LEVEL II**	**16K**	**$25**

Order from:

TSE **TRS-80 Software Exchange**
17 Briar Cliff Dr. Milford, NH 03055

PILLBOX by Gene Perkins
This program simulates an artillery battle between two fixed implacements. A two-player game, each player controls the angle of fire and the muzzle velocity of the shell. The game places a mountain between the warring batteries and lets the laws of physics take over. A really good game, easily fitting a 4K machine.

8080 TO Z-80 CONVERSION-by M. Kellher
What can we say! For you machine language buffs, here is a program which permits you to enter 8080 codings and the program will return the Z-80 equivalent. It will also store these equivalents in the order in which they were entered, for later review.

BIORHYTHM-by James Penny
There is a theory that everyone is subject to a group of life cycles which, together, effect our daily life. The rates of those cycles are mathematically fixed and lend themselves to computer analysis. This program unravels those interrelated formulas into a meaningful graphic presentation. Runs in 4K Level I.

BINGO CALLING PROGRAM -by Tim Quinlan
This is a great program for the family or small groups. It picks a number and displays it in screen size characters. It then displays a table of all the calls up to that time. When someone has a bingo, there's a number checking routine at the end.

OTHELLO III -by Tim Quinlan
A strategy game played on an 8 x 8 board. The object of the game is to capture as many of the squares as possible. You can play against the computer, a friend or have the computer play against itself. Has an interesting graphics display.

GALACTIC BLOCKADE RUNNNER -by Tim Quinlan
You are the captain of a federation starship battle cruiser. Your mission is to run an enemy blockade and to deliver vital supplies to federation forces under siege on Planet M/5. You control your ship's course and speed along with the firing of its weapons. You will have to fight battle after battle successfully to reach your destination. Besides the enemy, you will have to cope with ship malfunctions and ion storms.

GAMES/GROUP I -by Tim Quinlan
There are four games in this package, starting off with an old favorite (for computerists, that is) Hammurabi. The other games are Concentration 1, which is based on the TV game, Russian Roulette, play with the computer or a friend, and UFO, a space war game.

REMAINDER by Lance Micklus
A real good way to show off your TRS-80. It's a "find my number" game for people with 64K of head space. **Warning:** Don't leave this game loaded in your computer and walk away. Or, when you return, you'll find a crowd playing thes game. (Worse yet, they won't let you have your machine back.)

TREASURE HUNT by Lance Micklus
This is a challenge, so don't cheat and read the program listing. Use your imagination. You are exploring caves and trying to find 20 treasures. Some are easy to get, others are very difficult because you have to figure out how. When you first play, you will probably make a lot of mistakes. The more you play this game, the more secrets you will discover, and thus, the more treasure you will find. All 20 treasures can be found in about an hour of play if you know what you're doing. Your first problem is to draw a map of the caves. However, to save you time, a map is enclosed. Good luck, you're gonna need it.

CHECKERS by Don McAllister
A Level I machine with 4K of memory is all you need to have a checkers partner on call whenever you're in the mood. The program is written in BASIC, but is suprisingly fast and competitive for such a small program.

TEST FOR INDEPENDENT VARIABLES -by Steven Hebbler
Computes for Mean, Standard Deviation, N, Degrees of Freedom, and probability of occurrence. Level II 4K

METRIC/ENGLISH CONVERTER -by Steven Hebbler
Conversion of length, weight, volume, temperature, and area are all provided for in this Level I or II 4K program.

HANGMAN, 2-PLAYER OR SOLITARY -by Robert Harkins
The game of Hangman just the way you remember playing it. Excellent graphics. Level II 4K

PORK BARREL -by Rev. George Blank
"The game that Congressmen never stop playing ... re-election". So begins this 16K Level II masterpiece by the author of the December SoftSide's cover program, **Santa Paravia en Fiumaccio**. Put yourself in the shoes of an aspiring Congressman. Given a breakdown of your constituency by percentages; white collar, retired, farm worker, unemployed, welfare, blue collar, elderly, and many more, how would you vote on various sensitive issues? In **PORK BARREL**, you get to put your vote where your mouth is. Don't worry, the voters in your district will let you know how they feel!

TROLL'S GOLD -by Rev. George Blank
A chase game for children of all ages. The troll is deep within the caves. Your goal is to descend to his gold-filled lair and escape with the booty without him catching you. Level II 16K

MASTERMIND II-by Lance Micklus
Lots of people have written digital MASTERMIND programs that create the code and give you the clues. This one will also let you make the code and give the clues. You can play either way or take turns with the computer. 10 rounds make up a game, and at the end of each round, player averages are displayed. Because this is a machine language program, it takes the computer 3 seconds or less to come up with a guess. Both Levels I and II versions are supplied. Level I loads with the CLOAD command, and Level II with the SYSTEM command (file name MSTR). Loads into memory addresses 5000 to 7FF0 and thus requires 16K of memory.

PROGRAM	PRICE	LEVEL	MEMORY
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Personal Finance	9.95	I & II	4K
Home Financial Mgt	9.95	II	16K
Mortgage Calculation	3.95	II	4K

HANGMAN [Level I]-by Roger Robitaille
The age old pencil game has been tamed in Level I. For those who don't know the game, it is the original "guess my word in X number of tries" game. Originally in two versions, improvements have permitted this Program to play both a solitary and a two-player version. To be acceptable to Level I BASIC, the words must be coded in numeric equivalents, but the ever available conversion chart lessens the confusion. The displays are alphabetic.

PERSONAL FINANCE PACKAGE -by Tim Quinlan
This package contains 3 programs to aid you in handling your personal finances. The first is a Checking Account Program to help you keep track of checks, deposits, interest, charges, transfers, etc., along with computing your balance. It has a lot of nice features, including a fast method of data retrieval. The second program helps you keep track of your Budget and the final program computes interest on loans, mortgages and charge accounts.

HAM RADIO CLOCK -by Peter Ashley
A versatile time-keeping program which will track local, Greenwich Mean, elapsed time and flash prompts for station identification at proper intervals. Level I or Level II.

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SPELLING BEE by Lance Micklus
Displays a correctly spelled word, then asks player to type it out on the keyboard. Words are chosed at random and the order is not duplicated from session to session. May be updated by changing words in DATA statements as student's ability increases.

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