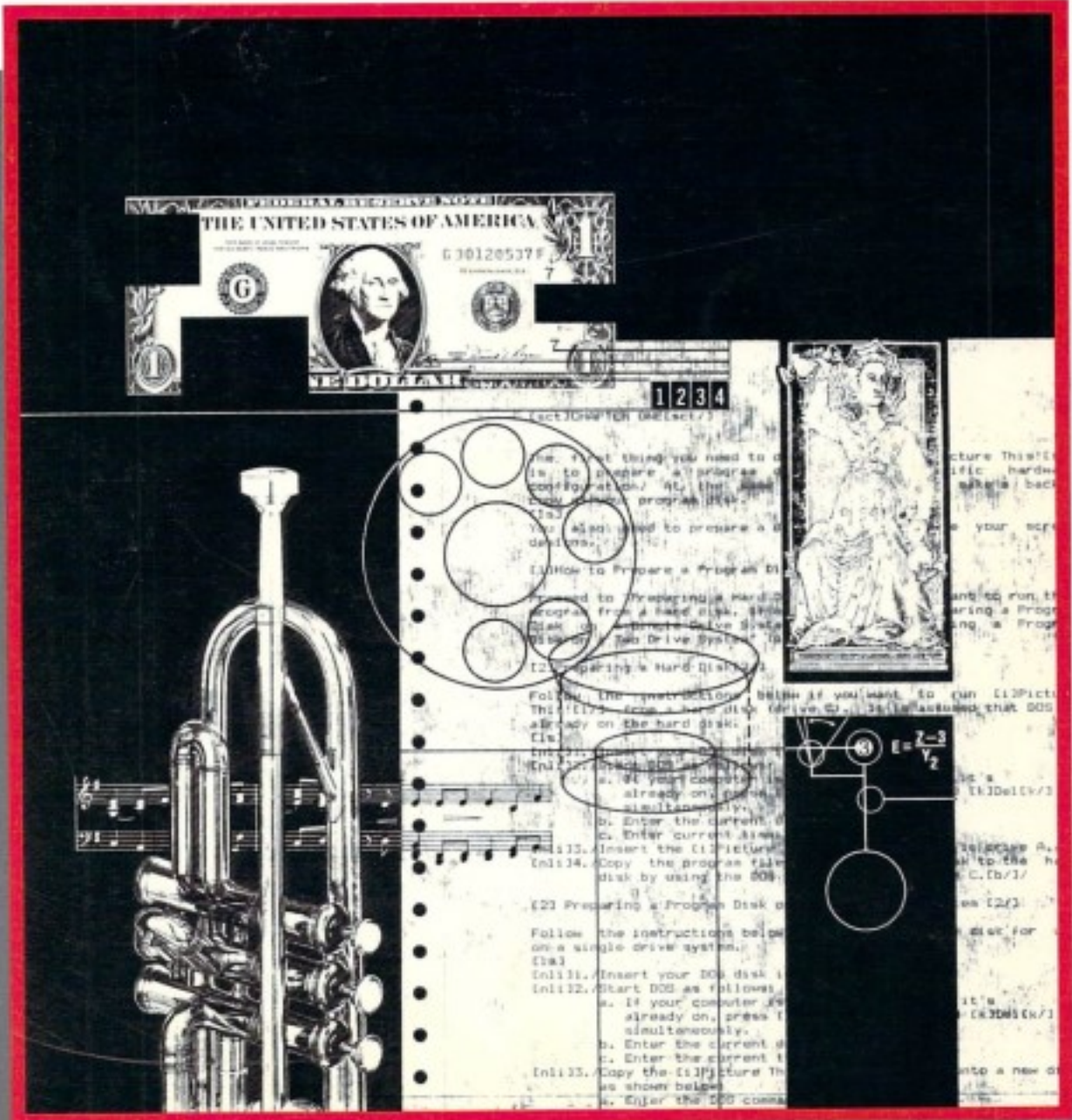


Mostly BASIC: Applications for Your Commodore 64™

Book 1

Howard Berenbon





**Mostly BASIC:
Applications for Your Commodore 64
Book 1**



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**Mostly BASIC:
Applications for Your
Commodore 64
Book 1**

**by
Howard Berenbon**

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Preface

The microcomputer has come a long way since the 1975 introduction of the Altair 8800. It required program entry, in binary, through "front panel" switches. But now there are several different microcomputer systems to choose from. Most include a typewriter-style keyboard, some sort of video graphics display, and a BASIC language resident in ROM.

This book is written for the hobbyist who owns a Commodore 64 computer. It's composed of 38 chapters filled with useful BASIC programs for the home and office. It can help the hobbyist save money on energy usage, keep a record of medical expenses, make a bar chart of business sales, teach foreign languages, and dial the telephone.

As an added feature, an educational Dungeons and Dragons* game program is included. It's called the Dungeon of Htam. It's a two level Dungeon where the player must answer math questions as he wanders through the maze. He receives gold for a correct response, and will lose gold for an incorrect response. His goal is to find the way out of the Dungeon, with as much gold as possible.

Also included is the Tarot Card Reader. It's a program based on the ancient deck of 78 cards, used in fortune-telling.

The last section in the book includes six chapters on graphics and sound. The programs include a joystick message writer that uses the joystick for typing instead of the keyboard (may be used to aid the handicapped), an electronic harpsichord that simulates the sound of a harpsichord and five other musical instruments, electronic dice, a color crosshatch to check the linearity of your television picture, a moving stars simulation, and a joystick test program with sound.

The programs are written in Commodore 64 BASIC for the Commodore 64 computer. Many will RUN with slight modifications in other microcomputer BASICs. In some cases, the programs contain additional lines to ensure some compatibility with the many dialects of BASIC.

The programs listed are only a fraction of the useful and practical programs that will be available to the computer hobbyist.

The application of the home computer is only limited by the imagination.

HOWARD BERENBON

*Dungeons and Dragons is a registered trademark of TSR Hobbies, Inc.

*To my family and friends whose encouragement
and constructive criticism was welcomed and appreciated.*

*I would like to thank Rick and Jo Ann
for their help with program loading and testing.*

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SECTION I

Real Time Applications

This book begins with 4 “real time” applications for your microcomputer. They are a telephone dialer, a combination lock, a timer, and a digital stopwatch. Most require a simple hardware interface, for connection to the “outside world.”

The Commodore 64* computer has a Serial Port which may be used for interfacing the system to the “outside world.” The basic interface circuit, as shown in Fig. I-1, consists of 2 resistors, one transistor, one diode, a miniature relay, and a 9-volt battery.

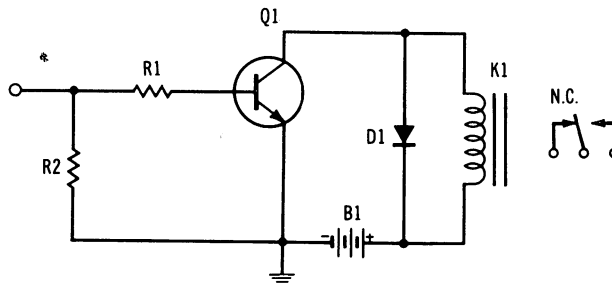


Fig. I-1. Interface circuit.

*Commodore 64 is a registered trademark of Commodore Business Machines, Inc.

CHAPTER 1

BASIC Telephone Dialer

Here's an excellent application for your home computer. It's a telephone dialer program, written in BASIC, for your microcomputer. The program listing is given in Program 1-1.

THE PROGRAM

The program accesses phone numbers by comparing your string input (any string of characters) to the phone number list, stored in DATA statements beginning at program line 1000. If the entry is not found, then the program will display ENTRY NOT FOUND. When the entry is found, the number is dialed and displayed, one digit at a time. Pulses are outputted to the interface circuit through the i/o port of the computer, simulating the action of a rotary dial.

ENTERING PHONE NUMBERS

The phone numbers are entered in the following format:

```
1010 DATA "NAME",5,5,5,1,2,1,2,55
```

Separate each digit with a comma. The last entry must be 55. This is used to stop the dialing process. Also, the last data statement must be DATA "END". The number of phone numbers in your list is limited by your RAM memory size.

HARDWARE

A simple interface circuit is required to operate the dialer. It's connected in series with L1 of the

phone, using the normally closed (N.C.) contacts of relay K1; it works with both dial and pushbutton phones (see Note 1-1).

NOTE 1-1

This device may be added to a privately owned home or company internal phone system. It is not intended to be connected directly to a subscriber's telephone set without compliance to local telephone company regulations. It is intended for demonstrating a practical application for the home computer.

INTERFACE

The interface circuit is shown in Fig. 1-1 and the parts list is given in Table 1-1. It consists of two 5.6 k Ω resistors, one 2N2222A NPN transistor, one 1N914 silicon diode, a 5- or 6-V dc miniature relay, and a 9-volt battery.

The interface is connected to the Commodore 64 Serial Port. The connector is a 6-pin DIN jack located on the back-center of the cabinet. The interface is connected to pin 2 and pin 3. Pin 2 is the ground and pin 3 is the output. The statement POKE 56576,151 activates the circuit, and POKE 56576,159 deactivates it. The normally closed contacts (N.C.) of relay K1 are connected in series with L1 of the phone (see Note 1-1).

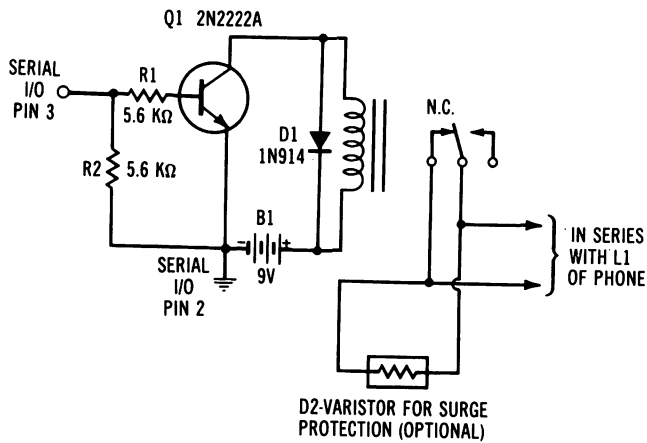


Fig. 1-1. Interface circuit.

Table 1-1. Parts List for Interface Circuit

Item	Description
B1	Battery, 9-V transistor
D1	Diode, silicon, 1N914 or equiv
D2	Varistor, GE-V82ZA12 (Optional for surge protection)
K1	Relay, 5- or 6-V dc, 500-ohm, spdt (Radio Shack 275-004 or equiv)
Q1	Transistor, NPN, 2N2222A or equiv
R1, R2	Resistors, 5.6 kΩ, ½ W
Misc	Battery clip

OPERATION

After you run the program, you have 3 options:

1. Print the phone number list by entering an L.
2. Access a phone number for dialing by entering a D.
3. Repeat the last number dialed by entering an R.

To dial a number, enter a D for the dial mode, then lift the telephone receiver and wait for a dial tone. Finally, enter the string access code of the

phone number that you want dialed. See Fig. 1-2 for a sample run.

To stop the program depress the RUN/STOP and RESTORE keys.

```

PHONE DIALER PROGRAM
COPYRIGHT (C) 1984 BY HOWARD BERENBON
INSTRUCTIONS?
ENTER 'L' TO PRINT PHONE # LIST
ENTER 'D' TO DIAL A NUMBER
ENTER 'R' TO REPEAT LAST NUMBER
? L

                PHONE NUMBER LIST
TIME           4 7 2 1 2 1 2
WEATHER       9 3 2 1 2 1 2
HARRY         5 5 5 1 2 8 2
FIRE          9 1 1
POLICE        9 1 1
LONG DISTANCE 1 2 1 3 5 5 5 1 2 1 2
RICK          5 5 5 5 2 1 9
DAVE          5 5 5 1 9 6 3
BRUCE         5 5 5 2 8 9 7
COMPUTER CENTER 5 5 5 2 1 5 1

INSTRUCTIONS?
ENTER 'L' TO PRINT PHONE # LIST
ENTER 'D' TO DIAL A NUMBER
ENTER 'R' TO REPEAT LAST NUMBER
? D

LIFT TELEPHONE RECEIVER BEFORE DIALING
WAIT FOR A DIAL TONE

ENTER ACCESS CODE (ANY STRING OF CHARACTERS)
? DAVE

SEARCHING LIST FOR DAVE

DIALING DAVE
5 5 5 1 9 6 3
DIALING COMPLETE

INSTRUCTIONS?
ENTER 'L' TO PRINT PHONE # LIST
ENTER 'D' TO DIAL A NUMBER
ENTER 'R' TO REPEAT LAST NUMBER
?

```

Fig. 1-2. Basic Telephone Dialer sample run.

Program 1-1. BASIC Telephone Dialer Program Listing.

```
100 PRINTCHR$(147):POKE 56576,159
110 PRINT"COMMODORE 64 PHONE DIALER PROGRAM"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
130 PRINT
140 GOTO 770
150 PRINT"LIFT RECEIVER BEFORE DIALING"
160 PRINT"WAIT FOR A DIAL TONE"
170 PRINT
180 PRINT"ENTER ACCESS CODE (ANY STRING)"
190 INPUT A$
200 PRINTCHR$(147)
210 PRINT"SEARCHING LIST FOR ";A$
220 READ C$
230 IF C$="END" THEN 440
240 IF C$<>A$ THEN 410
250 REM DIALING NUMBER FROM DATA
260 PRINT
270 PRINT"DIALING ";A$
280 READ C
290 IF C=55 THEN 730
300 PRINT C;
310 IF C=0 THEN 870
320 REM DIAL PHONE # 1 DIGIT AT A TIME
330 GOSUB 480
340 POKE 56576,151
350 GOSUB 510
360 POKE 56576,159
370 GOSUB 540
380 C=C-1
390 IF C=0 THEN 280
400 GOTO 340
410 READ C
420 IF C=55 THEN 220
430 GOTO 410
440 PRINT"ENTRY NOT FOUND"
450 RESTORE
460 PRINT
470 GOTO 140
480 FOR A=1 TO 208
490 NEXT A
500 RETURN
510 FOR A=1 TO 38
520 NEXT A
530 RETURN
540 FOR A=1 TO 25
550 NEXT A
560 RETURN
570 GOSUB 590
580 GOTO 770
590 PRINT TAB(12)"PHONE NUMBER LIST"
600 PRINT
610 READ A$
620 PRINT A$,
```

Program 1-1—cont. BASIC Telephone Dialer Program Listing.

```
630 IF A$="END" THEN 700
640 READ A
650 IF A=55 THEN 680
660 PRINT A;
670 GOTO 640
680 GOSUB 890
690 GOTO 610
700 PRINT
710 RESTORE
720 RETURN
730 PRINT
740 PRINT"DIALING COMPLETE"
750 PRINT
760 RESTORE
770 PRINT"INSTRUCTIONS?"
780 PRINT
790 PRINT"ENTER 'L' TO PRINT PHONE # LIST"
800 PRINT"ENTER 'D' TO DIAL A PHONE NUMBER"
810 PRINT"ENTER 'R' TO REPEAT LAST #"
820 INPUT R$
830 IF R$="R" THEN 200
840 IF R$="D" THEN 150
850 IF R$="L" THEN 570
860 GOTO 770
870 C=10
880 GOTO 320
890 PRINT
900 FOR X=1 TO 700
910 NEXT X
920 RETURN
980 REM DATA STORAGE BEGINS AT LINE 1000
990 REM ENTER LAST DATA STATEMENT AS-DATA "END"
1000 DATA "TIME",4,7,2,1,2,1,2,55
1010 DATA "WEATHER",9,3,2,1,2,1,2,55
1020 DATA "HARRY",5,5,5,1,2,8,2,55
1030 DATA "FIRE",9,1,1,55
1040 DATA "POLICE",9,1,1,55
1050 DATA "LONG DISTANCE",1,2,1,3,5,5,5,1,2,1,2,5
1060 DATA "RICK",5,5,5,5,2,1,9,55
1070 DATA "DAVE",5,5,5,1,9,6,3,55
1080 DATA "BRUCE",5,5,5,2,8,9,7,55
1090 DATA "COMPUTER CENTER",5,5,5,2,1,5,1,55
1100 DATA "END"
```


CHAPTER 2

Combination Lock

The Combination Lock program will allow your computer to accept input of a combination, to activate a control circuit. It can be used to open a safe, turn on a light, switch on your tv, or unlock a door. The program is written in BASIC for your microcomputer. An interface circuit is required for operation. See Program 2-1 for the program listing.

INTERFACE

The interface and control circuit is shown in Fig. 2-1. The parts list is given on Table 2-1. It connects to the Commodore 64 Serial Port. The connector is a 6-Pin DIN jack located on the back-center of the cabinet. The interface is connected to pin 2 and pin 3. Pin 2 is the ground and pin 3 is the output. The statement POKE 56576,151 activates the circuit, and POKE 56576,159 deactivates it. The normally open contacts (N.O.) of relay K1 operate the control circuit. Relay K2 is a power relay for controlling lights or appliances.

PROGRAM

In the load mode, the Commodore 64 program allows entry of numbers and letters for the combination, limited to 79 characters. After entering the access mode, the program is locked into that mode. Entering the correct combination will activate the control circuit, and OPEN will be displayed. Entering a C will deactivate it. If there is an error in entry, it will display ERROR, RE-ENTER. After 3 unsuccessful tries, it will display NO ENTRY. Depress the RUN/STOP and RE-STORE keys to stop program.

USES

Computerized Lock

A solenoid may be used in place of K2, to design a computer activated lock. See Fig. 2-2 for the circuit changes. K1 and B1 are the same as in Fig. 2-1. The solenoid is a 6-volt, 2-oz at 1/4" limit. The plunger of the solenoid is used to latch the lock on a door or safe.

A "foolproof" system would require an external keypad for entering the combination. This will eliminate direct access to the computer, to prevent tampering with the program.

Light or Appliance Lock

A light or appliance may be activated with the program. The appliance is plugged into the ac outlet box for activation.

See Fig. 2-3 for a sample run.

Table 2-1. Parts Lists for Interface and Control Circuits

Item	Description
B1	Battery, 9-volt transistor
B2	Battery, 6-volt lantern
D1, D2	Diode, silicon, 1N914 or equiv
K1	Relay, 5- or 6-V dc, 500-ohm, spst (Radio Shack 275-004 or equiv)
K2	Relay, 6-V dc, 350-ohm, spdt, contacts rated at 3.5A, 117-V ac (Allied Electronics 802-1880, series 1345 or equiv)
Q1	Transistor, NPN, 2N2222A, or equiv
R1, R2	Resistor, 5.6 k Ω , 1/2 W
Misc	Ac outlet box; 117-V ac line cord with plug; battery clips

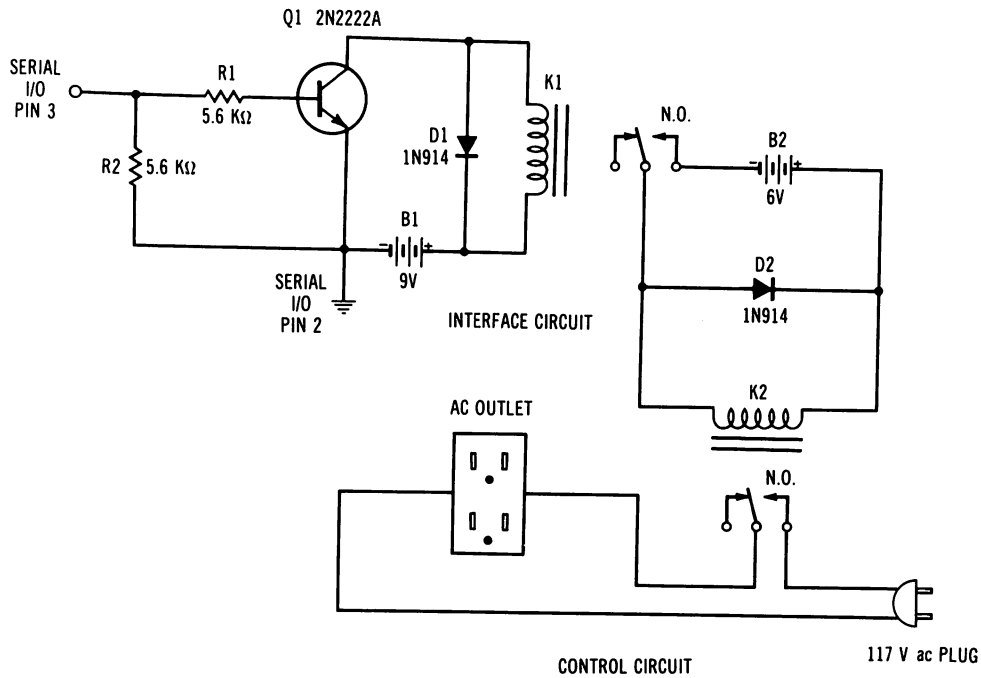


Fig. 2-1. Interface and control circuits.

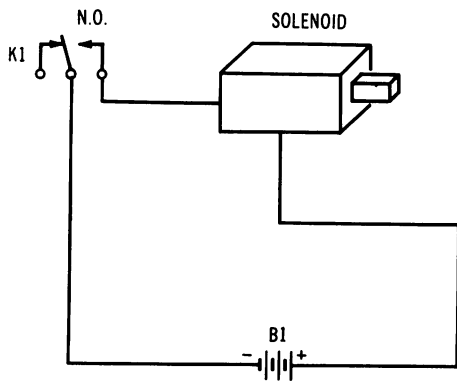


Fig. 2-2. Solenoid circuit for computerized lock.

COMBINATION LOCK
 COPYRIGHT (C) 1984 BY HOWARD BERENSON

ENTER MODE?
 '1' TO LOAD NEW COMBINATION
 '2' TO ACCESS COMBINATION LOCK
 ? 1
 LOAD NEW COMBINATION
 ENTER UP TO 250 CHARACTERS,
 LETTERS AND/OR NUMBERS
 ? 2054ABCDEF GH

COMBINATION LOADED
 ENTER MODE?
 '1' TO LOAD NEW COMBINATION
 '2' TO ACCESS COMBINATION LOCK
 ? 2

ACCESS MODE
 ENTER COMBINATION
 ? 2054ABCDEF GH
 OPEN
 ENTER A 'C' TO CLOSE
 ? C
 CLOSED

ACCESS MODE
 ENTER COMBINATION
 ?

Fig. 2-3. Combination Lock sample run.

Program 2-1. Combination Lock Program Listing.

```
100 PRINTCHR$(147):POKE 56576,159
110 PRINT"COMBINATION LOCK:COMMODORE 64"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
130 PRINT
140 PRINT"ENTER MODE?"
150 PRINT"'1' TO LOAD NEW COMBINATION"
160 PRINT"'2' TO ACCESS COMBINATION LOCK"
170 INPUT A
180 IF A=1 THEN 210
190 IF A=2 THEN 270
200 GOTO 140
210 PRINT"LOAD NEW COMBINATION"
220 PRINT"ENTER UP TO 79 CHARACTERS,"
230 PRINT"LETTERS AND/OR NUMBERS"
240 INPUT A$
250 PRINT"COMBINATION LOADED"
260 GOTO 140
270 PRINTCHR$(147)
280 PRINT"ACCESS MODE"
290 PRINT
300 PRINT"ENTER COMBINATION"
310 N=3
320 N=N-1
330 INPUT B$
340 IF A$<>B$ THEN 470
350 GOSUB 500
360 POKE 56576,151
370 PRINT"ENTER A 'C' TO CLOSE"
380 INPUT C$
390 IF C$<>"C" THEN 370
400 POKE 56576,159
410 PRINT"CLOSED"
420 FOR A=1TO1875
430 NEXT A
440 GOTO 270
450 PRINT"NO ENTRY"
460 GOTO 460
470 IF N=0 THEN 450
480 PRINT"ERROR, RE-ENTER"
490 GOTO 320
500 PRINT"OPEN"
510 RETURN
```

CHAPTER 3

The Time Machine

Here's a program that allows your computer to operate as a 24-hour digital clock and timer, for controlling lights or appliances plugged into a power control circuit. It's written in BASIC for your microcomputer. A simple interface circuit is required for interfacing your computer to the "outside world." See Program 3-1 for the program listing.

THE PROGRAM

The program accepts entry of the 24-hour time, the time for circuit activation, and the time for circuit deactivation. After entering a 1 to begin, the program displays the 24-hour time, the activation time, and the deactivation time in hours and minutes. After each minute has passed, the display is updated. When the timer reaches the activation time, the circuit is activated, and **CIRCUIT ACTIVATED** is displayed. When it reaches the deactivation time, the circuit is deactivated, and **CIRCUIT DEACTIVATED** is displayed. See Fig. 3-1 for a sample run.

Table 3-1. Parts Lists for Interface and Control Circuits

Item	Description
B1	Battery, 9-volt transistor
B2	Battery, 6-volt lantern
D1, D2	Diode, silicon, 1N914 or equiv
K1	Relay, 5- or 6-V dc, 500-ohm, spdt (Radio Shack, 275-004 or equiv)
K2	Relay, 6-V dc, 350-ohm, spdt, contacts rated at 3.5A, 117-V ac (Allied Electronics 802-1880, series 1345 or equiv)
Q1	Transistor, NPN, 2N2222A or equiv
R1, R2	Resistor, 5.6 k Ω , 1/2 W
Misc	Ac outlet box; 117-V ac line cord with plug; battery clips

INTERFACE

The interface circuit and control circuit are shown in Fig. 3-2. The parts list is given in Table 3-1. It connects to the Commodore 64 Serial Port. The connector is a 6-Pin DIN jack located on the back-center of the cabinet. The interface is con-

```
THE TIME MACHINE
COPYRIGHT (C) 1984 BY HOWARD BERENSON

THE TIME MACHINE WILL TURN YOUR
SYSTEM INTO A TIMER, FOR CONTROLLING
LIGHTS OR APPLIANCES.

ENTER THE CURRENT 24 HOUR TIME IN HRS
AND MINUTES (HRS,MIN)
? 15,20

ENTER THE ACTIVATION TIME (24 HR)
IN HRS AND MINUTES (HRS,MIN)
? 21,00

ENTER THE DEACTIVATION TIME (24 HR)
IN HRS AND MINUTES (HRS,MIN)
? 25,15

ENTER A '1' TO START THE TIMER
? 1

THE TIME MACHINE
24 HR TIME
HRS 15 : MIN 20

ACTIVATION TIME
HRS 21 : MIN 0

DEACTIVATION TIME
HRS 25 : MIN 15
```

Fig. 3-1. Time Machine sample run.

nected to pin 2 and pin 3. Pin 2 is the ground and pin 3 is the output. The statement POKE 56576, 151 activates the circuit, and POKE 56576,159

deactivates it. The normally open contacts (N.O.) of relay K1 operate the power control circuit, for controlling lights or appliances.

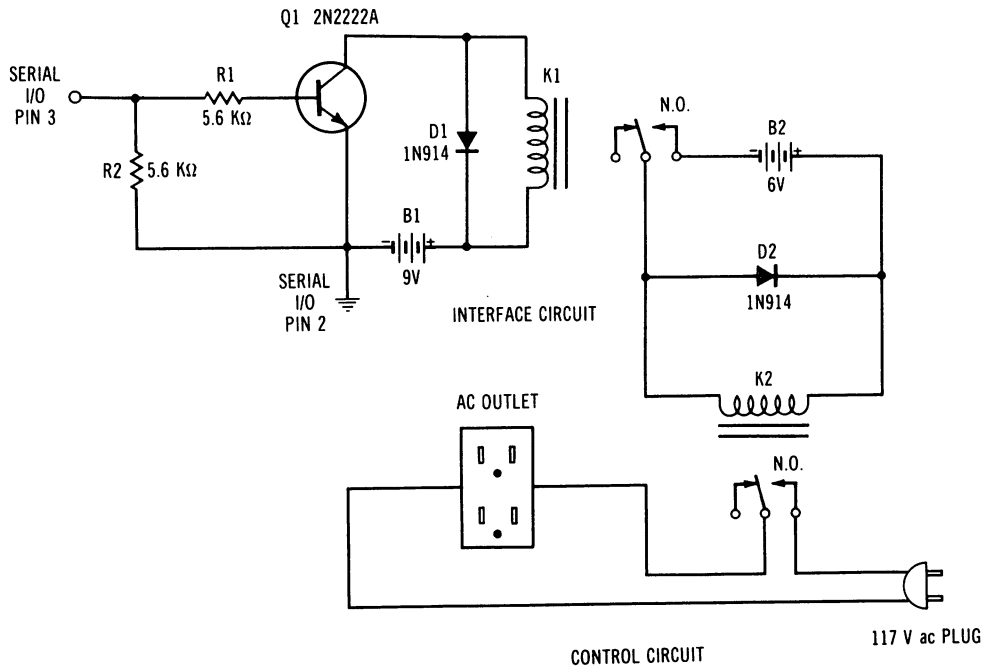


Fig. 3-2. Interface and control circuits.

Program 3-1. Time Machine Program Listing.

```
100 POKE 56576,159
110 PRINTCHR$(147);"THE TIME MACHINE:COMMODORE 64"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON":PRINT
130 PRINT"THE TIME MACHINE WILL TURN YOUR"
140 PRINT"SYSTEM INTO A TIMER, FOR CONTROLLING"
150 PRINT"LIGHTS OR APPLIANCES":PRINT
160 PRINT"ENTER THE CURRENT 24 HOUR TIME IN HRS"
170 PRINT"AND MINUTES (HRS,MIN)"
180 INPUT H,M:PRINT
190 PRINT"ENTER THE ACTIVATION TIME (24 HR)"
200 PRINT"IN HRS AND MINUTES (HRS,MIN)"
210 INPUT I,N:PRINT
220 PRINT"ENTER THE DEACTIVATION TIME (24 HR)"
230 PRINT"IN HRS AND MINUTES (HRS,MIN)"
240 INPUT J,K:PRINT:PRINT
250 PRINT"ENTER A '1' TO START THE TIMER"
260 INPUT C
270 PRINT CHR$(147)
280 PRINT"THE TIME MACHINE"
290 PRINT
300 REM DISPLAY TIMER
310 PRINT"24 HR TIME"
320 PRINT"HRS ";H;" : MIN ";M
330 PRINT
340 PRINT"ACTIVATION TIME"
350 PRINT"HRS ";I;" : MIN ";N
360 PRINT
370 PRINT"DEACTIVATION TIME"
380 PRINT"HRS ";J;" : MIN ";K
390 GOSUB 410
400 GOTO 270
410 FOR A=1TO580*60
420 NEXT A
430 M=M+1
440 IF H=I AND M=N THEN 540
450 IF H=J AND M=K THEN 590
460 IF M>=60 THEN 480
470 RETURN
480 M=0
490 H=H+1
500 IF H=25 THEN H=1
510 IF H=I AND M=N THEN 540
520 IF H=J AND M=K THEN 590
530 RETURN
540 POKE 56576,151
550 PRINTCHR$(147);"CIRCUIT ACTIVATED"
560 FOR A=1TO580*60
570 NEXT A:M=M+1
580 GOTO 460
590 POKE 56576,159
600 PRINTCHR$(147);"CIRCUIT DEACTIVATED"
610 GOTO 560
```

CHAPTER 4

Digital Stopwatch

This program turns your system into a digital stopwatch. It's written in BASIC for your micro-computer. See Program 4-1 for the program listing.

THE PROGRAM

The program displays the HRS MIN SEC on the display beginning with 0 HRS 0 MIN 0 SEC. It will RUN to 1000 before it resets to zero. See Fig. 4-1 for a sample run. To stop the stopwatch press RUN/STOP on the Commodore 64. A suggested use would be as a long distance phone call timer.

```
DIGITAL STOPWATCH
COPYRIGHT (C) 1984 BY HOWARD BERENBON
PRESS 'BREAK' TO STOP TIMER
PRESS 'ENTER' TO START
?

DIGITAL STOPWATCH

HRS 0 : MIN 1 : SEC 8
```

Fig. 4-1. Digital Stopwatch sample run.

Program 4-1. Digital Stopwatch Program Listing.

```
100 PRINTCHR$(147)
110 PRINT"DIGITAL STOPWATCH"
120 PRINT"COMMODORE 64"
130 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
140 PRINT
150 PRINT"PRESS 'RUN/STOP' TO STOP TIMER"
160 PRINT
170 PRINT"ENTER A '1' TO START"
180 INPUT A
190 W=0
200 T=1000
210 X=0:Y=0:Z=0
220 PRINTCHR$(147)
230 PRINT TAB(10)"DIGITAL STOPWATCH"
240 PRINTCHR$(19):FOR B=1 TO 10
250 PRINT
260 NEXT B
270 PRINT TAB(5)"HRS ";Z;" : MIN ";Y;" : SEC ";X
280 GOSUB 360
290 X=X+1
300 IF X=60 THEN 320
310 GOTO 240
320 X=0
330 Y=Y+1
340 IF Y=60 THEN 390
345 IF X=0 THEN 220
350 GOTO 240
360 FOR A=1 TO 700
370 NEXT A
380 RETURN
390 Y=0
400 Z=Z+1
410 IF Z=T THEN 210
420 GOTO 220
```

SECTION II

Educational Programs

Educational software is needed to utilize the home computer for learning. This section contains programs to aid in learning.

In a classroom situation, where each student has his own terminal, the computer allows the teacher more time for individual instruction.

In the home, you can use your computer to supplement your children's education, and your own. The Language Flash Card program and the Word Board will aid in learning French, Spanish, Italian, and German. The Dungeon of Htam is a math educational game. The Sun and Constellation 10 will help out in astronomy. Also included is a math test, a visual perception game, a memory test game, a spelling test, and a reading pacer.

CHAPTER 5

Language Flash Cards

Flash cards are an important educational tool for learning a variety of subjects. An excellent application of the home computer is its use as a language flash card generator. This chapter describes 4 different language flash card programs, written in BASIC, for your microcomputer. They are French, Spanish, Italian, and German flash cards. See Programs 5-1 through 5-4 for the French, Spanish, Italian, and German flash card programs, respectively.

THE PROGRAM

Each program will flash 25 language cards, with a choice of three different speeds, and either foreign entry, or English entry.

The words are stored in DATA statements, beginning at line 2000. You can use the words given, or select your own list. Alternate between

the foreign word and its English equivalent when entering your words.

After you run the program, it requests entry of the type of card to be flashed. Enter a 1 for foreign cards, or 2 for English cards. Then enter the speed; 1 for slow, 2 for moderate, or 3 for fast. Finally, you can review the word list before starting the test. Enter a 1 for YES or a 0 for NO.

THE TEST

Enter a 1 to begin the test. A card will be flashed on the screen. Now enter the correct word. The program will check your entry, and print CORRECT or INCORRECT, then print the correct answer. Enter a 1 to continue. After all 25 cards are displayed, it prints your point score, out of 25, and the percent correct. See Fig. 5-1 for a sample run.

FRENCH-ENGLISH FLASH CARDS

COPYRIGHT (C) 1984 BY HOWARD BERENBON

BEGINNING AT LINE 2000, ENTER YOUR LIST OF
FLASH CARDS IN THE FORM OF DATA STATEMENTS. ALTERNATE
BETWEEN FRENCH AND ENGLISH; OR USE THE WORDS GIVEN.

THE PROGRAM WILL FLASH THE FRENCH OR ENGLISH WORD,
AND EXPECT YOUR ENTRY OF ITS EQUIVALENT. BEFORE YOU
TAKE THE TEST YOU MAY REVIEW THE WORD LIST. THE CARDS
MAY BE IN FRENCH OR IN ENGLISH, AND YOU HAVE A CHOICE
OF THREE SPEEDS: SLOW, MODERATE, FAST.

ENTER '1' FOR FRENCH CARDS, '2' FOR ENGLISH CARDS
? 1

ENTER SPEED: 1=SLOW 2=MODERATE 3=FAST
? 2

REVIEW THE WORD LIST? 1=YES 0=NO
? 0

ENTER A '1' TO BEGIN
? 1

CARD # 1

* *
* *
* PLUS *
* *
* *

CARD # 1
ENTER ANSWER, IN ENGLISH
? MORE
CORRECT

FRENCH 'PLUS' = ENGLISH 'MORE'

ENTER A '1' TO CONTINUE
? 1

CARD # 2

* *
* *
* REPOS *
* *
* *

CARD # 2
ENTER ANSWER, IN ENGLISH
? REST
CORRECT

FRENCH 'REPOS' = ENGLISH 'REST'

ENTER A '1' TO CONTINUE
? 1

CARD # 3

* *
* *
* RUE *
* *
* *

CARD # 3
ENTER ANSWER, IN ENGLISH
? STREET
CORRECT

FRENCH 'RUE' = ENGLISH 'STREET'

ENTER A '1' TO CONTINUE
? 1

PRESS 'ENTER' TO DISPLAY SCORE
?
YOUR SCORE IS 25 CORRECT OUT OF 25
THAT'S 100 % CORRECT
READY
>

Fig. 5-1. Language Flash Cards sample run.

Program 5-1. French Flash Cards Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"FRENCH-ENGLISH FLASH CARDS
"
110 PRINT"COMMODORE 64 VERSION"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
130 PRINT
140 PRINT"BEGINNING AT LINE 2000, ENTER YOUR LIST OF"
150 PRINT"FLASH CARDS IN THE FORM OF DATA STATEMENTS. ALTERNATE"
160 PRINT"BETWEEN FRENCH AND ENGLISH; OR USE THE WORDS GIVEN."
170 PRINT
180 PRINT"THE PROGRAM WILL FLASH THE FRENCH OR ENGLISH WORD,"
190 PRINT"AND EXPECT YOUR ENTRY OF ITS EQUIVALENT. BEFORE YOU"
200 PRINT"TAKE THE TEST YOU MAY REVIEW THE WORD LIST. THE CARDS"
210 PRINT"MAY BE IN FRENCH OR IN ENGLISH, AND YOU HAVE A CHOICE"
220 PRINT"OF THREE SPEEDS: SLOW, MODERATE, FAST."
230 PRINT
240 PRINT"ENTER '1'-FRENCH OR '2'-ENGLISH CARDS"
250 INPUT J
260 GOSUB 970
270 PRINT"ENTER SPEED: 1=SLOW 2=MODERATE 3=FAST"
280 INPUT S
290 GOSUB 400
300 PRINT"REVIEW THE WORD LIST? 1=YES 0=NO"
310 INPUT A
320 IF A<>1 THEN 340
330 GOSUB 490
340 PRINTCHR$(147)
350 PRINT"ENTER A '1' TO BEGIN"
360 INPUT A
370 GOSUB 600
380 GOSUB 820
390 END
400 IF S=1 THEN 430
410 IF S=2 THEN 450
420 IF S=3 THEN 470
430 X=1515
440 RETURN
450 X=663
460 RETURN
470 X=284
480 RETURN
490 FOR C=1 TO 25
500 PRINTCHR$(147)
510 PRINT"ENGLISH","FRENCH","CARD #";C
520 PRINT
530 READ A$,B$
540 PRINT B$,A$
550 FOR T=1 TO 758
560 NEXT T
570 NEXT C
580 RESTORE
590 RETURN
600 IF J=2 THEN 1140
610 W=0
```

Program 5-1—cont. French Flash Cards Program Listing.

```

620 PRINTCHR$(147)
630 FOR F=1 TO 25
640 READ A$
650 READ B$
660 PRINT"CARD #";F
670 PRINT"*****"
680 PRINT"*          *"
690 PRINT"*          *"
700 PRINT"*";TAB(4);A$;TAB(13)"*"
710 PRINT"*          *"
720 PRINT"*          *"
730 PRINT"*****"
740 GOSUB 1040
750 INPUT C$
760 IF C$=B$ THEN 920
770 PRINT
780 PRINT"INCORRECT"
790 GOSUB 850
800 NEXT F
810 RETURN
820 PRINT"YOUR SCORE IS";W;"CORRECT OUT OF 25"
830 PRINT"THAT'S";W*4;"% CORRECT"
840 RETURN
850 PRINT"FRENCH ";A$;" = ENGLISH ";B$;" "
860 IF F=25 THEN 1100
870 PRINT
880 PRINT"ENTER A '1' TO CONTINUE"
890 INPUT A
900 PRINTCHR$(147)
910 RETURN
920 W=W+1
930 PRINT"CORRECT"
940 PRINT
950 GOSUB 850
960 GOTO 800
970 REM SET UP TYPE OF CARD INPUT REQUEST
980 IF J=2 THEN 1020
990 J=1
1000 L$=" ENGLISH"
1010 RETURN
1020 L$=" FRENCH"
1030 RETURN
1040 FOR A=1 TO X
1050 NEXT A
1060 PRINTCHR$(147)
1070 PRINT"CARD #";F
1080 PRINT"ENTER ANSWER, IN";L$
1090 RETURN
1100 PRINT
1110 PRINT"ENTER A '1' TO DISPLAY SCORE"
1120 INPUT A
1130 RETURN
1140 W=0

```


Program 5-1—cont. French Flash Cards Program Listing.

```

1150 PRINTCHR$(147)
1160 FOR F=1 TO 25
1170 READ A$
1180 READ B$
1190 PRINT"CARD #";F
1200 PRINT"*****"
1210 PRINT"*          *"
1220 PRINT"*          *"
1230 PRINT"*";TAB(4);B$;TAB(13)"*"
1240 PRINT"*          *"
1250 PRINT"*          *"
1260 PRINT"*****"
1270 GOSUB 1040
1280 INPUT C$
1290 IF C$=A$ THEN 1350
1300 PRINT
1310 PRINT"INCORRECT"
1320 GOSUB 850
1330 NEXT F
1340 RETURN
1350 W=W+1
1360 PRINT"CORRECT"
1370 PRINT
1380 GOSUB 850
1390 GOTO 1330
1980 REM ENTER THE DATA, ALTERNATE BETWEEN FRENCH AND ENGLISH WORD
    S
1990 REM 25 FRENCH AND 25 ENGLISH
2000 DATA "PLUS","MORE","REPOS","REST","RUE","STREET","SALE","DIRT
    Y"
2010 DATA "VIN","WINE","PLUTOT","RATHER","VERRE","GLASS","TOUT","A
    LL"
2020 DATA "SEL","SALT","TACHE","SPOT","VELO","BICYCLE","MONTRE","W
    ATCH"
2030 DATA "ICI","HERE","FRANCAIS","FRENCH","HAUT","HIGH","ENFANT",
    "CHILD"
2040 DATA "FAIM","HUNGER","AMI","FRIEND","CENT","HUNDRED","BRAS","
    ARM"
2050 DATA "CHAMBRE","ROOM","GARCON","BOY","LAIT","MILK"
2060 DATA "GRAND","BIG","FLEUR","FLOWER"

```

Program 5-2. Spanish Flash Cards Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"SPANISH-ENGLISH FLASH CARD
S"
110 PRINT"COMMODORE 64 VERSION"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
130 PRINT
140 PRINT"BEGINNING AT LINE 2000, ENTER YOUR LIST OF"
150 PRINT"FLASH CARDS IN THE FORM OF DATA STATEMENTS. ALTERNATE"
160 PRINT"BETWEEN SPANISH AND ENGLISH; OR USE THE WORDS GIVEN."
170 PRINT
180 PRINT"THE PROGRAM WILL FLASH THE SPANISH OR ENGLISH WORD,"
190 PRINT"AND EXPECT YOUR ENTRY OF ITS EQUIVALENT. BEFORE YOU"
200 PRINT"TAKE THE TEST YOU MAY REVIEW THE WORD LIST. THE CARDS"
210 PRINT"MAY BE IN SPANISH OR IN ENGLISH, AND YOU HAVE A CHOICE"
220 PRINT"OF THREE SPEEDS: SLOW, MODERATE, FAST."
230 PRINT
240 PRINT"ENTER '1'-SPANISH OR '2'-ENGLISH CARDS"
250 INPUT J
260 GOSUB 970
270 PRINT"ENTER SPEED: 1=SLOW 2=MODERATE 3=FAST"
280 INPUT S
290 GOSUB 400
300 PRINT"REVIEW THE WORD LIST? 1=YES 0=NO"
310 INPUT A
320 IF A<>1 THEN 340
330 GOSUB 490
340 PRINTCHR$(147)
350 PRINT"ENTER A '1' TO BEGIN"
360 INPUT A
370 GOSUB 600
380 GOSUB 820
390 END
400 IF S=1 THEN 430
410 IF S=2 THEN 450
420 IF S=3 THEN 470
430 X=1515
440 RETURN
450 X=663
460 RETURN
470 X=284
480 RETURN
490 FOR C=1 TO 25
500 PRINTCHR$(147)
510 PRINT"ENGLISH", "SPANISH", "CARD #";C
520 PRINT
530 READ A$,B$
540 PRINT B$,A$
550 FOR T=1 TO 758
560 NEXT T
570 NEXT C
580 RESTORE
590 RETURN
600 IF J=2 THEN 1140
610 W=0
```

Program 5-2—cont. Spanish Flash Cards Program Listing.

```
620 PRINTCHR$(147)
630 FOR F=1 TO 25
640 READ A$
650 READ B$
660 PRINT"CARD #";F
670 PRINT"*****"
680 PRINT"          *"
690 PRINT"          *"
700 PRINT"*";TAB(4);A$;TAB(13)"*"
710 PRINT"          *"
720 PRINT"          *"
730 PRINT"*****"
740 GOSUB 1040
750 INPUT C$
760 IF C$=B$ THEN 920
770 PRINT
780 PRINT"INCORRECT"
790 GOSUB 850
800 NEXT F
810 RETURN
820 PRINT"YOUR SCORE IS";W;"CORRECT OUT OF 25"
830 PRINT"THAT'S";W*4;"% CORRECT"
840 RETURN
850 PRINT"SPANISH ";A$;"' = ENGLISH ";B$;"'"
860 IF F=25 THEN 1100
870 PRINT
880 PRINT"ENTER A '1' TO CONTINUE"
890 INPUT A
900 PRINTCHR$(147)
910 RETURN
920 W=W+1
930 PRINT"CORRECT"
940 PRINT
950 GOSUB 850
960 GOTO 800
970 REM SET UP TYPE OF CARD INPUT REQUEST
980 IF J=2 THEN 1020
990 J=1
1000 L$=" ENGLISH"
1010 RETURN
1020 L$=" SPANISH"
1030 RETURN
1040 FOR A=1 TO X
1050 NEXT A
1060 PRINTCHR$(147)
1070 PRINT"CARD #";F
1080 PRINT"ENTER ANSWER, IN";L$
1090 RETURN
1100 PRINT
1110 PRINT"ENTER A '1' TO DISPLAY SCORE"
1120 INPUT A
1130 RETURN
1140 W=0
```

Program 5-2—cont. Spanish Flash Cards Program Listing.

```
1150 PRINTCHR$(147)
1160 FOR F=1 TO 25
1170 READ A$
1180 READ B$
1190 PRINT"CARD #";F
1200 PRINT"*****"
1210 PRINT"*          *"
1220 PRINT"*          *"
1230 PRINT"*";TAB(4);B$;TAB(13)"*"
1240 PRINT"*          *"
1250 PRINT"*          *"
1260 PRINT"*****"
1270 GOSUB 1040
1280 INPUT C$
1290 IF C$=A$ THEN 1350
1300 PRINT
1310 PRINT"INCORRECT"
1320 GOSUB 850
1330 NEXT F
1340 RETURN
1350 W=W+1
1360 PRINT"CORRECT"
1370 PRINT
1380 GOSUB 850
1390 GOTO 1330
1980 REM ENTER THE DATA, ALTERNATE BETWEEN SPANISH AND ENGLISH WORDS
1990 REM 25 SPANISH AND 25 ENGLISH
2000 DATA "ENVOLVER","INVOLVE","CANTARO","JAR","QUIETO","QUIET"
2010 DATA "CIMA","TOP","SEMANA","WEEK","TIRO","THROW","ESTADO","STATE"
2020 DATA "EMBARAZO","PUZZLE","CERCANO","NEAR","CRUZ","CROSS"
2030 DATA "VIGILIA","FAST","COMPRAR","BUY","PROMEDIO","AVERAGE"
2040 DATA "MAL","HARM","VIDRIO","GLASS","RESULTADO","ISSUE"
2050 DATA "PRONTO","QUICK","MAR","SEA","ENTONCES","THEN","VIDA","LIFE"
2060 DATA "PERDIDA","LOSS","LECHE","MILK","RED","NET"
2070 DATA "ORIGEN","ORIGIN","PLUMA","PEN"
```

Program 5-3. Italian Flash Cards Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"ITALIAN-ENGLISH FLASH CARD
S"
110 PRINT"COMMODORE 64 VERSION"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
130 PRINT
140 PRINT"BEGINNING AT LINE 2000, ENTER YOUR LIST OF"
150 PRINT"FLASH CARDS IN THE FORM OF DATA STATEMENTS. ALTERNATE"
160 PRINT"BETWEEN ITALIAN AND ENGLISH; OR USE THE WORDS GIVEN."
170 PRINT
180 PRINT"THE PROGRAM WILL FLASH THE ITALIAN OR ENGLISH WORD,"
190 PRINT"AND EXPECT YOUR ENTRY OF ITS EQUIVALENT. BEFORE YOU"
200 PRINT"TAKE THE TEST YOU MAY REVIEW THE WORD LIST. THE CARDS"
210 PRINT"MAY BE IN ITALIAN OR IN ENGLISH, AND YOU HAVE A CHOICE"
220 PRINT"OF THREE SPEEDS: SLOW, MODERATE, FAST."
230 PRINT
240 PRINT"ENTER '1'-ITALIAN OR '2'-ENGLISH CARDS"
250 INPUT J
260 GOSUB 970
270 PRINT"ENTER SPEED: 1=SLOW 2=MODERATE 3=FAST"
280 INPUT S
290 GOSUB 400
300 PRINT"REVIEW THE WORD LIST? 1=YES 0=NO"
310 INPUT A
320 IF A<>1 THEN 340
330 GOSUB 490
340 PRINTCHR$(147)
350 PRINT"ENTER A '1' TO BEGIN"
360 INPUT A
370 GOSUB 600
380 GOSUB 820
390 END
400 IF S=1 THEN 430
410 IF S=2 THEN 450
420 IF S=3 THEN 470
430 X=1515
440 RETURN
450 X=663
460 RETURN
470 X=284
480 RETURN
490 FOR C=1 TO 25
500 PRINTCHR$(147)
510 PRINT"ENGLISH","ITALIAN","CARD #";C
520 PRINT
530 READ A$,B$
540 PRINT B$,A$
550 FOR T=1 TO 758
560 NEXT T
570 NEXT C
580 RESTORE
590 RETURN
600 IF J=2 THEN 1140
610 W=0
```

Program 5-3—cont. Italian Flash Cards Program Listing.

```
620 PRINTCHR$(147)
630 FOR F=1 TO 25
640 READ A$
650 READ B$
660 PRINT"CARD #";F
670 PRINT"*****"
680 PRINT"*          *"
690 PRINT"*          *"
700 PRINT"*";TAB(4);A$;TAB(13)"*"
710 PRINT"*          *"
720 PRINT"*          *"
730 PRINT"*****"
740 GOSUB 1040
750 INPUT C$
760 IF C$=B$ THEN 920
770 PRINT
780 PRINT"INCORRECT"
790 GOSUB 850
800 NEXT F
810 RETURN
820 PRINT"YOUR SCORE IS";W;"CORRECT OUT OF 25"
830 PRINT"THAT'S";W*4;"% CORRECT"
840 RETURN
850 PRINT"ITALIAN ";A$;"' = ENGLISH ";B$;"'"
860 IF F=25 THEN 1100
870 PRINT
880 PRINT"ENTER A '1' TO CONTINUE"
890 INPUT A
900 PRINTCHR$(147)
910 RETURN
920 W=W+1
930 PRINT"CORRECT"
940 PRINT
950 GOSUB 850
960 GOTO 800
970 REM SET UP TYPE OF CARD INPUT REQUEST
980 IF J=2 THEN 1020
990 J=1
1000 L$=" ENGLISH"
1010 RETURN
1020 L$=" ITALIAN"
1030 RETURN
1040 FOR A=1 TO X
1050 NEXT A
1060 PRINTCHR$(147)
1070 PRINT"CARD #";F
1080 PRINT"ENTER ANSWER, IN";L$
1090 RETURN
1100 PRINT
1110 PRINT"ENTER A '1' TO DISPLAY SCORE"
1120 INPUT A
1130 RETURN
1140 W=0
```

Program 5-3—cont. Italian Flash Cards Program Listing.

```
1150 PRINTCHR$(147)
1160 FOR F=1 TO 25
1170 READ A$
1180 READ B$
1190 PRINT"CARD #";F
1200 PRINT"*****"
1210 PRINT"*          *"
1220 PRINT"*          *"
1230 PRINT"*";TAB(4);B$;TAB(13)"*"
1240 PRINT"*          *"
1250 PRINT"*          *"
1260 PRINT"*****"
1270 GOSUB 1040
1280 INPUT C$
1290 IF C$=A$ THEN 1350
1300 PRINT
1310 PRINT"INCORRECT"
1320 GOSUB 850
1330 NEXT F
1340 RETURN
1350 W=W+1
1360 PRINT"CORRECT"
1370 PRINT
1380 GOSUB 850
1390 GOTO 1330
1980 REM ENTER THE DATA, ALTERNATE BETWEEN ITALIAN AND ENGLISH WORDS
1990 REM 25 ITALIAN AND 25 ENGLISH
2000 DATA "SPARO","SHOT","ACQUA","WATER","DOLORE","PAIN","CAMERA",
"ROOM"
2010 DATA "GITA","TRIP","UNITA","UNIT","PIOGGIA","RAIN","MARE","SEA"
2020 DATA "PROVA","TEST","ANSIETA","CONCERN","ANCORA","AGAIN"
2030 DATA "ERBA","GRASS","INDICE","INDEX","GIACCA","COAT"
2040 DATA "PASTO","MEAL","AGO","NEEDLE","PAIO","PAIR","QUIETO","QUIET"
2050 DATA "SENSO","SENSE","DIRETTO","THROUGH","SOTTO","UNDER"
2060 DATA "PIEDE","FOOT","PORTA","DOOR","NUBE","CLOUD","RESPIRO","BREATH"
2070 DATA "ORIGEN","ORIGIN","PLUMA","PEN"
```

Program 5-4. German Flash Cards Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"GERMAN-ENGLISH FLASH CARDS
"
110 PRINT"COMMODORE 64 VERSION"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
130 PRINT
140 PRINT"BEGINNING AT LINE 2000, ENTER YOUR LIST OF"
150 PRINT"FLASH CARDS IN THE FORM OF DATA STATEMENTS. ALTERNATE"
160 PRINT"BETWEEN GERMAN AND ENGLISH; OR USE THE WORDS GIVEN."
170 PRINT
180 PRINT"THE PROGRAM WILL FLASH THE GERMAN OR ENGLISH WORD,"
190 PRINT"AND EXPECT YOUR ENTRY OF ITS EQUIVALENT. BEFORE YOU"
200 PRINT"TAKE THE TEST YOU MAY REVIEW THE WORD LIST. THE CARDS"
210 PRINT"MAY BE IN GERMAN OR IN ENGLISH, AND YOU HAVE A CHOICE"
220 PRINT"OF THREE SPEEDS: SLOW, MODERATE, FAST."
230 PRINT
240 PRINT"ENTER '1'-GERMAN OR '2'-ENGLISH CARDS"
250 INPUT J
260 GOSUB 970
270 PRINT"ENTER SPEED: 1=SLOW 2=MODERATE 3=FAST"
280 INPUT S
290 GOSUB 400
300 PRINT"REVIEW THE WORD LIST? 1=YES 0=NO"
310 INPUT A
320 IF A<>1 THEN 340
330 GOSUB 490
340 PRINTCHR$(147)
350 PRINT"ENTER A '1' TO BEGIN"
360 INPUT A
370 GOSUB 600
380 GOSUB 820
390 END
400 IF S=1 THEN 430
410 IF S=2 THEN 450
420 IF S=3 THEN 470
430 X=1515
440 RETURN
450 X=663
460 RETURN
470 X=284
480 RETURN
490 FOR C=1 TO 25
500 PRINTCHR$(147)
510 PRINT"ENGLISH", "GERMAN", "CARD #"; C
520 PRINT
530 READ A$, B$
540 PRINT B$, A$
550 FOR T=1 TO 758
560 NEXT T
570 NEXT C
580 RESTORE
590 RETURN
600 IF J=2 THEN 1140
610 W=0
```


Program 5-4—cont. German Flash Cards Program Listing.

```

620 PRINTCHR$(147)
630 FOR F=1 TO 25
640 READ A$
650 READ B$
660 PRINT"CARD #";F
670 PRINT"*****"
680 PRINT"*"
690 PRINT"*"
700 PRINT"*";TAB(4);A$;TAB(13)"*"
710 PRINT"*"
720 PRINT"*"
730 PRINT"*****"
740 GOSUB 1040
750 INPUT C$
760 IF C$=B$ THEN 920
770 PRINT
780 PRINT"INCORRECT"
790 GOSUB 850
800 NEXT F
810 RETURN
820 PRINT"YOUR SCORE IS";W;"CORRECT OUT OF 25"
830 PRINT"THAT'S";W*4;"% CORRECT"
840 RETURN
850 PRINT"GERMAN '";A$;"' = ENGLISH '";B$;"'"
860 IF F=25 THEN 1100
870 PRINT
880 PRINT"ENTER A '1' TO CONTINUE"
890 INPUT A
900 PRINTCHR$(147)
910 RETURN
920 W=W+1
930 PRINT"CORRECT"
940 PRINT
950 GOSUB 850
960 GOTO 800
970 REM SET UP TYPE OF CARD INPUT REQUEST
980 IF J=2 THEN 1020
990 J=1
1000 L$=" ENGLISH"
1010 RETURN
1020 L$=" GERMAN"
1030 RETURN
1040 FOR A=1 TO X
1050 NEXT A
1060 PRINTCHR$(147)
1070 PRINT"CARD #";F
1080 PRINT"ENTER ANSWER, IN";L$
1090 RETURN
1100 PRINT
1110 PRINT"ENTER A '1' TO DISPLAY SCORE"
1120 INPUT A
1130 RETURN
1140 W=0

```

Program 5-4—cont. German Flash Cards Program Listing.

```
1150 PRINTCHR$(147)
1160 FOR F=1 TO 25
1170 READ A$
1180 READ B$
1190 PRINT"CARD #";F
1200 PRINT"*****"
1210 PRINT"*          *"
1220 PRINT"*          *"
1230 PRINT"*";TAB(4);B$;TAB(13)"*"
1240 PRINT"*          *"
1250 PRINT"*          *"
1260 PRINT"*****"
1270 GOSUB 1040
1280 INPUT C$
1290 IF C$=A$ THEN 1350
1300 PRINT
1310 PRINT"INCORRECT"
1320 GOSUB 850
1330 NEXT F
1340 RETURN
1350 W=W+1
1360 PRINT"CORRECT"
1370 PRINT
1380 GOSUB 850
1390 GOTO 1330
1980 REM ENTER THE DATA, ALTERNATE BETWEEN GERMAN AND ENGLISH WORD
    S
1990 REM 25 GERMAN AND 25 ENGLISH
2000 DATA "MORGEN", "TOMORROW", "GLUECKLICH", "HAPPY", "KUNFTIG", "FUTUR
    E"
2010 DATA "NORD", "NORTH", "GENIESSEN", "ENJOY", "SCHLAG", "KNOCK", "PAR
    FUM", "PERFUME"
2020 DATA "VERNUNFT", "REASON", "STILLE", "STILL", "TRAUBE", "GRAPE"
2030 DATA "BEKOMMEN", "OBTAIN", "STAUB", "DUST", "SCHLOSS", "CASTLE"
2040 DATA "HERZ", "HEART", "FEDER", "PEN", "SEGEL", "SAIL", "HANDEL", "TR
    ADE"
2050 DATA "AUF", "UP", "SCHRITT", "WALK", "ANLEGEN", "INVEST", "EINTRETE
    N", "ENTER"
2060 DATA "DUNKEL", "DARK", "BRUCH", "BREAK", "ERSCHEINEN", "APPEAR", "F
    AHNE", "FLAG"
```

CHAPTER 6

The Dungeon of Htam

The Dungeon of Htam is an educational fantasy game, where the player must answer math questions as he wanders through the chambers and corridors of the dungeon. It's a 2 level dungeon, based on the fantasy role playing game Dungeons and Dragons*. It's written in BASIC for your microcomputer. See Program 6-1 for the program listing.

THE PROGRAM

You are given 1000 pieces, and then teleported to a random location in the lower level of this 128 chamber, 2 level dungeon (64 chambers per level). Your goal is to find your way out, with as much gold as possible. Gold pieces are acquired by answering math questions asked by monsters that occupy the dungeon. Each time a question is answered correctly, a random amount of gold is given as a reward. If your answer is incorrect, then a random amount of gold is taken away. The level of math is simple addition, subtraction, multiplication, and division. The game is directed towards children, as an incentive for learning math. See Fig. 6-2 for a sample run.

The Math Problems

The problems are generated randomly using program lines 3250 through 4100. A random number generator subroutine at line 3860 is used to generate the X and Y components of the problems. Division is slightly different from the others. In order to have the answer as an integer, multiplication is used to create the problem, with $Z=X * Y$. It is generated using $X=Z/Y$, where X is the answer entered.

*Dungeons and Dragons is a registered trademark of TSR Hobbies, Inc.

In the lower level of the dungeon, level 2, the problems are generally less difficult than those at level 1. The maximum value generated for X and Y is 30 at level 1, and 15 at level 2. The values in the random number generator subroutine may be changed for different difficulty levels.

ACTIONS OR MOVES

In your trip into the dungeon, you will encounter math monsters, thieves, empty chambers, trap doors, secret doors leading to North-South or East-West corridors, maps, and enchanted keys.

Enter the letter in parentheses for the following actions or moves in the dungeon:

1. (N)ORTH movement (up)
2. (E)AST movement (right)
3. (S)OUTH movement (down)
4. (W)EST movement (left)
5. (U)P movement
6. (M)AP display
7. (G)OLD pieces left

North Movement

Entering an N allows you to move North through the dungeon. You may not move North under the following conditions.

1. If you reach the North Wall you cannot pass through.
2. If you enter an East-West corridor (through a secret door), North movement is not allowed.

East Movement

Entering an E allows you to move East. You may not move East under the following conditions:

YOU WILL BE TELEPORTED TO . . .
THE DUNGEON OF HTAM
ENTER YOUR CHARACTERS NAME?
? RICK THE GREAT
YOU CARRY 1000 GOLD PIECES WITH YOU
RICK THE GREAT . . . YOU ARE ON YOUR WAY

YOU HAVE ARRIVED AT
THE DUNGEON OF HTAM . . . LEVEL 2
YOU WILL ENCOUNTER MONSTERS AND
THIEVES, AND GOLD . . . BUT WATCH
YOUR STEP
TRAP DOORS CAN BE COSTLY

YOU ARE IN A COLD AND DARK
. EMPTY CHAMBER

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?
(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? N

YOU DISTURBED A MONSTER IN THIS CHAMBER
AND HE SPEAKS

STOP *** I AM BUS

YOU MAY NOT PASS THRU UNTIL
YOU ANSWER THIS MATH QUESTION.

WHAT IS . . .
30 - 3 = ? 27

CORRECT
YOU WIN 352 GOLD PIECES

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?

(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? S

THERE IS A THIEF IN THIS CHAMBER
. HE SURPRISES YOU.
AS HE QUICKLY PASSES BY YOU HE
SNATCHES . . . 325 GOLD PIECES

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?
(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? E

THERE IS A THIEF IN THIS CHAMBER
YOU SURPRISED THE THIEF
AS HE RUNS OUT HE DROPS
. . . 103 GOLD PIECES.
YOU PICK UP THE GOLD PIECES

YOU SEARCH THE CHAMBER AND
YOU FIND A MAP

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?
(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? N

YOU DISTURBED A MONSTER IN THIS CHAMBER
AND HE SPEAKS

HALT *** I AM DDA

YOU MAY NOT PASS THRU UNTIL
YOU ANSWER THIS MATH QUESTION.

WHAT IS . . .
13 + 27 = ? 40

CORRECT
YOU WIN 160 GOLD PIECES

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?

(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? W

Fig. 6-1. The Dungeon of Htam sample run.

YOU DISTURBED A MONSTER IN THIS CHAMBER
AND HE SPEAKS

STOP *** I AM VID

YOU MAY NOT PASS THRU UNTIL
YOU ANSWER THIS MATH QUESTION.

WHAT IS . . .
399 / 21 = ? 19
19
CORRECT
YOU WIN 379 GOLD PIECES

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?

(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? W

YOU OPEN A SECRET DOOR AND
. ENTER AN EAST-WEST CORRIDOR

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?

(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? W

YOU ARE AT A STAIRWAY
. GOING UP

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?

(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? U

YOU WALK UP THE STAIRWAY
THE ENCHANTED KEY OPENS THE LOCK
YOU FOUND YOUR WAY
. OUT OF THE DUNGEON OF HTAM

YOU HAVE ACQUIRED 5600 GOLD PIECES

GAME RATING IS 919

YOU TOOK 166 TURNS TO FIND THE WAY OUT,
AND ANSWERED 28 QUESTIONS CORRECTLY.

ANOTHER GAME?
ENTER '1'-YES '0'-NO
?

(through a secret door), East movement is not allowed.

South Movement

Entering an S allows you to move South. You may not move South under the following conditions:

1. If you reach the South Wall you cannot pass through.
2. If you enter an East-West corridor (through a secret door), South movement is not allowed.

West Movement

Entering a W allows you to move West. You may not move West under the following conditions:

1. If you reach the West Wall you cannot pass through.
2. If you enter a North-South corridor (through a secret door), West movement is not allowed.

Up Movement

Entering a U, when you are at a stairway and have found the Enchanted Key, allows you to go up to the next level. If you haven't found the key, or you are not at a stairway, you cannot go up the stairway. To find the Enchanted Key, you must answer a random number of math questions correctly, for each level. There is a different key for each level.

Map Display

Entering an M, when you have found a Map, will display the map for that level. Each level has a different map, and they may be found when encountering thieves. The 64 chamber dungeon is displayed using the following symbols:

1. M = Math monster
2. O = Empty chamber
3. ? = Unknown contents (either a thief or a trap door)
4. UP = Stairway up
5. NS = North-South corridor (entered through secret doors)
6. EW = East-West corridor (entered through secret doors)
7. P1 = Your location in the dungeon

See Fig. 6-2 for a sample Map.

Fig. 6-1—cont. The Dungeon of Htam sample run.

1. If you reach the East Wall you cannot pass through.
2. If you enter a North-South corridor

A question mark (?) indicates either a Thief or a Trap Door. There is no way of knowing the contents, unless you enter the chamber. If you encounter a Thief, you either surprise him and he

```

THE DUNGEON OF HTAM *** MAP LEVEL 2 ***
M  UP  0  EW  0  NS  M  0
EW  M  0  ?  M  M  ?  ?
UP  0  EW  ?  NS  EW  0  ?
M  0  NS  ?  P1  ?  NS  0
UP  M  M  NS  M  ?  ?  0
M  EW  0  M  NS  M  ?  M
0  0  NS  EW  0  M  M  M
0  0  EW  EW  0  M  NS  M

RICK THE GREAT, WHAT IS YOUR ACTION OR MOVE?

(N)ORTH, (E)AST, (S)OUTH, (W)EST
(U)P, (M)AP, (G)OLD
? S

```

Fig. 6-2. Sample map.

drops some of his gold pieces, or he surprises you and steals some of your gold pieces. This is randomly determined, but it's in favor of the Thief.

If you activate a Trap Door, you can either fall through, or catch yourself from falling. If you fall

through, you will lose most of your gold pieces. There is a 50 percent chance that you will fall through. If you are at level 2, then you will fall into a deep pit. If you are at level 1, then you will fall through to level 2.

Gold Pieces Left

Entering a G will display the number of gold pieces you have with you. You will start out with 1000, and you can gain or lose gold during your trip. But if you lose all your gold pieces, you will lose the game.

GAME RATING

After you complete the game, a game rating is displayed, along with the number of gold pieces acquired, the number of math questions answered correctly, and the number of turns taken. The rating is a number from approximately -500 to +1000, depending upon the above statistics. The higher the rating number, the better the rating. A negative number indicates a poor rating.

Program 6-1. The Dungeon of Htam Program Listing.

```
100 S=RND(-TI):POKE53281,11:PRINTCHR$(5);CHR$(147)
110 PRINT"THE DUNGEON OF HTAM"
120 PRINT"COMMODORE 64"
130 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
140 PRINT
150 PRINT"AN EDUCATIONAL MATH DUNGEON"
160 GOSUB440
170 GOSUB440
180 PRINTCHR$(147)
190 DIMA(9,9,2)
200 PRINT"YOU WILL BE TELEPORTED TO . . . "
210 PRINT
220 PRINT"THE DUNGEON OF HTAM"
230 PRINT
240 MA=0:CA=0:G=1000:M1=1:K=0
250 PRINT"ENTER YOUR CHARACTER'S NAME?"
260 INPUTA$
270 GOSUB440
280 PRINT:PRINT"YOU CARRY 1000 GOLD PIECES WITH YOU"
290 PRINT:GOSUB440:PRINTA$;" . . . YOU ARE ON YOUR WAY"
300 GOSUB440
310 GOSUB480
320 PRINTCHR$(147)
330 PRINT"YOU HAVE ARRIVED AT . . . ."
340 PRINT
350 PRINT"THE DUNGEON OF HTAM . . . LEVEL 2"
360 PRINT
370 PRINT"YOU WILL ENCOUNTER MONSTERS AND"
380 PRINT"THIEVES, AND GOLD . . . BUT WATCH"
390 PRINT"YOUR STEP . . . . . ."
400 PRINT"TRAP DOORS CAN BE COSTLY . . . ."
410 FORAB=1TO3787
420 NEXTAB
430 GOTO1010
440 REM DELAY
450 FOR Z2=1TO757
460 NEXTZ2
470 RETURN
480 REM SET UP 2 LEVEL DUNGEON
490 FORX=1TO8
500 FORY=1TO8
510 FORZ=1TO2
520 A(X,Y,Z)=INT(RND(1)*7+1)
530 NEXTZ
540 NEXTY
550 NEXTX
560 REM TRAP DOORS #8, MIN-1, MAX-3
570 H=INT(RND(1)*3+1)
580 FORA=1TO2
590 FORN=1TOH
600 X=INT(RND(1)*8+1)
610 Y=INT(RND(1)*8+1)
620 A(X,Y,A)=8
```

Program 6-1—cont. The Dungeon of Htam Program Listing.

```
630 NEXTN
640 NEXTA
650 REM STAIRWAYS #9, MIN-3, MAX-6
660 S=INT(RND(1)*4+1)+2
670 FORA=1TO2
680 FORN=1TOS
690 X=INT(RND(1)*8+1)
700 Y=INT(RND(1)*8+1)
710 A(X,Y,A)=9
720 NEXTN
730 NEXTA
740 RETURN
750 REM STAIRWAY
760 L1=L1-1
770 PRINT"YOU WALK UP THE STAIRWAY"
780 GOSUB440
790 PRINT"THE ENCHANTED KEY . . . OPENS THE LOCK"
800 GOSUB440
810 IFL1=0THEN870
820 MA=0:K=0:K4=INT(RND(1)*4+1)+4
830 PRINT:CB=CA+K4
840 PRINT"YOU ARE AT . . . . . LEVEL 1"
850 GOSUB440:GOSUB440
860 GOTO1070
870 PRINT"YOU FOUND YOUR WAY . . . ."
880 PRINT" . . . OUT OF THE DUNGEON OF HTAM"
890 PRINT
900 PRINT"YOU HAVE ACQUIRED";G;"GOLD PIECES"
910 GOSUB930
920 GOTO1910
930 GG=G+100:REM RATING
940 R=INT((GG*CA-7000+1)/M1)
950 PRINT
960 PRINT"GAME RATING IS";R
970 PRINT:IFG<=0THEN4300
980 PRINT"YOU TOOK";M1;"TURNS TO FIND THE WAY OUT,"
990 PRINT"AND ANSWERED";CA;"QUESTIONS CORRECTLY."
1000 RETURN
1010 REM SET UP 1ST MOVE
1020 C=INT(RND(1)*8+1)
1030 D=INT(RND(1)*8+1)
1040 A(C,D,2)=1
1050 L1=2
1060 K4=INT(RND(1)*4+1)+4
1070 REM PLAYER MOVE ROUTINE
1080 PRINTCHR$(147)
1090 A=A(C,D,L1)
1100 GOSUB440
1110 ON A GOSUB 2220,2280,2340,2340,2390,2700,2750,2800,3080
1120 PRINT
1130 IFG<=0THEN1820
1140 PRINTA$;" , WHAT IS YOUR ACTION OR MOVE?"
1150 PRINT
```


Program 6-1—cont. The Dungeon of Htam Program Listing.

```
1160 PRINT"(N)ORTH, (E)AST, (S)OUTH, (W)EST"  
1170 PRINT"(U)P, (M)AP, (G)OLD"  
1180 INPUTM1$  
1190 M1=M1+1:IFK=0ANDM1>=140/L1THEN4210  
1200 IFM1$="N"THEN1290  
1210 IFM1$="E"THEN1340  
1220 IFM1$="S"THEN1390  
1230 IFM1$="W"THEN1440  
1240 IFM1$="U"THEN1490  
1250 IFM1$="M"THEN1610  
1260 IFM1$="G"THEN1670  
1270 PRINT  
1280 GOTO1120  
1290 REM NORTH MOVEMENT  
1300 IFA=7THEN1710  
1310 IF(D-1)=0THEN1980  
1320 D=D-1  
1330 GOTO1070  
1340 REM EAST MOVEMENT  
1350 IFA=6THEN1770  
1360 IF(C+1)=9THEN2030  
1370 C=C+1  
1380 GOTO1070  
1390 REM SOUTH MOVEMENT  
1400 IFA=7THEN1710  
1410 IF(D+1)=9THEN2050  
1420 D=D+1  
1430 GOTO1070  
1440 REM WEST MOVEMENT  
1450 IFA=6THEN1770  
1460 IF(C-1)=0THEN2070  
1470 C=C-1  
1480 GOTO1070  
1490 PRINTCHR$(147):REM STAIRWAY UP  
1500 IFA<>9THEN1580  
1510 IFK=1THEN750  
1520 PRINT  
1530 PRINT"YOU CANNOT GO UP THE STAIRWAY"  
1540 PRINT"YOU DON'T HAVE THE KEY"  
1550 GOSUB440  
1560 PRINT  
1570 GOTO1120  
1580 PRINT"YOU ARE NOT AT A STAIRWAY"  
1590 GOSUB440  
1600 GOTO1120  
1610 PRINTCHR$(147):REM MAP  
1620 IFMA=1THEN2090  
1630 PRINT"YOU DON'T HAVE THE MAP"  
1640 PRINT  
1650 GOSUB440  
1660 GOTO1120  
1670 REM GOLD PIECES  
1680 PRINTCHR$(147):PRINT"YOU HAVE";G;"GOLD PIECES WITH YOU"
```

Program 6-1—cont. The Dungeon of Htam Program Listing.

```
1690 PRINT
1700 GOTO1120
1710 REM EW CORRIDOR
1720 PRINT
1730 PRINTCHR$(147):PRINT"YOU ARE IN AN EAST-WEST CORRIDOR"
1740 PRINT"YOU CAN ONLY GO EAST OR WEST"
1750 PRINT
1760 GOTO1120
1770 REM NS CORRIDOR
1780 PRINT
1790 PRINTCHR$(147):PRINT"YOU ARE IN A NORTH-SOUTH CORRIDOR"
1800 PRINT"YOU CAN ONLY GO NORTH OR SOUTH"
1810 GOTO1750
1820 REM GOLD ZERO
1830 GOSUB440:GOSUB440
1840 PRINT
1850 PRINT"YOU LOST ALL YOUR GOLD AND YOU WERE"
1860 PRINT" . . . UNABLE TO MEET THE DEMANDS OF"
1870 PRINT" . . . THE DUNGEON OF HTAM."
1880 PRINT:PRINT
1890 PRINT"BETTER LUCK NEXT TIME"
1900 GOSUB930
1910 PRINT
1920 PRINT"ANOTHER GAME?"
1930 PRINT"ENTER '1'-YES '0'-NO"
1940 INPUTAA
1950 IFAA<>1THEN1970
1960 PRINTCHR$(147):GOTO220
1970 END
1980 PRINTCHR$(147):PRINT"YOU ARE AT THE NORTH WALL"
1990 PRINT"YOU CANNOT PASS THROUGH"
2000 PRINT
2010 PRINT"TRY ANOTHER DIRECTION?"
2020 GOTO1120
2030 PRINTCHR$(147):PRINT"YOU ARE AT THE EAST WALL"
2040 GOTO1990
2050 PRINTCHR$(147):PRINT"YOU ARE AT THE SOUTH WALL"
2060 GOTO1990
2070 PRINTCHR$(147):PRINT"YOU ARE AT THE WEST WALL"
2080 GOTO1990
2090 REM DISPLAY MAP
2100 PRINTCHR$(147)
2110 PRINT"THE DUNGEON OF HTAM *** MAP LEVEL";L1;"****"
2120 PRINT
2130 FORQ=1TO8
2140 FORN=1TO8
2150 IFC=N AND D=Q THEN PRINT"Pl ";:GOTO2180
2160 S1=A(N,Q,L1)
2170 ON S1 GOSUB 3120,3120,3140,3140,3160,3180,3200,3220,3230
2180 NEXTN
2190 PRINT
2200 NEXTQ
2210 GOTO1120
```

Program 6-1—cont. The Dungeon of Htam Program Listing.

```
2220 REM EMPTY ROOM
2230 PRINT
2240 PRINT"YOU ARE IN A COLD AND DARK"
2250 PRINT" . . . . . EMPTY CHAMBER"
2260 PRINT
2270 RETURN
2280 REM EMPTY ROOM 2
2290 PRINT"YOU ARE IN A DAMP AND MISTY"
2310 PRINT" . . . . . EMPTY CHAMBER"
2320 PRINT
2330 RETURN
2340 PRINTCHR$(147):GOSUB4160
2350 M4=INT(RND(1)*4+1)
2360 ON M4 GOSUB 3250,3380,3550,3680
2370 PRINT
2380 RETURN
2390 PRINTCHR$(147):PRINT"THERE IS A THIEF IN THIS CHAMBER"
2400 A(C,D,L1)=2
2410 GOSUB440
2420 G4=INT(RND(1)*350/L1+1)
2430 Y=INT(RND(1)*8+1)
2440 IFY<=3THEN2610
2450 PRINT
2460 PRINT" . . . . . HE SURPRISES YOU."
2470 GOSUB440
2480 PRINT"AS HE QUICKLY PASSES BY YOU HE"
2490 PRINT"SNATCHES . . .";G4;"GOLD PIECES":PRINT
2500 G=G-G4
2510 REM LOOK FOR MAP
2520 IFMA=1THENRETURN
2530 MA=INT(RND(1)*4+1):IFMA<=2THENMA=1
2540 IFMA=1THEN2570
2550 RETURN
2560 GOSUB440
2570 PRINT"YOU SEARCH THE CHAMBER AND"
2580 GOSUB440
2590 PRINT"YOU . . . . . FIND A MAP"
2600 RETURN
2610 PRINT"YOU SURPRISED THE THIEF . . . ."
2620 GOSUB440
2630 PRINT"AS HE RUNS OUT HE DROPS . . . ."
2640 PRINT" . . .";G4;"GOLD PIECES."
2650 PRINT"YOU PICK UP THE GOLD PIECES":G=G+G4
2660 PRINT:IFMA=1THENRETURN
2670 MA=INT(RND(1)*4+1):IFMA<2THENMA=1
2680 IFMA=1THEN2570
2690 RETURN
2700 PRINTCHR$(147):REM NORTH SOUTH CORRIDOR
2710 PRINT
2720 GOSUB4350:PRINT" . . . ENTER A NORTH-SOUTH CORRIDOR"
2730 PRINT:GOSUB4330
2740 RETURN
```

Program 6-1—cont. The Dungeon of Htam Program Listing.

```
2750 PRINTCHR$(147):REM EAST WEST CORRIDOR
2760 PRINT
2770 GOSUB4350:PRINT" . . . ENTER AN EAST-WEST CORRIDOR"
2780 PRINT:GOSUB4330
2790 RETURN
2800 REM TRAP DOOR
2810 PRINT"YOU ACTIVATED A . . . TRAP DOOR"
2820 GOSUB440
2830 TD=INT(RND(1)*4+1)
2840 IFTD>=3THEN2890
2850 PRINT
2860 PRINT"BUT . . . YOU CAUGHT YOURSELF"
2870 PRINT"FROM FALLING"
2880 RETURN
2890 IFL1=2THEN3000
2900 L1=L1+1:PRINT:K=1
2910 PRINT"YOU FELL THRU TO LEVEL 2 . . . AND"
2920 G=100
2930 GOSUB440
2940 PRINT
2950 PRINT"YOU . . . . . LOST"
2960 PRINT"MOST OF YOUR GOLD PIECES":PRINT
2970 PRINT"YOU HAVE . . .";G;"GOLD PIECES LEFT"
2980 PRINT"BUT . . . YOU STILL HAVE YOUR KEY"
2990 RETURN
3000 PRINT"YOU FELL INTO A DEEP . . . PIT"
3010 GOSUB440
3020 PRINT"YOU'RE LUCKY . . . ."
3030 PRINT"YOU DIDN'T GET HURT"
3040 PRINT
3050 GOSUB440
3060 PRINT"BUT IN CLIMBING OUT . . . ."
3070 GOTO4250
3080 PRINT"YOU ARE AT A STAIRWAY"
3090 PRINT" . . . . . GOING UP"
3100 PRINT
3110 RETURN
3120 PRINT"O ";
3130 RETURN
3140 PRINT"M ";
3150 RETURN
3160 PRINT"? ";
3170 RETURN
3180 PRINT"NS ";
3190 RETURN
3200 PRINT"EW ";
3210 RETURN
3220 GOTO3160
3230 PRINT"UP ";
3240 RETURN
3250 REM ADD
3260 PRINT"HALT *** I AM DDA"
3270 GOSUB3810
```

Program 6-1—cont. The Dungeon of Htam Program Listing.

```
3280 GOSUB3860
3290 PRINTX;" + ";Y;" = ";
3300 Z=X+Y
3310 INPUTA1
3320 IFA1=ZTHEN3360
3330 REM LOSE GOLD
3340 GOSUB4020
3350 RETURN
3360 GOSUB3920
3370 RETURN
3380 REM SUB
3390 PRINT"STOP *** I AM BUS"
3400 GOSUB3810
3410 GOSUB3860
3420 PRINTX;" - ";Y;" = ";
3430 Z=X-Y
3440 INPUTA1
3450 IFA1=ZTHEN3480
3460 GOSUB4020
3470 RETURN
3480 GOSUB3920
3490 RETURN
3500 GOSUB480
3510 H=1:O=9:W=8
3520 B=0:E=5:R=14
3530 C=0:PR=0
3540 GOTO1010
3550 REM MULT
3560 PRINT"HALT *** I AM LUM"
3570 GOSUB3810
3580 GOSUB3860
3590 PRINTX;" X ";Y;" = ";
3600 Z=X*Y
3610 INPUTA1
3620 IFA1=ZTHEN3660
3630 REM LOSE GOLD
3640 GOSUB4020
3650 RETURN
3660 GOSUB3920
3670 RETURN
3680 REM DIV
3690 PRINT"STOP *** I AM VID"
3700 GOSUB3810
3710 GOSUB3860
3720 PRINTX*Y;" / ";Y;" = ";
3730 Z=X
3740 INPUTA1
3750 IFA1=ZTHEN3790
3760 REM LOSE GOLD
3770 GOSUB4020
3780 RETURN
3790 GOSUB3920
3800 RETURN
```

Program 6-1—cont. The Dungeon of Htam Program Listing.

```
3810 PRINT
3820 PRINT"YOU MAY NOT PASS THRU UNTIL"
3830 PRINT"YOU ANSWER THIS MATH QUESTION."
3840 PRINT
3850 RETURN
3860 REM RANDOM ROUTINE
3870 X=INT(RND(1)*30/L1+1)
3880 Y=INT(RND(1)*30/L1+1)
3890 PRINT"WHAT IS . . ."
3900 GOSUB 440
3910 RETURN
3920 PRINT"CORRECT"
3930 G4=INT(RND(1)*400/L1+1)+25
3940 G=G+G4
3950 GOSUB440
3960 PRINT"YOU WIN";G4;"GOLD PIECES"
3970 A(C,D,L1)=1
3980 CA=CA+1:IFK=1THENRETURN
3990 IFCA=K4THEN4110
4000 IFL1=1THEN4230
4010 RETURN
4020 PRINT
4030 PRINT"INCORRECT"
4040 PRINT"THE CORRECT ANSWER IS";Z
4050 PRINT
4060 G4=INT(RND(1)*350/L1+1)
4070 G=G-G4
4080 GOSUB440
4090 PRINT"YOU LOSE";G4;"GOLD PIECES"
4100 RETURN
4110 GOSUB440
4120 K=1
4130 PRINT:PRINT"YOU HAVE FOUND THE ENCHANTED KEY . . ."
4140 GOSUB440
4150 RETURN
4160 PRINT"YOU DISTURBED A MONSTER IN THIS CHAMBER"
4170 GOSUB440
4180 PRINT"AND HE SPEAKS . . . . .":PRINT
4190 GOSUB440
4200 RETURN
4210 GOSUB4120
4220 GOTO1200
4230 IFCA=CBTHEN4110
4240 RETURN
4250 G=100:GOSUB440:PRINT
4260 PRINT"YOU . . . . . DROPPED"
4270 PRINT"MOST OF YOUR GOLD PIECES"
4280 PRINT"YOU HAVE . . ";G;"GOLD PIECES LEFT"
4290 RETURN
4300 PRINT"YOU ANSWERED";CA;"QUESTIONS CORRECTLY"
4310 PRINT" . . . . . IN";M1;"TURNS."
4320 RETURN
```

Program 6-1—cont. The Dungeon of Htam Program Listing.

```
4330 PRINT"THE DOOR CLOSES AND LOCKS BEHIND YOU":GOSUB440
4340 RETURN
4350 PRINT"YOU OPEN A SECRET DOOR AND . . .":GOSUB440
4360 RETURN
```

CHAPTER 7

Math 4

Math 4 is an educational program that gives 4 different 10-question math tests. It's written in BASIC for your microcomputer. See Program 7-1 for the program listing.

THE PROGRAM

The program begins by requesting entry of the difficulty level. Enter

1. Easy
2. Moderate
3. Most Difficult

Then enter your choice of the 4 subjects:

1. Addition
2. Subtraction
3. Multiplication
4. Division

Each test generates random problems, and no two tests will be alike. Enter the number (1-4) of the desired test. You have two tries to enter the correct answer, then the program advances to the next problem. Your answer is checked, then CORRECT or INCORRECT is displayed. After you complete all 10 questions, your score is displayed. You may then select another test, or end the program. See Fig. 7-1 for a sample run.

THE MATH PROBLEMS

The program generates random values for X and Y with program lines 280 and 290. The maximum value is determined by the difficulty level. At the most difficult level, X and Y will not exceed 100.

imum value is determined by the difficulty level. At the most difficult level, X and Y will not exceed 100.

```
RUN
MATH 4
COPYRIGHT (C) 1984 BY HOWARD BERENSON
```

```
THIS IS A MATH TEST PROGRAM WITH
FOUR DIFFERENT 10-QUESTION TESTS.
YOU HAVE 2 TRIES PER QUESTION.
```

```
ENTER DIFFICULTY LEVEL
```

```
1) EASY
2) MODERATE
3) MOST DIFFICULT
? 1
```

```
MATH 4
```

```
ENTER THE DESIRED TEST NUMBER
```

```
1) ADDITION
2) SUBTRACTION
3) MULTIPLICATION
4) DIVISION
? 1
```

```
PROBLEM 1          ADDITION TEST
TRIAL 1

  1  +   7  =  ? 8
CORRECT
```

```
PROBLEM 2          ADDITION TEST
TRIAL 1

  5  +   6  =  ? 11
CORRECT
```

Fig. 7-1. Math 4 sample run.

Program 7-1. Math 4 Program Listing.

```
100 S=RND(-TI):POKE53281,11:PRINTCHR$(5);CHR$(147)"MATH 4: COMMODO
    RE 64"
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
120 PRINT
130 PRINT"THIS IS A MATH TEST PROGRAM WITH"
140 PRINT"FOUR DIFFERENT 10-QUESTION TESTS."
150 PRINT"YOU HAVE 2 TRIES PER QUESTION."
160 PRINT:GOSUB 1200
170 PRINTCHR$(147):PRINTTAB(18)"MATH 4"
180 PRINT
190 PRINT"ENTER THE DESIRED TEST NUMBER"
200 PRINT
210 PRINT"1) ADDITION"
220 PRINT"2) SUBTRACTION"
230 PRINT"3) MULTIPLICATION"
240 PRINT"4) DIVISION"
250 INPUT A
260 ON A GOTO 400,690,850,1010
270 GOTO 190
280 X=INT(RND(1)*D+1)
290 Y=INT(RND(1)*D+1)
300 PRINT
310 RETURN
320 PRINT"PROBLEM";A
330 PRINT"TRIAL";T
340 PRINT
350 RETURN
360 PRINT"INCORRECT"
370 GOSUB 1170
380 PRINT
390 RETURN
400 S=0
410 FORA=1TO10
420 T=1
430 GOSUB 280
440 PRINTCHR$(147):PRINTTAB(18)"ADDITION TEST"
450 GOSUB 320
460 PRINTX;" + ";Y;" = ";
470 INPUT B
480 IFB=X+Y THEN 570
490 T=T+1
500 GOSUB 360
510 IF T=3 THEN 530
520 GOTO 440
530 PRINT"THE CORRECT ANSWER IS";X+Y
540 GOSUB 1170
550 NEXT A
560 GOTO 610
570 PRINT"CORRECT"
580 GOSUB 1170
590 S=S+1
600 GOTO 550
610 PRINT
```

Program 7-1—cont. Math 4 Program Listing.

```
620 PRINT"YOU HAVE";S;"CORRECT OUT OF 10"  
630 PRINT"THAT'S A SCORE OF";S*10;"%"  
640 PRINT  
650 PRINT"ENTER A '1' TO CONTINUE TESTING"  
660 INPUT A  
670 IF A=1 THEN 160  
680 END  
690 S=0  
700 FORA=1TO10  
710 T=1  
720 GOSUB 280  
730 PRINTCHR$(147):PRINTTAB(18)"SUBTRACTION TEST"  
740 GOSUB 320  
750 PRINTX;" - ";Y;" = ";  
760 INPUT B  
770 IF B=X-Y THEN 570  
780 T=T+1  
790 GOSUB 360  
800 IF T=3 THEN 820  
810 GOTO 730  
820 PRINT"THE CORRECT ANSWER IS";X-Y  
830 GOSUB 1170  
840 GOTO 550  
850 S=0  
860 FORA=1TO10  
870 T=1  
880 GOSUB 280  
890 PRINTCHR$(147):PRINTTAB(18)"MULTIPLICATION TEST"  
900 GOSUB 320  
910 PRINT X;" X ";Y;" = ";  
920 INPUT B  
930 IF B=X*Y THEN 570  
940 T=T+1  
950 GOSUB 360  
960 IF T=3 THEN 980  
970 GOTO 890  
980 PRINT"THE CORRECT ANSWER IS";X*Y  
990 GOSUB 1170  
1000 GOTO 550  
1010 S=0  
1020 FORA=1TO10  
1030 T=1  
1040 GOSUB 280  
1050 PRINTCHR$(147):PRINTTAB(18)"DIVISION TEST"  
1060 GOSUB 320  
1070 PRINTX*Y;" / ";Y;" = ";  
1080 INPUT B  
1090 IF B=X THEN 570  
1100 T=T+1  
1110 GOSUB 360  
1120 IF T=3 THEN 1140  
1130 GOTO 1050  
1140 PRINT"THE CORRECT ANSWER IS";X
```

Program 7-1—cont. Math 4 Program Listing.

```
1150 GOSUB 1170
1160 GOTO 550
1170 FOR P=1 TO 758
1180 NEXT P
1190 RETURN
1200 PRINT "ENTER DIFFICULTY LEVEL"
1210 PRINT
1220 PRINT "1) EASY"
1230 PRINT "2) MODERATE"
1240 PRINT "3) MOST DIFFICULT"
1250 INPUT E
1260 ON E GOTO 1280,1290,1300
1270 GOTO 1200
1280 D=10:RETURN
1290 D=20:RETURN
1300 D=100:RETURN
```

CHAPTER 8

Visual Perception Test

The Visual Perception Test is a game used to check your visual perception. It's written in BASIC for your microcomputer. See Program 8-1 for the program listing.

The program randomly displays 5 different symbols (= + < > *) at random locations, for a random period of time. You have 25 tries to enter the correct symbol, as it's flashed on the screen. This could be from 0.2 second to 3 seconds. See Fig. 8-1 for a sample run.

THE TEST

Begin the program by entering the difficulty

level. You have three to choose from. Enter 1 for easy, 2 for medium difficulty, and 3 for most difficult. Now you must pay attention, and enter a 1 to begin. A symbol will be displayed on the screen, then you enter the number (1-5) that corresponds to the symbol: 1 for = ; 2 for + ; 3 for < ; 4 for > ; and 5 for *. Continue for 25 tries. When you're finished with the test, you may continue with another and change the difficulty level, or end the game.

When you end the game, your percent score for each test is displayed. Finally, an average score is given.

RUN
VISUAL PERCEPTION TEST
COPYRIGHT (C) 1984 BY HOWARD BERENBON

IT RANDOMLY DISPLAYS 5 SYMBOLS FOR A RANDOM PERIOD
FROM .2 TO 3 SEC. YOU HAVE 25 TRIES, WITH THE COMPUTER
KEEPING TRACK OF YOUR SCORE.
THE SYMBOLS ARE: = + < > *

ENTER DIFFICULTY LEVEL
1=EASY
2=MEDIUM DIFFICULTY
3=MOST DIFFICULT
?
1

ENTER '1' TO BEGIN
GET READY
? 1

TRIAL 24 DIFFICULTY LEVEL 1

ENTER THE SYMBOL # FOR EACH TRIAL
1 FOR '=' 2 FOR '+' 3 FOR '<'
4 FOR '>' 5 FOR '*' 0 FOR DON'T KNOW
? 3

TRIAL 25 DIFFICULTY LEVEL 1

ENTER THE SYMBOL # FOR EACH TRIAL
1 FOR '=' 2 FOR '+' 3 FOR '<'
4 FOR '>' 5 FOR '*' 0 FOR DON'T KNOW
? 1

TRIAL 1 DIFFICULTY LEVEL 1

ENTER THE SYMBOL # FOR EACH TRIAL
1 FOR '=' 2 FOR '+' 3 FOR '<'
4 FOR '>' 5 FOR '*' 0 FOR DON'T KNOW
? 5

TRIAL 2 DIFFICULTY LEVEL 1

ENTER THE SYMBOL # FOR EACH TRIAL
1 FOR '=' 2 FOR '+' 3 FOR '<'
4 FOR '>' 5 FOR '*' 0 FOR DON'T KNOW
? 4

YOUR VISUAL PERCEPTION SCORE IS 25 OUT OF 25
THAT'S 100 % CORRECT

YOU HAVE COMPLETED 1 TEST(S)

TEST	% SCORE
1	100

DO YOU WISH ANOTHER TEST
ENTER '1' FOR YES, '0' FOR NO
? 0

Fig. 8-1. Visual Perception Test sample run.

Program 8-1. Visual Perception Test Program Listing.

```
100 S=RND(-TI):POKE53281,11
110 PRINTCHR$(5);CHR$(147)"COMMODORE 64 VISUAL PERCEPTION TEST"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON":PRINT
130 PRINT"IT RANDOMLY DISPLAYS 5 SYMBOLS FOR A    RANDOM PERIOD"
140 PRINT"FROM .2 TO 3 SEC. YOU HAVE 25 TRIES,    WITH THE COMPUTE
    R"
150 PRINT"KEEPING TRACK OF YOUR SCORE."
160 PRINT"THE SYMBOLS ARE:  = + < > *"
170 PRINT
180 DIM A(100)
190 W=0
200 G=1
210 GOSUB 940
220 PRINTCHR$(147)
230 PRINT"ENTER '1' TO BEGIN"
240 W=0
250 PRINT"GET READY"
260 INPUT F
270 FOR B=1 TO 25
280 PRINTCHR$(147)
290 Y=28
300 REM GENERATE RANDOM NUMBERS
310 N=INT(RND(1)*R+1)
320 GOSUB 1090
330 GOSUB 560
340 FOR A=1 TO Y+N
350 NEXT A
360 PRINTCHR$(147)
370 PRINT"TRIAL";B;"    DIFFICULTY LEVEL";H
380 PRINT
390 GOSUB 740
400 NEXT B
410 PRINT"YOUR VISUAL PERCEPTION SCORE IS ";W;" OUT OF 25
420 PRINT"THAT'S";W*4;"% CORRECT"
430 GOSUB 830
440 PRINT"DO YOU WISH ANOTHER TEST"
450 PRINT"ENTER '1' FOR YES, '0' FOR NO"
460 INPUT C
470 IF C=1 THEN 210
480 PRINT"YOUR AVERAGE SCORE OUT OF";G-1;"TEST(S) "
490 G=G-1
500 B=A(1)
510 FOR X=1 TO G
520 B=A(X+1)+B
530 NEXT X
540 PRINT"IS";B/G;"%"
550 END
560 Z=INT(RND(1)*5+1)
570 ON Z GOTO 590,620,650,680,710
580 GOTO 560
590 GOSUB 1120
600 PRINT TAB(X) "="
610 RETURN
```

Program 8-1—cont. Visual Perception Test Program Listing.

```
620 GOSUB 1120
630 PRINT TAB(X) "+"
640 RETURN
650 GOSUB 1120
660 PRINT TAB(X) "<"
670 RETURN
680 GOSUB 1120
690 PRINT TAB(X) ">"
700 RETURN
710 GOSUB 1120
720 PRINT TAB(X) "*"
730 RETURN
740 PRINT "ENTER THE SYMBOL # FOR EACH TRIAL"
750 PRINT "1 FOR '=' 2 FOR '+' 3 FOR '<'"
760 PRINT "4 FOR '>' 5 FOR '*' 0 FOR DON'T KNOW"
770 INPUT T
780 PRINTCHR$(147)
790 IF T=Z THEN 810
800 RETURN
810 W=W+1
820 RETURN
830 PRINT
840 A(G)=W*4
850 PRINT "YOU HAVE COMPLETED";G;"TEST(S) "
860 PRINT
870 PRINT TAB(14) "% SCORE"
880 FOR X=1 TO G
890 PRINT "TEST";X,A(X)
900 NEXT X
910 G=G+1
920 PRINT
930 RETURN
940 PRINT "ENTER DIFFICULTY LEVEL"
950 PRINT "1=EASY"
960 PRINT "2=MEDIUM DIFFICULTY"
970 PRINT "3=MOST DIFFICULT"
980 INPUT H
990 IF H=1 THEN 1030
1000 IF H=2 THEN 1050
1010 IF H=3 THEN 1070
1020 GOTO 940
1030 R=560
1040 RETURN
1050 R=370
1060 RETURN
1070 R=186
1080 RETURN
1090 Y1=INT(RND(1)*22+1)
1100 X=INT(RND(1)*37+1)
1110 RETURN
1120 FOR A=1 TO Y1
1130 PRINT
1140 NEXT A:RETURN
```

CHAPTER 9

Memory Challenger

The Memory Challenger is a game used to test your memory and concentration. It's written in BASIC, for your microcomputer. See Program 9-1 for the program listing.

The program generates and displays random numbers of different lengths. There are three different levels of play. Enter a 1 for easy, 2 for medium difficulty, and 3 for most difficult.

THE PROGRAM

Enter a 1 to begin. The numbers are flashed at

the center of the screen. Enter the number that was flashed. Each time you enter an answer, the program checks the entry, and prints CORRECT or INCORRECT. Then it displays the correct answer, and the number of correct entries out of the number of tries so far. Now you may change the difficulty level and continue, continue at the same level, or end the game. If you decide to stop playing, then it displays your final percent score. See Fig. 9-1 for a sample run.

```

RUN
MEMORY CHALLENGER
COPYRIGHT (C) 1984 BY HOWARD BERENBON

THIS PROGRAM GENERATES AND DISPLAYS RANDOM NUMBERS
OF DIFFERENT LENGTHS. YOU MUST ENTER THE NUMBER THAT
IS FLASHED ON THE SCREEN.

ENTER DIFFICULTY LEVEL:
1=EASY
2=MEDIUM DIFFICULTY
3=MOST DIFFICULT
?

ENTER '1' TO BEGIN
? 1

GET READY

40035

DIFFICULTY LEVEL 2

ENTER NUMBER
? 40035
THE ANSWER IS 40035

CORRECT
YOU HAVE 1 CORRECT OUT OF 3 TRIES

TRY AGAIN?
1 = YES & SAME DIFFICULTY-**GET READY**
2 = YES & CHANGE DIFFICULTY
0 = NO
?
```

Fig. 9-1. Memory Challenger sample run.

Program 9-1. Memory Challenger Program Listing.

```
100 S=RND(-TI):POKE53281,11
110 PRINTCHR$(5);CHR$(147)"COMMODORE 64 MEMORY CHALLENGER"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON":PRINT
130 PRINT"THIS PROGRAM GENERATES AND DISPLAYS      RANDOM NUMBERS"
140 PRINT"OF DIFFERENT LENGTHS. YOU MUST ENTER      THE NUMBER THAT"
150 PRINT"IS FLASHED ON THE SCREEN."
160 PRINT
170 Z=0
180 W=0
190 PRINT"ENTER DIFFICULTY LEVEL:"
200 PRINT"1=EASY"
210 PRINT"2=MEDIUM DIFFICULTY"
220 PRINT"3=MOST DIFFICULT"
230 INPUT A
240 PRINTCHR$(147)
250 IF A=1 THEN 560
260 IF A=2 THEN 600
270 IF A=3 THEN 640
280 GOTO 190
290 PRINTCHR$(147)
300 PRINT"ENTER '1' TO BEGIN"
310 INPUT B
320 Y=3986
330 PRINTCHR$(147)
340 PRINT:PRINT:PRINT:PRINT
350 PRINT TAB(14)"GET READY"
360 FOR D=1 TO 373
370 NEXT D
380 X=INT(RND(1)*Y+1)*F
390 PRINTCHR$(147)
400 GOSUB 830
410 GOSUB 680
420 PRINTCHR$(147)
430 PRINT TAB(20)"DIFFICULTY LEVEL";A
440 PRINT"ENTER NUMBER"
450 Z=Z+1
460 INPUT C
470 PRINT"THE ANSWER IS";X
480 PRINT
490 IF X=C THEN 530
500 PRINT"INCORRECT"
510 PRINT"YOU HAVE";W;"CORRECT OUT OF";Z;"TRIES"
520 GOTO 730
530 PRINT"CORRECT"
540 W=W+1
550 GOTO 510
560 G=168
570 F=1
580 N=INT(RND(1)*559+1)
590 GOTO 300
600 N=INT(RND(1)*373+1)
610 G=65
620 F=15
```

Program 9-1—cont. Memory Challenger Program Listing.

```
630 GOTO 300
640 N=INT(RND(1)*186+1)
650 G=83
660 F=158
670 GOTO 300
680 FOR E=1 TO G+N
690 NEXT E
700 RETURN
710 PRINT"YOUR FINAL SCORE IS";W/Z*100;"PERCENT"
720 END
730 PRINT
740 PRINT"TRY AGAIN?"
750 PRINT"1 = YES & SAME DIFFICULTY-**GET READY**"
760 PRINT"2 = YES & CHANGE DIFFICULTY"
770 PRINT"0 = NO"
780 INPUT D
790 IF D=1 THEN 330
800 IF D=2 THEN 190
810 IF D=0 THEN 710
820 GOTO 730
830 FORH=1TO11
840 PRINT
850 NEXT H
860 PRINT TAB(16);X
870 RETURN
```

CHAPTER 10

Spelling Test

The Spelling Test is an educational program that tests for the correct spelling of 20 vocabulary words. It's written in BASIC for your microcomputer. See Program 10-1 for the program listing.

THE PROGRAM

The program accepts entry of the correctly spelled word, after the incorrect spelling is displayed. You have two tries to enter the correct

answer, then it advances to the next word. After each entry, it displays either CORRECT or INCORRECT. After all 20 words are displayed, it prints your total number correct and the percent score. See Fig. 10-1 for a sample run.

DATA STORAGE

The vocabulary words are stored in DATA statements beginning at program line 1000. You can use the words supplied or enter a new list. See Table 10-1 for the word list.

When entering new words, alternate between the correct spelling and incorrect spelling.

```

                                SPELLING TEST

WORD # 1
TRIAL 1

PROGRAMING
? PROGRAMING
CORRECT

                                SPELLING TEST

WORD # 2
TRIAL 1

DICTIONERY
? DICTIONERY

INCORRECT
WORD # 2
TRIAL 2

DICTIONERY
?
    
```

Fig. 10-1. Spelling Test sample run.

Table 10-1. Spelling Test Word List

Incorrect	Correct
programing	programming
dictionery	dictionary
performense	performance
investagate	investigate
satasfactory	satisfactory
inportant	important
signifacant	significant
simalar	similar
comand	command
necesary	necessary
constelation	constellation
busines	business
analise	analyze
dificult	difficult
challange	challenge
intellagant	intelligent
skillfull	skillful
imformation	information
obsvration	observation
duplaccit	duplicate

Program 10-1. Spelling Test Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"SPELLING TEST: COMMODORE 6
4"
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
120 PRINT
130 PRINT"THIS IS A SPELLING TEST PROGRAM."
140 PRINT"GIVEN ARE 20 INCORRECTLY SPELLED"
150 PRINT"WORDS; YOU HAVE 2 TRIES TO"
160 PRINT"ENTER EACH CORRECT SPELLING."
170 PRINT
180 PRINT"THE WORDS ARE STORED IN DATA STATEMENTS"
190 PRINT"BEGINNING AT LINE 1000.ALTERNATE BETWEEN";
200 PRINT"THE CORRECT AND INCORRECT SPELLINGS."
210 PRINT
220 PRINT"ENTER A '1' TO BEGIN"
230 INPUT A
240 S=0
250 FOR A=1TO20
260 READ A$,B$
270 T=1
280 PRINTCHR$(147)
290 GOSUB 560
300 PRINT"WORD #";A
310 PRINT"TRIAL";T
320 PRINT
330 PRINT B$
340 INPUT C$
350 IF C$=A$ THEN 480
360 T=T+1
370 IF T=3 THEN 410
380 PRINT
390 PRINT"INCORRECT"
400 GOTO 300
410 PRINTCHR$(147)
420 PRINT"INCORRECT"
430 PRINT"THE CORRECT SPELLING IS ";A$;" "
440 FOR H=1 TO 2500
450 NEXT H
460 NEXT A
470 GOTO 510
480 PRINT"CORRECT"
490 S=S+1
500 GOTO 440
510 PRINT
520 GOSUB 560
530 PRINT"YOU HAVE";S;"CORRECT OUT OF 20 WORDS."
540 PRINT"THAT'S A SCORE OF";S*5;"PERCENT."
550 END
560 PRINT TAB(15)"SPELLING TEST"
570 PRINT
580 RETURN
980 REM ENTER THE WORDS, ALTERNATING WITH THE CORRECT
990 REM AND INCORRECT WORD, AS SEEN BELOW.
1000 DATA "PROGRAMMING","PROGRAMING","DICTIONARY","DICTIONERY"
```

Program 10-1—cont. Spelling Test Program Listing.

1010 DATA "PERFORMANCE", "PERFORMENSE", "INVESTIGATE", "INVESTAGATE"
1020 DATA "SATISFACTORY", "SATASFACERY", "IMPORTANT", "INPORTANT"
1030 DATA "SIGNIFICANT", "SIGNIFACANT", "SIMILAR", "SIMALAR"
1040 DATA "COMMAND", "COMAND", "NECESSARY", "NECESARY"
1050 DATA "CONSTELLATION", "CONSTELATION", "BUSINESS", "BUSINES"
1060 DATA "ANALYZE", "ANALISE", "DIFFICULT", "DIFICULT"
1070 DATA "CHALLENGE", "CHALLENGE", "INTELLIGENT", "INTELLAGANT"
1080 DATA "SKILLFUL", "SKILLFULL", "INFORMATION", "IMFORMATION"
1090 DATA "OBSERVATION", "OBSURVATION", "DUPLICATE", "DUPLACAIT"

CHAPTER 11

The Word Board

Are you interested in educational applications, or in experimenting with new devices that can aid the handicapped? Then the Word Board is just the program for you. Using your microcomputer, you can turn your system into a language communicator.

WORD BOARD 1

The Word Board 1 accepts keyboard entry of individual letters, and displays single words assigned to each letter. See Program 11-1 for the program listing.

```
RUN
WORD BOARD 1
COPYRIGHT (C) 1984 BY HOWARD BERENBON

ACCEPTS CHARACTER INPUT (A TO Z, 0 TO 9)
AND PRINTS WORDS AND NUMBERS THAT
CORRESPOND TO THE ENTRY. ENTERING
AN '@' WILL SKIP 4 LINES.

ENTER CHARACTER?
? A

A
ENGLISH          FRENCH
-----
APPLE            POMME

ENTER CHARACTER?
? B

B
ENGLISH          FRENCH
-----
AIRPLANE        AVION

ENTER CHARACTER?
?
```

Fig. 11-1. Word Board 1 sample run.

```
RUN
WORD BOARD 2
COPYRIGHT (C) 1984 BY HOWARD BERENBON

ACCEPTS CHARACTER INPUT (A TO Z, 0 TO 9)
AND PRINTS WORDS AND NUMBERS THAT
CORRESPOND TO THE ENTRY. ENTERING
AN '@' WILL SKIP 4 LINES.

MAY BE USED AS A HELP TO THE HANDICAPPED
? Q

Q
? F                I
? V                WANT
? B                TO
? @                EAT

R
? S                DO
? T                YOU
? V                GO
? B                TO
? @                EAT

L
?                  OKAY
```

Fig. 11-2. Word Board 2 sample run.

The program may be used to aid in language instruction, by assigning English words to each of the 26 keys. For the English word covering a key, its French equivalent can be displayed. It allows the French word to be displayed, when the English word is depressed. See Fig. 11-1 for a sample run. The words are printed towards the center of the screen, after the RETURN key is depressed. It's a handy aid for the language student, to help in memorizing foreign vocabulary words. A French vocabulary is given in Table 11-1. After the 26 words are learned, the student can test his memory by covering the keytops, and typing through the list for review.

Depress the RUN/STOP and RESTORE keys to exit the program.

Table 11-1. French Vocabulary Words

Key	French	English
A	pomme	apple
B	avion	airplane
C	tasse	cup
D	vache	cow
E	veston	coat
F	chien	dog
G	main	hand
H	soleil	sun
I	livre	book
J	lune	moon
K	oreille	ear
L	nuage	cloud
M	peigne	comb
N	yeux	eyes
O	glace	ice
P	etoile	star
Q	cuillere	spoon
R	chaise	chair
S	cheval	horse
T	crayon	pencil
U	lampe	lamp
V	oiseau	bird
W	poissen	fish
X	velo	bicycle
Y	chat	cat
Z	chapeau	hat
1	un	one
2	deux	two
3	trois	three
4	quatre	four
5	cinq	five
6	six	six
7	sept	seven
8	huit	eight
9	neuf	nine
0	zero	zero
@	(skip 4 lines)	

Variations

A variation of Word Board 1 is to place small pictures on the keytops, and have their foreign meanings displayed when depressed. Program lines 600 through 1630 hold the French words in PRINT statements. An additional 10 keys, 0 through 9, are used to access their equivalent French numbers. The @ sign is used to skip 4 lines.

After the 26 words are mastered, a different vocabulary set can be entered. Also, any language can be substituted in place of French used in the program.

You may also place the foreign meanings of the words on the keytops, and have their English equivalents displayed. Have the student read a word on the keytop, and recite the English meaning, then depress that key to find the correct answer.

The program can be used as a computer dictionary. The meaning of words, assigned to each key, can be displayed in sentence form.

WORD BOARD 2

Word Board 2 is used as a language communicator for the handicapped. See Program 11-2 for the program listing. A speech handicapped person

Table 11-2. Keyboard Layout for Limited Vocabulary

Key	Word	Key	Word	Key	Word
A	he	N	time	Z	she
B	eat	O	yes	1	1
C	like	P	no	2	2
D	are	Q	I	3	3
E	is	R	do	4	4
F	want	S	you	5	5
G	drink	T	go	6	6
H	speak	U	here	7	7
I	please	V	to	8	8
J	happy	W	it	9	9
K	thank you	X	am	0	0
L	okay	Y	sleep	@	skip 4 lines
M	not				

may communicate with a limited vocabulary of 26 essential words, and numbers 0 through 9. Each key is assigned a different word. See Table 11-2 for the keyboard layout. Only two movements are required; typing a key covered by the word, and depressing RETURN. Sentences may be formed to call for a person's basic needs, as eating and sleeping. See Fig. 11-2 for a sample

run. Alternately, sentences may be assigned certain keys to display one's needs. Example: "I am hungry, when do we eat?". Of course, this sentence won't fit on the keytop, so the handicapped person will have to choose from a list of special keys, with assigned sentences.

APPLICATIONS

Apply the Word Board at home. Expand on Word Board 1 for your educational needs. Develop

a more detailed language study program, with several lists of vocabulary. Use it to increase your English vocabulary, by accessing and learning the meanings of 10 new words a week.

You may or may not have an application for Word Board 2. But you can find organizations, in your area, that help the handicapped. Demonstrate the program. This application may be useful to them. Considering that a home computer may be less expensive than other devices used to aid the handicapped, it may be within their budget to buy one or two.

Program 11-1. Word Board 1 Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"WORD BOARD 1"  
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
120 PRINT  
130 PRINT"ACCEPTS CHARACTER INPUT (A TO Z, 0 TO 9)";  
140 PRINT"AND PRINTS WORDS AND NUMBERS THAT"  
150 PRINT"CORRESPOND TO THE ENTRY. ENTERING"  
160 PRINT"AN '@' WILL SKIP 4 LINES."  
170 PRINT  
180 PRINT  
190 GOSUB 1750  
200 INPUT A$  
210 IFA$="A" THEN 590  
220 IFA$="B" THEN 620  
230 IFA$="C" THEN 650  
240 IFA$="D" THEN 680  
250 IFA$="E" THEN 710  
260 IFA$="F" THEN 740  
270 IFA$="G" THEN 770  
280 IFA$="H" THEN 800  
290 IFA$="I" THEN 830  
300 IFA$="J" THEN 860  
310 IFA$="K" THEN 890  
320 IFA$="L" THEN 920  
330 IFA$="M" THEN 950  
340 IFA$="N" THEN 980  
350 IFA$="O" THEN 1010  
360 IFA$="P" THEN 1040  
370 IFA$="Q" THEN 1070  
380 IFA$="R" THEN 1100  
390 IFA$="S" THEN 1130  
400 IFA$="T" THEN 1160  
410 IFA$="U" THEN 1190  
420 IFA$="V" THEN 1220  
430 IFA$="W" THEN 1250  
440 IFA$="X" THEN 1280  
450 IFA$="Y" THEN 1310  
460 IFA$="Z" THEN 1340  
470 IFA$="1" THEN 1370  
480 IFA$="2" THEN 1400  
490 IFA$="3" THEN 1430  
500 IFA$="4" THEN 1460  
510 IFA$="5" THEN 1490  
520 IFA$="6" THEN 1520  
530 IFA$="7" THEN 1550  
540 IFA$="8" THEN 1580  
550 IFA$="9" THEN 1610  
560 IFA$="0" THEN 1640  
570 IFA$="@ " THEN 1670  
580 GOTO190  
590 GOSUB1710  
600 PRINT"APPLE", "POMME"  
610 GOTO 190  
620 GOSUB 1710
```

Program 11-1—cont. Word Board 1 Program Listing.

```
630 PRINT "AIRPLANE", "AVION"  
640 GOTO 190  
650 GOSUB 1710  
660 PRINT "CUP", "TASSE"  
670 GOTO 190  
680 GOSUB 1710  
690 PRINT "COW", "VACHE"  
700 GOTO 190  
710 GOSUB 1710  
720 PRINT "COAT", "VESTON"  
730 GOTO 190  
740 GOSUB 1710  
750 PRINT "DOG", "CHIEN"  
760 GOTO 190  
770 GOSUB 1710  
780 PRINT "HAND", "MAIN"  
790 GOTO 190  
800 GOSUB 1710  
810 PRINT "SUN", "SOLEIL"  
820 GOTO 190  
830 GOSUB 1710  
840 PRINT "BOOK", "LIVRE"  
850 GOTO 190  
860 GOSUB 1710  
870 PRINT "MOON", "LUNE"  
880 GOTO 190  
890 GOSUB 1710  
900 PRINT "EAR", "OREILLE"  
910 GOTO 190  
920 GOSUB 1710  
930 PRINT "CLOUD", "NAUGE"  
940 GOTO 190  
950 GOSUB 1710  
960 PRINT "COMB", "PEIGNE"  
970 GOTO 190  
980 GOSUB 1710  
990 PRINT "EYES", "YEUX"  
1000 GOTO 190  
1010 GOSUB 1710  
1020 PRINT "ICE", "GLACE"  
1030 GOTO 190  
1040 GOSUB 1710  
1050 PRINT "STAR", "ETOILE"  
1060 GOTO 190  
1070 GOSUB 1710  
1080 PRINT "SPOON", "CUILLERE"  
1090 GOTO 190  
1100 GOSUB 1710  
1110 PRINT "CHAIR", "CHAISE"  
1120 GOTO 190  
1130 GOSUB 1710  
1140 PRINT "HORSE", "CHEVAL"  
1150 GOTO 190
```

Program 11-1—cont. Word Board 1 Program Listing.

```
1160 GOSUB 1710
1170 PRINT"PENCIL", "CRAYON"
1180 GOTO 190
1190 GOSUB 1710
1200 PRINT"LAMP", "LAMPE"
1210 GOTO 190
1220 GOSUB 1710
1230 PRINT"BIRD", "OISEAU"
1240 GOTO 190
1250 GOSUB 1710
1260 PRINT"FISH", "POISSEN"
1270 GOTO 190
1280 GOSUB 1710
1290 PRINT"BICYCLE", "VELO"
1300 GOTO 190
1310 GOSUB 1710
1320 PRINT"CAT", "CHAT"
1330 GOTO 190
1340 GOSUB 1710
1350 PRINT"HAT", "CHAPEAU"
1360 GOTO 190
1370 GOSUB 1710
1380 PRINT"ONE", "UN"
1390 GOTO 190
1400 GOSUB 1710
1410 PRINT"TWO", "DEUX"
1420 GOTO 190
1430 GOSUB 1710
1440 PRINT"THREE", "TROIS"
1450 GOTO 190
1460 GOSUB 1710
1470 PRINT"FOUR", "QUATRE"
1480 GOTO 190
1490 GOSUB 1710
1500 PRINT"FIVE", "CINQ"
1510 GOTO 190
1520 GOSUB 1710
1530 PRINT"SIX", "SIX"
1540 GOTO 190
1550 GOSUB 1710
1560 PRINT"SEVEN", "SEPT"
1570 GOTO 190
1580 GOSUB 1710
1590 PRINT"EIGHT", "HUIT"
1600 GOTO 190
1610 GOSUB 1710
1620 PRINT"NINE", "NEUF"
1630 GOTO 190
1640 GOSUB 1710
1650 PRINT"ZERO", "ZERO"
1660 GOTO 190
1670 FOR A=1 TO 4
1680 PRINT
```

Program 11-1—cont. Word Board 1 Program Listing.

```
1690 NEXT A
1700 GOTO 190
1710 PRINT"ENGLISH","FRENCH"
1720 PRINT"-----","-----"
1730 PRINT
1740 RETURN
1750 PRINT
1760 PRINT
1770 PRINT"ENTER CHARACTER?"
1780 RETURN
```

Program 11-2. Word Board 2 Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"WORD BOARD 2"  
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
120 PRINT  
130 PRINT"ACCEPTS CHARACTER INPUT (A TO Z, 0 TO 9)";  
140 PRINT"AND PRINTS WORDS AND NUMBERS THAT"  
150 PRINT"CORRESPOND TO THE ENTRY. ENTERING"  
160 PRINT"AN '@! WILL SKIP 4 LINES"  
170 PRINT  
180 PRINT"MAY BE USED AS A HELP TO THE HANDICAPPED"  
190 INPUT A$  
200 IFA$="A" THEN 580  
210 IFA$="B" THEN 600  
220 IFA$="C" THEN 620  
230 IFA$="D" THEN 640  
240 IFA$="E" THEN 660  
250 IFA$="F" THEN 680  
260 IFA$="G" THEN 700  
270 IFA$="H" THEN 720  
280 IFA$="I" THEN 740  
290 IFA$="J" THEN 760  
300 IFA$="K" THEN 780  
310 IFA$="L" THEN 800  
320 IFA$="M" THEN 820  
330 IFA$="N" THEN 840  
340 IFA$="O" THEN 860  
350 IFA$="P" THEN 880  
360 IFA$="Q" THEN 900  
370 IFA$="R" THEN 920  
380 IFA$="S" THEN 940  
390 IFA$="T" THEN 960  
400 IFA$="U" THEN 980  
410 IFA$="V" THEN 1000  
420 IFA$="W" THEN 1020  
430 IFA$="X" THEN 1040  
440 IFA$="Y" THEN 1060  
450 IFA$="Z" THEN 1080  
460 IFA$="1" THEN 1100  
470 IFA$="2" THEN 1120  
480 IFA$="3" THEN 1140  
490 IFA$="4" THEN 1160  
500 IFA$="5" THEN 1180  
510 IFA$="6" THEN 1200  
520 IFA$="7" THEN 1220  
530 IFA$="8" THEN 1240  
540 IFA$="9" THEN 1260  
550 IFA$="0" THEN 1280  
560 IFA$="@ " THEN 1300  
570 GOTO 190  
580 PRINTTAB(20)"HE"  
590 GOTO 190  
600 PRINTTAB(20)"EAT"  
610 GOTO 190  
620 PRINTTAB(20)"LIKE"
```

Program 11-2—cont. Word Board 2 Program Listing.

```
530 GOTO 190
640 PRINTTAB(20) "ARE"
650 GOTO 190
660 PRINTTAB(20) "IS"
670 GOTO 190
680 PRINTTAB(20) "WANT"
690 GOTO 190
700 PRINTTAB(20) "DRINK"
710 GOTO 190
720 PRINTTAB(20) "SPEAK"
730 GOTO 190
740 PRINTTAB(20) "PLEASE"
750 GOTO 190
760 PRINTTAB(20) "HAPPY"
770 GOTO 190
780 PRINTTAB(20) "THANK YOU"
790 GOTO 190
800 PRINTTAB(20) "OKAY"
810 GOTO 190
820 PRINTTAB(20) "NOT"
830 GOTO 190
840 PRINTTAB(20) "TIME"
850 GOTO 190
860 PRINTTAB(20) "YES"
870 GOTO 190
880 PRINTTAB(20) "NO"
890 GOTO 190
900 PRINTTAB(20) "I"
910 GOTO 190
920 PRINTTAB(20) "DO"
930 GOTO 190
940 PRINTTAB(20) "YOU"
950 GOTO 190
960 PRINTTAB(20) "GO"
970 GOTO 190
980 PRINTTAB(20) "HERE"
990 GOTO 190
1000 PRINTTAB(20) "TO"
1010 GOTO 190
1020 PRINTTAB(20) "IT"
1030 GOTO 190
1040 PRINTTAB(20) "AM"
1050 GOTO 190
1060 PRINTTAB(20) "SLEEP"
1070 GOTO 190
1080 PRINTTAB(20) "SHE"
1090 GOTO 190
1100 PRINTTAB(20) "1"
1110 GOTO 190
1120 PRINTTAB(20) "2"
1130 GOTO 190
1140 PRINTTAB(20) "3"
1150 GOTO 190
```

Program 11-2—cont. Word Board 2 Program Listing.

```
1160 PRINTTAB(20) "4"  
1170 GOTO 190  
1180 PRINTTAB(20) "5"  
1190 GOTO 190  
1200 PRINTTAB(20) "6"  
1210 GOTO 190  
1220 PRINTTAB(20) "7"  
1230 GOTO 190  
1240 PRINTTAB(20) "8"  
1250 GOTO 190  
1260 PRINTTAB(20) "9"  
1270 GOTO 190  
1280 PRINTTAB(20) "0"  
1290 GOTO 190  
1300 FOR A=1 TO 4  
1310 PRINT  
1320 NEXT A  
1330 GOTO 190
```

The Reading Pacer

Here's a program that will help you increase your reading speed. It's called The Reading Pacer, and it's written in BASIC for your microcomputer. See Program 12-1 for the program listing.

THE PROGRAM

The program displays one line of text at a variable speed, from approximately 0.3 second to 3 seconds. It can display lines of text up to 1200 words per minute. Each line is printed at the center of the screen.

After you RUN the program, enter a speed value from 1 to 10. Your slowest speed is accessed with a 1, and the quickest with a 10. Then enter a 1 to begin. See Fig. 12-1 for a sample run.

DATA STORAGE

The lines of text are stored in DATA statements beginning with program line 1000. Any number of DATA statements may be used, just enter one line of text per statement. The last line must be DATA "END".

USE

Start the pacer at the slowest speed, then gradually increase the speed. Change the text, then start the pacer at about half your fastest speed. You should notice an increase in your reading speed and comprehension.

```

RUN
THE READING PACER

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ENTER TEXT AS DATA STATEMENTS STARTING AT
LINE 1000.

THE READING PACER WILL DISPLAY LINES OF
TEXT UP TO 1200 WORDS PER MINUTE.

ENTER LINE SPEED-FROM 1 TO 10
ENTRY OF '10' IS THE QUICKEST,
'1' IS THE SLOWEST
? 4

ENTER '1' TO BEGIN
? 1

THE READING PACER CAN HELP INCREASE

END

DO YOU WISH TO TRY AGAIN?
ENTER '1'-YES, '0'-NO
? 1

```

Fig. 12-1. The Reading Pacer sample run.

Program 12-1. The Reading Pacer Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"THE READING PACER"  
110 PRINT"COMMODORE 64"  
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
130 PRINT  
140 PRINT"ENTER TEXT AS DATA STATEMENTS STARTING"  
150 PRINT"AT LINE 1000."  
160 PRINT  
170 PRINT"THE READING PACER WILL DISPLAY LINES OF"  
180 PRINT"TEXT UP TO 1200 WORDS PER MINUTE."  
190 PRINT  
200 PRINT"ENTER LINE SPEED-FROM 1 TO 10"  
210 PRINT"ENTRY OF '10' IS THE QUICKEST,"  
220 PRINT"'1' IS THE SLOWEST"  
230 INPUT A  
240 GOSUB 430  
250 PRINTCHR$(147)  
260 PRINT"ENTER '1' TO BEGIN"  
270 INPUT B  
280 PRINTCHR$(147)  
290 READ A$:FORP=1TO11:PRINT  
300 NEXTP:PRINT A$  
310 IF A$="END" THEN 360  
320 FOR C=1 TO F  
330 NEXT C  
340 PRINTCHR$(147)  
350 GOTO 290  
360 RESTORE  
370 PRINT  
380 PRINT"DO YOU WISH TO TRY AGAIN?"  
390 PRINT"ENTER '1'-YES, '0'-NO"  
400 INPUT X  
410 IF X=1 THEN 200  
420 END  
430 F=(5/A)*350  
440 RETURN  
1000 DATA "THE READING PACER CAN HELP INCREASE"  
1010 DATA "YOUR READING SPEED. START WITH THE"  
1020 DATA "SLOWEST SPEED BY ENTERING A '1',"  
1030 DATA "AND GRADUALLY INCREASE THE SPEED"  
1040 DATA "UNTIL YOU NOTICE YOUR READING"  
1050 DATA "COMPREHENSION INCREASING. CHANGE"  
1060 DATA "THE TEXT, THEN START THE PACER AT"  
1070 DATA "ABOUT HALF YOUR FASTEST SPEED. YOU"  
1080 DATA "SHOULD NOTICE AN INCREASE IN YOUR"  
1090 DATA "READING SPEED AND COMPREHENSION."  
1100 DATA "END"
```

CHAPTER 13

The Sun

The Sun is an educational program describing the star at the center of our solar system. It lists important information about the sun, and gives a 10 question, TRUE/FALSE, test. It's written in BASIC for your microcomputer. See Program 13-1 for the program listing.

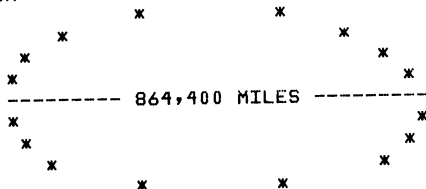
THE TEST

After reviewing the information, a TRUE/

FALSE test may be taken. Enter a 1 to take the test. To enter an answer, enter a 1 for TRUE or a 0 for FALSE. If your answer is correct, then CORRECT will be displayed. After all 10 questions are answered, the number of correct points per question, and your percent score, will be displayed. See Fig. 13-1 for a sample run.

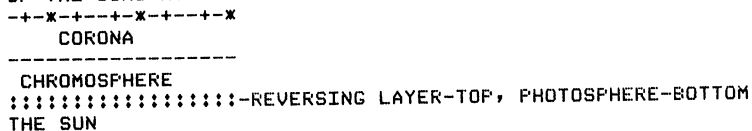
```
>RUN
THE SUN-ASTRONOMY LESSON II
COPYRIGHT (C) 1984 BY HOWARD BERENSON
```

```
THE SUN
```



```
ENTER '1' TO CONTINUE
?
```

THE SUN IS AN AVERAGE SIZE STAR IN OUR GALAXY. ITS MASS IS 2.2×10^{27} TONS. IT IS COMPLETELY GASEOUS. SUNLIGHT ORIGINATES FROM THE PHOTOSPHERE, A BOUNDARY THAT EXISTS BETWEEN THE SUN AND ITS ATMOSPHERE. THE REVERSING LAYER, THE CHROMOSPHERE, AND THE CORONA ARE THE THREE LAYERS OF THE SUNS ATMOSPHERE.



```
ENTER '1' TO CONTINUE
?
```

THE DENSITY IS .25 THAT OF THE EARTH, AND SURFACE GRAVITY IS 28 TIMES THAT OF THE EARTH. THE PHOTOSPHERE IS A SHELL ABOUT 150 MILES THICK FROM WHICH LIGHT IS EMITTED. THE BRIGHTNESS IS NOT UNIFORM, BUT SPECKLED OR GRANULATED WITH DIAMETERS HUNDREDS OF MILES LONG, AND CONSTANTLY CHANGING. 'SUNSPOTS' ARE GIGANTIC AREAS ON THE SUN THAT APPEAR DARK COMPARED TO OTHER AREAS. THEY CAN LAST FROM 4 DAYS (AVERAGE) TO MORE THAN 100 DAYS. THEY CAUSE AN INCREASE IN THE MAGNETIC FIELD, BY MANY THOUSANDS, IN THE AREA OF THE SUNSPOT.

```
ENTER '1' TO CONTINUE
?
```

'FACULAE' ARE SMALL TORCHES ABOVE THE SURFACE OF THE PHOTOSPHERE. THEY PRECEDE THE APPEARANCE OF SUNSPOTS AND LAST FROM 2 WEEKS TO MONTHS AFTER A SUNSPOT. THE TEMPERATURE AT THE 'REVERSING LAYER', AT THE BASE OF THE SUN, IS 7500 DEGREES A. 'PROMINENCES' ARE ROSE-COLORED FEATHERY FLAMES FROM THE SUN. THEY FORM NEAR SUNSPOTS. 'CHROMOSPHERIC FLARES' CAUSE RADIO FADEOUTS, FROM STRONG ULTRAVIOLET RADIATION EMITTED BY THESE FLARES.

```
ENTER '1' TO CONTINUE
?
```

Fig. 13-1. The Sun sample run.

THE 'CORONA' IS THE OUTER LAYER OF THE SUNS ATMOSPHERE. IT IS VISIBLE TO THE NAKED EYE DURING AN ECLIPSE. IT HAS HIGH TEMPERATURES OF 1,000,000 DEGREES A.

ENTER '1'-TEST, '2'-REVIEW
? 1

10 QUESTION 'TRUE' OR 'FALSE' TEST

1) THE DIAMETER OF THE SUN IS 864,400 MILES

ENTER '1'-TRUE, '0'-FALSE
? 1

CORRECT

2) SUNSPOTS ARE BRIGHT SPOTS ON THE SUN

ENTER '1'-TRUE, '0'-FALSE
? 0

CORRECT

POINTS PER QUESTION

1= 10 2= 10 3= 10 4= 10 5= 10
6= 10 7= 10 8= 10 9= 10 10= 10

YOUR SCORE IS 10 CORRECT OUT OF 10.
THAT'S 100 PERCENT CORRECT
READY
>

Fig. 13-1—cont. The Sun sample run.

Program 13-1. The Sun Program Listing.

```

100 POKE53281,11:PRINTCHR$(5):DIM A(10)
110 FORA=1TO10
120 A(A)=0
130 NEXTA
140 PRINTCHR$(147):PRINT"THE SUN-ASTRONOMY LESSON II"
150 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
160 PRINT
170 PRINT"THE SUN"
180 PRINTTAB(16)"*";TAB(27)"*"
190 PRINTTAB(10)"*";TAB(32)"*"
200 PRINTTAB(7)"*";TAB(35)"*"
210 PRINTTAB(6)"*";TAB(37)"*"
220 PRINT"----- 864,400 MILES -----"
230 PRINTTAB(6)"*";TAB(38)"*"
240 PRINTTAB(7)"*";TAB(37)"*"
250 PRINTTAB(9)"*";TAB(35)"*"
260 PRINTTAB(16)"*";TAB(27)"*"
270 GOSUB1320
280 INPUTA:IFA<>1THEN270
290 PRINTCHR$(147);"THE SUN IS AN AVERAGE SIZE STAR IN OUR GALAXY
. ITS MASS"
300 PRINT"IS 2.2 X 10 TO THE 27TH TONS. IT IS COMPLETELY GASEOUS."
310 PRINT"SUNLIGHT ORIGINATES FROM THE PHOTOSPHERE, A BOUNDARY THA
T"
320 PRINT"EXISTS BETWEEN THE SUN AND ITS ATMOSPHERE. THE REVERSING
"
330 PRINT"LAYER, THE CHROMOSPHERE, AND THE CORONA ARE THE THREE LA
YERS"
340 PRINT"OF THE SUN'S ATMOSPHERE."
350 PRINT"-+*-+---+*---+*"
360 PRINT"      CORONA"
370 PRINT"-----"
380 PRINT" CHROMOSPHERE"
390 PRINT"::~::~::~::~::~::~::~::~:-REVERSING LAYER-TOP, PHOTOSPHERE-BOTT
OM"
400 PRINT"THE SUN"
410 PRINT:GOSUB1320
420 INPUTA:IFA<>1THEN410
430 PRINTCHR$(147);"THE DENSITY IS .25 THAT OF THE EARTH, AND SU
RFACE GRAVITY"
440 PRINT"IS 28 TIMES THAT OF THE EARTH."
450 PRINT"THE PHOTOSPHERE IS A SHELL ABOUT 150      MILES THICK FROM
WHICH"
460 PRINT"LIGHT IS EMITTED. THE BRIGHTNESS IS NOT UNIFORM, BUT"
470 PRINT"SPECKLED OR GRANULATED WITH DIAMETERS      HUNDREDS OF MILE
S"
480 PRINT"LONG, AND CONSTANTLY CHANGING."
490 PRINT"'SUNSPOTS' ARE GIGANTIC AREAS ON THE      SUN THAT APPEAR
DARK"
500 PRINT"COMPARED TO OTHER AREAS. THEY CAN LAST      FROM 4 DAYS (AVE
RAGE)"
510 PRINT"TO MORE THAN 100 DAYS. THEY CAUSE AN      INCREASE IN THE"

```

Program 13-1—cont. The Sun Program Listing.

```
520 PRINT"MAGNETIC FIELD, BY MANY THOUSANDS, IN THE AREA OF THE
    SUNSPOT."
530 PRINT:GOSUB1320
540 INPUTA:IFA<>1 THEN 530
550 PRINTCHR$(147);"'FACULAE' ARE SMALL TORCHES ABOVE THE SURFACE
    OF THE PHOTO-"
560 PRINT"SPHERE. THEY PRECEDE THE APPEARANCE OF SUNSPOTS AND LAS
    T"
570 PRINT"FROM 2 WEEKS TO MONTHS AFTER A SUNSPOT."
580 PRINT"THE TEMPERATURE AT THE 'REVERSING LAYER', AT THE BASE OF
    THE"
590 PRINT"SUN, IS 7500 DEGREES A."
600 PRINT"'PROMINENCES' ARE ROSE-COLORED FEATHERY FLAMES FROM THE
    SUN."
610 PRINT"THEY FORM NEAR SUNSPOTS."
620 PRINT"'CHROMOSPHERIC FLARES' CAUSE RADIO FADE OUTS, FROM STRON
    G"
630 PRINT"ULTRAVIOLET RADIATION EMITTED BY THESE FLARES."
640 PRINT:GOSUB1320
650 INPUTA:IFA<>1THEN640
660 PRINTCHR$(147);"THE 'CORONA' IS THE OUTER LAYER OF THE SUN'S A
    TMOSPHERE. IT"
670 PRINT"IS VISIBLE TO THE NAKED EYE DURING AN ECLIPSE. IT HAS HI
    GH"
680 PRINT"TEMPERATURES OF 1,000,000 DEGREES A."
690 PRINT
700 PRINT"ENTER '1'-TEST, '2'-REVIEW"
710 INPUTA:PRINTCHR$(147):IFA=1THEN730
720 IFA<>1THEN110
730 PRINT"10 QUESTION 'TRUE' OR 'FALSE' TEST"
740 P=0:PRINT
750 PRINT"1) THE DIAMETER OF THE SUN IS 864,400 MILES"
760 GOSUB1240
770 IFC<>1 THEN 790
780 GOSUB1270:A(1)=10
790 PRINT"2) SUNSPOTS ARE BRIGHT SPOTS ON THE SUN"
800 GOSUB1240
810 IFC<>0 THEN 830
820 GOSUB1270:A(2)=10
830 PRINT"3) THE SOLAR ATMOSPHERE CONSISTS OF 3 LAYERS:"
840 PRINT"REVERSING LAYER, CHROMOSPHERE, CORONA"
850 GOSUB1240
860 IFC<>1 THEN 880
870 GOSUB1270:A(3)=10
880 PRINT"4) THE SUN IS AN AVERAGE SIZE STAR IN OUR GALAXY"
890 GOSUB1240
900 IFC<>1 THEN 920
910 GOSUB1270:A(4)=10
920 PRINT"5) FACULAE ARE SMALL TORCHES ABOVE THE PHOTOSPHERE"
930 GOSUB1240
940 IFC<>1 THEN 960
950 GOSUB1270:A(5)=10
960 PRINT"6) PROMINENCES ARE BLUE COLORED FLAMES FROM THE SUN"
```

Program 13-1—cont. The Sun Program Listing.

```

970 GOSUB1240
980 IFC<>0 THEN 1000
990 GOSUB1270:A(6)=10
1000 PRINT"7) THE SUN IS COMPLETELY GASEOUS"
1010 GOSUB1240
1020 IFC<>1 THEN 1040
1030 GOSUB1270:A(7)=10
1040 PRINT"8) AS SUNSPOTS GROW THEIR MAGNETIC          FIELDS DECREASE
"
1050 GOSUB1240
1060 IFC<>0 THEN 1080
1070 GOSUB1270:A(8)=10
1080 PRINT"9) RADIO FADEOUTS ARE CAUSED BY INFRA-  RED RADIATION"
1090 GOSUB1240
1100 IFC<>0 THEN 1120
1110 GOSUB1270:A(9)=10
1120 PRINT"10) CHROMOSPHERIC FLARES EMIT ULTRA-  VIOLET RADIATIO
N"
1130 GOSUB1240
1140 IFC<>1 THEN 1160
1150 GOSUB1270:A(10)=10
1160 PRINT
1170 PRINT"POINTS PER QUESTION":PRINT
1180 PRINT"1=";A(1);" 2=";A(2);" 3=";A(3);" 4=";A(4);" 5=";A(5
)
1190 PRINT"6=";A(6);" 7=";A(7);" 8=";A(8);" 9=";A(9);" 10=";A(
10)
1200 PRINT
1210 PRINT"YOUR SCORE IS";P/10;"CORRECT OUT OF 10."
1220 PRINT"THAT'S";P;"PERCENT CORRECT"
1230 END
1240 PRINT:PRINT"ENTER '1'-TRUE, '0'-FALSE"
1250 INPUTC:PRINTCHR$(147)
1260 RETURN
1270 P=P+10
1280 PRINT
1290 PRINT"CORRECT"
1300 PRINT
1310 RETURN
1320 PRINT"ENTER '1' TO CONTINUE"
1330 RETURN

```

CHAPTER 14

Constellation 10

Here's an educational program for teachers, students, and scientists, or for anyone interested in astronomy. It displays 10 common constellations, and gives a multiple choice exam on the constellations. See Program 14-1 for the program listing.

After you run the program, you may choose to review the constellations by entering a 1. To take the test, enter a 0. In the review mode, entering any number from 1 to 10 will display a constellation. They are displayed using asterisks (*), with their names printed at the top of the screen.

THE TEST

After reviewing the 10th constellation, enter a 0 to take the test. The test consists of 10 multiple choice questions. A constellation is displayed without identification, with 4 possible answers. Enter the number (1-4) that corresponds to the

displayed constellation. If your answer is correct, then CORRECT will be displayed. The program will advance to the next question. After the 10 questions are answered, a list of points per question is displayed, with your percent score below. See Fig. 14-1 for a sample run.

MODIFICATIONS

The program may be modified for other constellation configurations. Of course, the test part of the program must be changed to accommodate the new constellations.

ONE LAST NOTE

After reviewing the constellations a few times, you'll be surprised how much you've learned. So the next time you look up into the night sky, you'll recognize Cassiopeia, easily.

RUN
CONSTELLATION 10
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THIS PROGRAM DISPLAYS 10 CONSTELLATIONS AND
GIVES A MULTIPLE CHOICE TEST.

1-REVIEW, 0-TEST? 1

CASSIOPEIA

```
      *
     *
    *
   *
  *
```

ENTER #1-10
?

LYNX

```
  *
 *
  *
```

ENTER #1-10
?

CAMELOPARDALIS

```
  *
 *
 *
 *
 *
```

ENTER #1-10
?

LYRA

```
  *
 *
 *
 *
 *
```

ENTER #1-10
?

CYGNUS

```
      *
     *
    *
   *
  *
```

1-REVIEW, 0-TEST? 0

MULTIPLE CHOICE TEST
ENTER CORRECT ANSWER (#1-4)

1)

```
  *
 *
 *
 *
 *
```

(1) LEO
(2) BOOTES
(3) CASSIOPEIA
(4) LYNX
(1-4)? 3

CORRECT
2)

```
  *
 *
 *
 *
```

(1) PROCYON
(2) CAMELOPARDALIS
(3) CEPHEUS
(4) ORION
(1-4)? 2

CORRECT

POINTS PER QUESTION

1= 10 2= 10 3= 10 4= 10 5= 10
6= 10 7= 10 8= 10 9= 10 10= 10

YOUR SCORE IS 10 CORRECT OUT OF 10.
THAT'S 100 PERCENT CORRECT
READY
>

Fig. 14-1. Constellation 10 sample run.

Program 14-1. Constellation 10 Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"CONSTELLATION 10: COMMODORE 64"
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
120 PRINT
130 PRINT"THIS PROGRAM DISPLAYS 10 CONSTELLATIONS AND"
140 PRINT"GIVES A MULTIPLE CHOICE TEST."
150 DIM A(10):PRINT
160 FORI=1TO10
170 A(I)=0
180 NEXTI
190 INPUT"1-REVIEW, 0-TEST";A
200 IFA=0THEN1180
210 PRINT
220 PRINT"ENTER #1-10"
230 INPUTB
240 PRINTCHR$(147)
250 ONBGOTO980,1000,1020,1040,1060,1080,1100,1120,1140,1160
260 PRINT"URSA MAJOR"
270 PRINTTAB(32)"*"
280 PRINT:PRINT
290 PRINTTAB(6)"*";TAB(13)"*";TAB(21)"*";TAB(33)"*"
300 PRINT:PRINT"*";TAB(25)"*"
310 RETURN
320 PRINT"CASSIOPEIA"
330 PRINTTAB(12)"*"
340 PRINTTAB(26)"*"
350 PRINTTAB(5)"*";TAB(20)"*"
360 PRINTTAB(33)"*"
370 RETURN
380 PRINT"LYNX"
390 PRINTTAB(7)"*"
400 PRINTTAB(7)"*"
410 PRINTTAB(19)"*"
420 RETURN
430 PRINT"CAMELOPARDALIS"
440 PRINTTAB(18)"*"
450 PRINT
460 PRINT
470 PRINTTAB(27)"*"
480 PRINTTAB(17)"*";TAB(23)"*"
490 RETURN
500 PRINT"ANDROMEDA"
510 PRINTTAB(19)"*"
520 PRINT
530 PRINTTAB(9)"*"
540 PRINTTAB(22)"*"
550 PRINTTAB(18)"*";TAB(26)"*"
560 PRINTTAB(26)"*";TAB(34)"*"
570 RETURN
580 PRINT"GEMINI"
590 PRINTTAB(10)"*";TAB(17)"*"
600 PRINT
610 PRINT
```

Program 14-1—cont. Constellation 10 Program Listing.

```
620 PRINTTAB(9) "*"
630 PRINTTAB(10) "*" ; TAB(17) "*"
640 PRINT
650 PRINTTAB(9) "*" ; TAB(18) "*"
660 PRINTTAB(4) "*" ; TAB(21) "*"
670 RETURN
680 PRINT "CANIS MINOR"
690 PRINTTAB(25) "*"
700 PRINT
710 PRINT
720 PRINTTAB(11) "*"
730 RETURN
740 PRINT "LYRA"
750 PRINTTAB(25) "*"
760 PRINTTAB(21) "*"
770 PRINTTAB(16) "*"
780 PRINT
790 PRINTTAB(19) "*"
800 PRINTTAB(14) "*"
810 RETURN
820 PRINT "BOOTES"
830 PRINTTAB(14) "*"
840 PRINT
850 PRINTTAB(8) "*" ; TAB(35) "*"
860 PRINTTAB(27) "*"
870 PRINTTAB(15) "*"
880 RETURN
890 PRINT "CYGNUS"
900 PRINTTAB(20) "*"
910 PRINTTAB(32) "*"
920 PRINTTAB(24) "*"
930 PRINTTAB(15) "*"
940 PRINTTAB(29) "*"
950 PRINTTAB(32) "*"
960 PRINTTAB(35) "*"
970 RETURN
980 GOSUB260
990 GOTO210
1000 GOSUB320
1010 GOTO210
1020 GOSUB380
1030 GOTO210
1040 GOSUB430
1050 GOTO210
1060 GOSUB500
1070 GOTO210
1080 GOSUB580
1090 GOTO210
1100 GOSUB680
1110 GOTO210
1120 GOSUB740
1130 GOTO210
1140 GOSUB820
```

Program 14-1—cont. Constellation 10 Program Listing.

```
1150 GOTO210
1160 GOSUB890
1170 GOTO190
1180 PRINTCHR$(147):P=0
1190 PRINT"MULTIPLE CHOICE TEST"
1200 PRINT"ENTER CORRECT ANSWER (#1-4)"
1210 PRINT
1220 PRINT"1)"
1230 GOSUB330
1240 PRINT"(1) LEO"
1250 PRINT"(2) BOOTES"
1260 PRINT"(3) CASSIOPEIA"
1270 PRINT"(4) LYNX"
1280 GOSUB2240
1290 IF C<>3 THEN 1310
1300 GOSUB2210:A(1)=10
1310 PRINT"2)"
1320 GOSUB440
1330 PRINT"(1) PROCYON"
1340 PRINT"(2) CAMELOPARDALIS"
1350 PRINT"(3) CEPHEUS"
1360 PRINT"(4) ORION"
1370 GOSUB2240
1380 IFC<>2 THEN 1400
1390 GOSUB 2210:A(2)=10
1400 PRINT"3)"
1410 GOSUB830
1420 PRINT"(1) BOOTES"
1430 PRINT"(2) AURIGA"
1440 PRINT"(3) GEMINI"
1450 PRINT"(4) HYDRA"
1460 GOSUB2240
1470 IF C<>1 THEN 1490
1480 GOSUB2210:A(3)=10
1490 PRINT"4)"
1500 GOSUB510
1510 PRINT"(1) ANDROMEDA"
1520 PRINT"(2) CRUX"
1530 PRINT"(3) CANOPUS"
1540 PRINT"(4) DRACO"
1550 GOSUB2240
1560 IFC<>1 THEN 1580
1570 GOSUB2210:A(4)=10
1580 PRINT"5)"
1590 GOSUB270
1600 PRINT"(1) AURIGA"
1610 PRINT"(2) LYNX"
1620 PRINT"(3) URSA MAJOR"
1630 PRINT"(4) LEPUS"
1640 GOSUB2240
1650 IFC<>3 THEN 1670
1660 GOSUB2210:A(5)=10
1670 PRINT"6)"
```

Program 14-1—cont. Constellation 10 Program Listing.

```

1680 GOSUB590
1690 PRINT"(1) LEO"
1700 PRINT"(2) CYGNUS"
1710 PRINT"(3) CORONA BOREALIS"
1720 PRINT"(4) GEMINI"
1730 GOSUB2240
1740 IFC<>4 THEN 1760
1750 GOSUB2210:A(6)=10
1760 PRINT"7)"
1770 GOSUB750
1780 PRINT"(1) LYRA"
1790 PRINT"(2) LEO"
1800 PRINT"(3) ORION"
1810 PRINT"(4) CETUS"
1820 GOSUB2240
1830 IFC<>1 THEN 1850
1840 GOSUB2210:A(7)=10
1850 PRINT"8)"
1860 GOSUB690
1870 PRINT"(1) CRUX"
1880 PRINT"(2) CETUS"
1890 PRINT"(3) DRACO"
1900 PRINT"(4) CANIS MINOR"
1910 GOSUB2240
1920 IFC<>4 THEN 1940
1930 GOSUB2210:A(8)=10
1940 PRINT"9)"
1950 GOSUB390
1960 PRINT"(1) CRUX"
1970 PRINT"(2) URSA MAJOR"
1980 PRINT"(3) LYNX"
1990 PRINT"(4) VIRGO"
2000 GOSUB2240
2010 IFC<>3 THEN 2030
2020 GOSUB2210:A(9)=10
2030 PRINT"10)"
2040 GOSUB900
2050 PRINT"(1) PERSEUS"
2060 PRINT"(2) LEPUS"
2070 PRINT"(3) CYGNUS"
2080 PRINT"(4) ORION"
2090 GOSUB2240
2100 IFC<>3 THEN 2120
2110 GOSUB2210:A(10)=10
2120 PRINT
2130 PRINT"POINTS PER QUESTION"
2140 PRINT
2150 PRINT"1=";A(1);" 2=";A(2);" 3=";A(3);" 4=";A(4);" 5=";A(5)
)
2160 PRINT"6=";A(6);" 7=";A(7);" 8=";A(8);" 9=";A(9);" 10=";A(
10)
2170 PRINT
2180 PRINT"YOUR SCORE IS";P/10;"CORRECT OUT OF 10."

```

Program 14-1—cont. Constellation 10 Program Listing.

```
2190 PRINT"THAT'S";P;"PERCENT CORRECT"  
2200 END  
2210 P=P+10  
2220 PRINT"CORRECT"  
2230 RETURN  
2240 PRINT"(1-4)";  
2250 INPUT C  
2260 PRINTCHR$(147)  
2270 RETURN
```

SECTION III

Business and Investment

The business and investment use of the home computer is an important one. In the past, the small business could not afford the use of a computer. Now with the low price of the home computer, under \$200, it's easily affordable. A fully equipped business system can cost from \$2500 to \$5000 including a printer, dual disks, and enough RAM memory for inventory and pay roll, etc.

This section includes an IRA program for retirement planning; a house buying guide program and a bond analysis program for investors; a loan amortization program that prints a payment schedule for a given loan amount, interest rate, and monthly payment; two depreciation programs for business property depreciation; and a bar chart for business sales.

IRA Planning

Individual retirement arrangements have become very popular in the past few years, because of the great tax advantages that they offer. The Individual Retirement Account (IRA) is one of the three types of accounts offered for retirement planning. It is a savings plan that lets you set aside money for your retirement. Your contributions to the IRA are tax deductible, and the interest earned is not taxed until it is distributed to you at retirement.

You may deposit up to \$2000 per year into your IRA, and receive the amount deposited as a deduction from your yearly income. It reduces your yearly income by that amount, therefore lowering your taxable income, and allowing you tax free interest on the amount contributed. Here's a program that is useful in estimating the balance in your IRA at retirement. It calculates and displays the approximate balance and cumulative interest after a given period. The program is written in BASIC for your microcomputer. See Program 15-1 for the program listing.

THE PROGRAM

After you run the program, it requests your entry of the beginning year of the plan and your

age at the start of the IRA. Now enter your estimated yearly deposit amount (maximum allowed is \$2000). Then enter the current yearly interest rate. Finally, enter your age at withdrawal. It is not recommended that you receive distributions before you are 59½ otherwise you will be charged a 10 percent additional tax on the premature distribution. Also, you must start receiving distributions before the end of the year in which you reach 70½, otherwise there is a 50 percent excise tax on the excess accumulation in your account in the year you reach 70½ and any year after that.

Now the computer will display NOW CALCULATING COMPOUND INTEREST and the year in which the calculation is being performed. Since there are 360 calculations for each year, it may take some time to complete the calculation. This is dependent upon the number of years you have until retirement. After the calculations are completed, the computer will display the beginning year of the plan, the yearly interest rate, the yearly IRA deposit, and the number of years compounding. Then it will display the principal, the compound interest, the retirement year, and the total balance in your IRA at retirement.

See Fig. 15-1 for a sample run.

IRA PLANNING
COMMODORE 64
COPYRIGHT (C) 1984 BY HOWARD BERENBON

CURRENTLY AT YEAR 2

THIS PROGRAM CALCULATES AND DISPLAYS
THE APPROXIMATE BALANCE AND CUMULATIVE
INTEREST AFTER A GIVEN TIME PERIOD.
IT REQUIRES THE ENTRY OF YOUR AGE
WHEN YOU BEGAN THE IRA, THE ESTIMATED
YEARLY DEPOSIT, THE APPROXIMATE
YEARLY INTEREST RATE (CURRENT RATE
WILL BE SUFFICIENT), AND THE AGE THAT
YOU EXPECT TO BEGIN WITHDRAWAL.

NOW CALCULATING COMPOUND INTEREST
FOR 37 YEARS

CURRENTLY AT YEAR 15

ENTER BEGINNING YEAR OF PLAN
? 1982

NOW CALCULATING COMPOUND INTEREST
FOR 37 YEARS

ENTER YOUR AGE AT START OF THE IRA
? 28

CURRENTLY AT YEAR 30

ENTER YOUR ESTIMATED YEARLY IRA DEPOSIT
? 2000

IRA PLANNING

ENTER THE CURRENT YEARLY INTEREST RATE
? 10

BEGINNING YEAR OF PLAN: 1982
YEARLY INTEREST RATE (%): 10

ENTER YOUR AGE AT WITHDRAWAL
? 65

YEARLY IRA DEPOSIT=\$ 2000

NOW CALCULATING COMPOUND INTEREST
FOR 37 YEARS

NUMBER OF YEARS COMPOUNDING: 37
PRINCIPAL=\$ 74000
COMPOUND INTEREST=\$ 754723

CURRENTLY AT YEAR 1

RETIREMENT YEAR: 2019

NOW CALCULATING COMPOUND INTEREST
FOR 37 YEARS

TOTAL BALANCE=\$ 828724

Fig. 15-1. IRA sample run.

Program 15-1. IRA Planning Program Listing.

```
100 PRINTCHR$(147);"IRA PLANNING"  
110 PRINT"COMMODORE 64"  
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
130 PRINT  
140 PRINT"THIS PROGRAM CALCULATES AND DISPLAYS"  
150 PRINT"THE APPROXIMATE BALANCE & CUMULATIVE"  
160 PRINT"INTEREST AFTER A GIVEN TIME PERIOD."  
170 PRINT"IT REQUIRES THE ENTRY OF YOUR AGE"  
180 PRINT"WHEN YOU BEGAN THE IRA, THE ESTIMATED"  
190 PRINT"YEARLY DEPOSIT, THE APPROXIMATE"  
200 PRINT"YEARLY INTEREST RATE (CURRENT RATE"  
210 PRINT"WILL BE SUFFICIENT), AND THE AGE THAT"  
220 PRINT"YOU EXPECT TO BEGIN WITHDRAWAL."  
230 PRINT  
240 PRINT"ENTER BEGINNING YEAR OF PLAN":INPUTY:PRINTCHR$(147)  
250 PRINT"ENTER YOUR AGE AT THE START OF THE IRA"  
260 INPUTA:PRINT:IFA>70.5THEN560  
270 PRINT"ENTER THE ESTIMATED YEARLY IRA DEPOSIT"  
280 INPUTD:PRINT:IFD>2000THENPRINT"TOO LARGE":GOTO270  
290 PRINT"ENTER THE CURRENT YEARLY INTEREST RATE"  
300 INPUTI:PRINT  
310 PRINT"ENTER YOUR AGE AT WITHDRAWAL"  
320 INPUTAW  
330 IFAW<59.5ORAW>70.5THEN610  
340 PRINTCHR$(147):REM CALCULATE COMPOUND INTEREST AND BALANCE  
350 CI=0:CM=360:REM DAILY INTEREST  
360 YA=AW-A:PRINT"NOW CALCULATING COMPOUND INTEREST"  
370 PRINT"FOR";YA;"YEARS"  
380 DI=(I/CM)/100:DZ=D  
390 FORZ=1TOYA:PRINTCHR$(19):FORJ=1TO5:PRINT:NEXTJ  
400 PRINTTAB(9);"CURRENTLY AT YEAR";Z:FORZ1=1TO360  
410 IN=DZ*DI  
420 IN=INT(IN*100+.5)/100  
430 B=DZ+IN:DZ=B  
440 CI=CI+IN:NEXTZ1:DZ=D+DZ  
450 NEXTZ:P=YA*D  
460 PRINTCHR$(147);"IRA PLANNING":PRINT  
470 PRINT:PRINT"BEGINNING YEAR OF PLAN:";Y  
480 PRINT"YEARLY INTEREST RATE (%):";I  
490 PRINT:PRINT"YEARLY IRA DEPOSIT=$";D  
500 PRINT:PRINT"NUMBER OF YEARS COMPOUNDING:";YA  
510 PRINT"PRINCIPAL=$";P  
520 PRINT"COMPOUND INTEREST=$";CI:PRINT  
530 YY=YA+Y:PRINT:PRINT"RETIREMENT YEAR:";YY:PRINT  
540 PRINT:PRINT"TOTAL BALANCE=$";B  
550 GOTO600  
560 PRINT"YOU CANNOT TAKE A TAX DEDUCTION FOR"  
570 PRINT"ANY PAYMENT MADE AFTER THE AGE OF"  
580 PRINT"70 1/2. THEREFORE, AT YOUR AGE OF";A  
590 PRINT"YOU ARE NOT ELIGIBLE FOR AN IRA."  
600 END  
610 PRINTCHR$(147);"WITHDRAWAL REQUIRED BETWEEN THE AGES"  
620 PRINT"OF 59 1/2 AND 70 1/2. RE-ENTER.":PRINT:GOTO310
```

The House Buying Guide

Here's an interesting program for the potential home investor, or investment group. It's the house buying guide, used for screening houses that may be of interest to you. It's written in BASIC, and will run on your microcomputer.

The program is a 16 question, questionnaire, with each answer assigned a point value. See Program 16-1 for the program listing. Before beginning the questionnaire, the program requires a "yes" answer to the following preliminary questions:

1. Does the house have all utilities?
(gas, water, etc.)
2. Is there gas heat?
3. Are the roads paved?
4. Is the down payment and initial cost within your budget?

If any of the preliminary questions are answered "no," then the house is not acceptable. A house that passed the screening will go on to the questionnaire. See Fig. 16-1 for a sample run.

USE

The questionnaire was designed to assist the investor in finding a reliable house, for maximum profitability and resale value.

A point score of 36 points or more is a positive recommendation to invest in the house. The house will have all the qualifications for a profit making investment, either for renting and/or selling at some future date.

Questions 14 through 16 pertain to profitability of your investment. Question 14 requires entry of the monthly rent that you will charge. Question 15 requests a monthly cash flow value, calculated by the following formula:

$$\text{Monthly Cash Flow} = \frac{(\text{yr rent}) - (\text{yr insurance} + \text{yr tax} + \text{yr water})}{12}$$

Finally, question 16 requests the percent profit, calculated by the formula:

$$\text{Percent Profit} = \frac{(\text{yr cash flow} + \text{yr principal})}{(\text{down payment} + \text{initial costs})}$$

If you intend to use the questionnaire for screening a house, without the intention of renting, then questions 14 through 16 must be answered with a set point value. To adjust the point count for an accurate recommendation, give these questions 4 points each.

RUN
THE HOUSE BUYING GUIDE

PRELIMINARY SCREENING

A
DOES THE HOUSE HAVE ALL UTILITIES?
ENTER '1'=YES, '0'=NO
? 1

B
IS THERE GAS HEAT?
ENTER '1'=YES, '0'=NO
? 1

C
ARE THE ROADS PAVED?
ENTER '1'=YES, '0'=NO
? 1

D
IS THE DOWN PAYMENT AND INITIAL
COST WITHIN YOUR BUDGET?
ENTER '1'=YES, '0'=NO
? 1

THE HOUSE HAS PASSED THE PRELIMINARY SCREENING

BEGIN QUESTIONNAIRE

#1
GENERAL CONDITION?
POOR =1
AVERAGE=2
GOOD =3
EXCELLENT=4
ENTER POINT VALUE
? 3

#2
STRUCTURE?
ALUMINUM=1
BRICK =2
ENTER POINT VALUE
? 2
POINTS SO FAR= 5

#3
FAMILY ROOM?
YES=1, NO=0
ENTER POINT VALUE
? 1

POINTS SO FAR= 10

#6
LOCATION? (RATING FROM 0 TO 5)
ZERO=0 THREE=6
ONE=2 FOUR=8
TWO=4 FIVE=10
ENTER POINT VALUE
? 8

8
POINTS SO FAR= 18

#7
IMMEDIATE NEIGHBORHOOD?
POOR =1
AVERAGE=2
GOOD =3
EXCELLENT=4
ENTER POINT VALUE
?

#9
BATHS?
1 1/2 BATHS=1 2 1/2 BATHS=3
2 BATHS =2 3 BATHS =4
ENTER POINT VALUE
? 2
POINTS SO FAR= 28

#10
BASEMENT?
YES=1, NO=0
ENTER POINT VALUE
? 1

POINTS SO FAR= 32

#13
AGE?
1 TO 5 YRS=3
6 TO 10 YRS=2
11 TO 15 YRS=1
16 OR GREATER=0
ENTER POINT VALUE
? 1

POINTS SO FAR= 45

THE HOUSE IS ACCEPTABLE

TOTAL POINTS= 45
READY
>

Fig. 16-1. The House Buying Guide sample run.

Program 16-1. House Buying Guide Program Listing.

```
100 PRINTCHR$(147):PRINT"THE HOUSE BUYING GUIDE"  
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
120 PRINT  
130 P=0  
140 PRINT"PRELIMINARY SCREENING"  
150 PRINT  
160 PRINT"A"  
170 PRINT"DOES THE HOUSE HAVE ALL UTILITIES?"  
180 GOSUB 1480  
190 PRINT"B"  
200 PRINT"IS THERE GAS HEAT?"  
210 GOSUB 1480  
220 PRINT"C"  
230 PRINT"ARE THE ROADS PAVED?"  
240 GOSUB 1480  
250 PRINT"D"  
260 PRINT"IS THE DOWN PAYMENT AND INITIAL"  
270 PRINT"COST WITHIN YOUR BUDGET?"  
280 GOSUB 1480  
290 PRINTCHR$(147);"THE HOUSE HAS PASSED THE PRELIMINARY SCREENING"  
"  
300 PRINT  
310 PRINT"BEGIN QUESTIONNAIRE"  
320 PRINT  
330 B=0  
340 PRINT"#1"  
350 PRINT"GENERAL CONDITION?"  
360 PRINT"POOR =1"  
370 PRINT"AVERAGE=2"  
380 PRINT"GOOD =3"  
390 PRINT"EXCELLENT=4"  
400 GOSUB 1530  
410 PRINT"#2"  
420 PRINT"STRUCTURE?"  
430 PRINT"ALUMINUM=1"  
440 PRINT"BRICK =2"  
450 GOSUB 1530  
460 PRINT"#3"  
470 PRINT"FAMILY ROOM?"  
480 PRINT"YES=1, NO=0"  
490 GOSUB 1530  
500 PRINT"#4"  
510 PRINT"GARAGE?"  
520 PRINT"1 CAR =1"  
530 PRINT"1 1/2 =2"  
540 PRINT"2 CAR =3"  
550 PRINT"2 1/2 =4"  
560 GOSUB 1530  
570 PRINT"#5"  
580 PRINT"BEDROOMS?"  
590 PRINT"TWO=1", "FOUR=3"  
600 PRINT"THREE=2", "FIVE=4"  
610 GOSUB 1530
```

Program 16-1—cont. House Buying Guide Program Listing.

```
620 PRINT"#6"
630 PRINT"LOCATION? (RATING FROM 0 TO 5)"
640 PRINT"ZERO=0","THREE=6"
650 PRINT"ONE=2","FOUR=8"
660 PRINT"TWO=4","FIVE=10"
670 GOSUB 1530
680 PRINT"#7"
690 PRINT"IMMEDIATE NEIGHBORHOOD?"
700 PRINT"POOR =1"
710 PRINT"AVERAGE=2"
720 PRINT"GOOD =3"
730 PRINT"EXCELLENT=4"
740 GOSUB 1530
750 PRINT"#8"
760 PRINT"SQUARE FOOTAGE?"
770 PRINT"1000=1","1400=5","1800=9"
780 PRINT"1100=2","1500=6","1900=10"
790 PRINT"1200=3","1600=7","2000=11"
800 PRINT"1300=4","1700=8","2100=12"
810 GOSUB 1530
820 PRINT"#9"
830 PRINT"BATHS?"
840 PRINT"1 1/2 BATHS=1","2 1/2 BATHS=3"
850 PRINT"2 BATHS =2","3 BATHS =4"
860 GOSUB 1530
870 PRINT"#10"
880 PRINT"BASEMENT?"
890 PRINT"YES=1, NO=0"
900 GOSUB 1530
910 PRINT"#11"
920 PRINT"LOAN %?"
930 PRINT"LESS THAN 8%=5"
940 PRINT"8 TO 9% =4"
950 PRINT"9 TO 10% =3"
960 PRINT"10 TO 12%=2"
970 PRINT"12 TO 14%=1"
980 GOSUB 1530
990 PRINT"#12"
1000 PRINT"LOAN TYPE?"
1010 PRINT"CONVENTIONAL=1"
1020 PRINT"LAND CONTRACT=2"
1030 PRINT"ASSUMPTION=3"
1040 GOSUB 1530
1050 PRINT"#13"
1060 PRINT"AGE?"
1070 PRINT"1 TO 5 YRS=3"
1080 PRINT"6 TO 10 YRS=2"
1090 PRINT"11 TO 15 YRS=1"
1100 PRINT"16 OR GREATER=0"
1110 GOSUB 1530
1120 PRINT"#14"
1130 PRINT"AVERAGE MONTHLY RENT (RENT PROPERTY)?"
1140 PRINT"LESS THAN $251=1"
```

Program 16-1—cont. House Buying Guide Program Listing.

```
1150 PRINT"$300 TO 251=2"  
1160 PRINT"$400 TO 301=3"  
1170 PRINT"$401 TO 450=2"  
1180 PRINT"GREATER THAN $450=1"  
1190 GOSUB 1530  
1200 PRINT"#15"  
1210 PRINT"MONTHLY CASH FLOW="  
1220 PRINT"((YR RENT)-(YR INSURANCE+YR TAX+YR WATER))/12"  
1230 PRINT"$50 TO 100=1"  
1240 PRINT"$101 TO 150=2"  
1250 PRINT"$151 TO 200=3"  
1260 PRINT"$201 TO 250=4"  
1270 PRINT"$251 TO 300=5"  
1280 PRINT"$301 TO 350=6"  
1290 PRINT"$351 TO 400=7"  
1300 PRINT"$401 TO 450=8"  
1310 GOSUB 1530  
1320 PRINT"#16"  
1330 PRINT"PERCENT PROFIT="  
1340 PRINT"(YR CASH FLOW+YR PRINCIPAL)/(DOWN PAYMENT+INITIAL COSTS  
)"  
1350 PRINT"10%=2", "13%=8"  
1360 PRINT"11%=4" "14%=10"  
1370 PRINT"12%=6", "15%=12"  
1380 GOSUB 1530  
1390 PRINT  
1400 PRINT  
1410 IF P>35 THEN 1440  
1420 GOTO 1600  
1430 END  
1440 PRINT"THE HOUSE IS ACCEPTABLE"  
1450 PRINT  
1460 PRINT"TOTAL POINTS=";P  
1470 GOTO 1430  
1480 PRINT"ENTER '1'=YES, '0'=NO"  
1490 INPUT A  
1500 IF A=0 THEN 1600  
1510 PRINT  
1520 RETURN  
1530 PRINT"ENTER POINT VALUE"  
1540 INPUT B:PRINTCHR$(147)  
1550 P=B+P  
1560 PRINT"POINTS SO FAR=";P  
1570 PRINT  
1580 PRINT  
1590 RETURN  
1600 PRINT"THE HOUSE IS NOT ACCEPTABLE"  
1610 PRINT"NO FURTHER SCREENING IS REQUIRED"  
1620 GOTO 1430
```


CHAPTER 17

Amortization Schedule

If you're in the market for a loan, then the amortization schedule can help you. The program generates a loan payment schedule given the principal, yearly interest rate, and monthly payment. It calculates and displays the balance, principal, interest, and cumulative interest for each month of the loan. It's written in BASIC for

your microcomputer. See Program 17-1 for the program listing.

THE PROGRAM

After you run the program, enter the principal (the amount of the loan), the yearly interest (in

```
RUN
AMORTIZATION SCHEDULE

COPYRIGHT (C) 1984 BY HOWARD BERENBON

THIS PROGRAM CALCULATES A MONTHLY LOAN PAYMENT
SCHEDULE. IT DISPLAYS THE PAYMENT, BALANCE, PRINCIPAL,
INTEREST, AND CUM. INTEREST FOR EACH MONTH OF THE LOAN.

ENTER THE PRINCIPAL (AMOUNT OF LOAN)
? 1000

ENTER THE YEARLY INTEREST RATE (%)
? 18

ENTER THE MONTHLY PAYMENT
? 140

ENTER '1' TO BEGIN
? 1

                AMORTIZATION SCHEDULE

PRINCIPAL=$ 1000                INTEREST= 18 %

MONTHLY PAYMENT=$ 140

MONTH  PAYMENT    BALANCE    PRINCIPAL    INTEREST    CUM. INT
-----
1      140         875         125          15           15
2      140         748.13     126.87       13.13        28.13
3      140         619.35     128.78       11.22        39.35
4      140         488.64     130.71       9.29         48.64
5      140         355.97     132.67       7.33         55.97
6      140         221.31     134.66       5.34         61.31
7      140         84.63      136.68       3.32         64.63
8      85.9         0           84.63       1.27         65.9

TOTAL INTEREST= 65.9
READY
>
```

Fig. 17-1. Amortization Schedule sample run.

percent), and the monthly payment. Then enter a 1 to display the schedule.

The program calculates the monthly interest from the principal, and subtracts that amount from the monthly payment, to give the current balance. This continues until the balance is less than the monthly payment, then the final month's data is calculated.

A time delay is included to aid in viewing the data. Each time a month's data is displayed, a 1.5

second delay is called. See program lines 500 and 510. This FOR-NEXT loop may be changed for different delay lengths, or eliminated altogether. See Fig. 17-1 for a sample run.

If an unrealistically low payment is entered, the program will not function properly, possibly giving negative or zero results. If this happens then stop the program, and run it again, entering a higher value for the monthly payment.

Program 17-1. Amortization Schedule Program Listing.

```
100 PRINTCHR$(147):PRINT"AMORTIZATION SCHEDULE"  
110 PRINT"COMMODORE 64 VERSION"  
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
130 PRINT  
140 PRINT"THIS PROGRAM CALCULATES A MONTHLY LOAN PAYMENT"  
150 PRINT"SCHEDULE. IT DISPLAYS THE PAYMENT, BALANCE, PRINCIP  
AL,"  
160 PRINT"INTEREST, AND CUM. INTEREST FOR EACH MONTH OF THE LOA  
N."  
170 PRINT  
180 PRINT"ENTER THE PRINCIPAL (AMOUNT OF LOAN)"  
190 INPUT A  
200 PRINT  
210 PRINT"ENTER THE YEARLY INTEREST RATE (%)"  
220 INPUT I  
230 PRINT  
240 PRINT"ENTER THE MONTHLY PAYMENT"  
250 INPUT P  
260 PRINT  
270 PRINT"ENTER '1' TO BEGIN"  
280 INPUT L  
290 PRINTCHR$(147)  
300 B=A  
310 REM PRINT SCHEDULE  
320 PRINT TAB(10)"AMORTIZATION SCHEDULE"  
330 PRINT  
340 PRINT"PRINCIPAL=$";B,"INTEREST=";I;"%"  
350 PRINT"MONTHLY PAYMENT=$";P  
360 PRINT  
370 PRINT"MO PAYMT BALANCE PRINCIP INT. CUM. INT"  
380 Y=1  
390 R=0  
400 IF A<=P THEN 680  
410 GOSUB 530  
420 PRINT Y;TAB(4);P;TAB(10);P2;TAB(18);P0;TAB(26);I2;TAB(32);R  
430 GOSUB 500  
440 Y=Y+1  
450 IF P2=0 THEN 470  
460 GOTO 400  
470 PRINT  
480 PRINT"TOTAL INTEREST=";R  
490 END  
500 FOR T=1 TO 937  
510 NEXT T  
520 RETURN  
530 REM CALCULATE BALANCE AND INTEREST  
540 I2=A*(I/100)  
550 I2=I2/12  
560 GOSUB 630  
570 P2=A-(P-I2)  
580 P0=P-I2  
590 P2=INT(P2*100+.5)/100  
600 A=P2
```

Program 17-1—cont. Amortization Schedule Program Listing.

```
610 R=I2+R
620 RETURN
630 REM ROUND TO 2 DIGITS PASSED THE DECIMAL POINT
640 I3=I2*100
650 I4=INT(I3+.5)
660 I2=I4/100
670 RETURN
680 REM CALCULATE LAST PAYMENT
690 I2=P2*(I/100)
700 I2=I2/12
710 GOSUB 630
720 P0=P2
730 P=P2+I2
740 P2=0
750 R=I2+R
760 GOTO 420
```

CHAPTER 18

Depreciation Schedule

If you're in business and have equipment that you depreciate, then the depreciation schedule can help you. It calculates a 5 year depreciation schedule, using the "sum of the years" method. It's written in BASIC for your microcomputer. See Program 18-1 for the program listing.

THE PROGRAM

The program assumes that your equipment will last 5 years. The first year deduction is 5/15 times the total cost of the equipment. The second, third, fourth, and fifth year deduction is 4/15, 3/15, 2/15, and 1/15 times the cost, respectively.

After you run the program, enter the total amount for depreciation and the starting year. A schedule will then be displayed. See Fig. 18-1 for a sample run.

It does not take into account the "salvage" value of the equipment. It assumes there is no salvage value. But if your equipment has a value after the 5 years, then you must subtract that amount from the fifth year deduction.

Check with your accountant before you use this schedule. He may recommend another method of calculating depreciation that is more suited to your type of business.

```

RUN
DEPRECIATION SCHEDULE
COPYRIGHT (C) 1984 BY HOWARD BERENSON

THIS PROGRAM WILL PRINT A 5 YEAR SCHEDULE
TO HELP YOU DEPRECIATE BUSINESS EQUIPMENT.
IT USES THE SUM OF THE YEARS METHOD.

ENTER THE TOTAL AMOUNT FOR DEPRECIATION.
? 2548+

? 1980
      FIVE YEAR DEPRECIATION SCHEDULE
      USING THE SUM OF THE YEARS METHOD.

TOTAL AMOUNT FOR DEPRECIATION=$ 2548

YEAR #           DEPRECIATION      AMOUNT LEFT
1980              840.84             1707.16
1981              662.48             1044.68
1982              509.6              535.08
1983              331.24             203.84
1984              203.84              0

READY
>
```

Fig. 18-1. Depreciation Schedule sample run.

Program 18-1. Depreciation Schedule Program Listing.

```
100 PRINTCHR$(147):PRINT"DEPRECIATION SCHEDULE"  
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
120 PRINT  
130 PRINT"THIS PROGRAM WILL PRINT A 5 YEAR"  
140 PRINT"SCHEDULE TO HELP YOU DEPRECIATE BUSINESS";  
150 PRINT"EQUIPMENT. IT USES THE SUM OF THE YEARS METHOD."  
160 PRINT  
170 PRINT"ENTER THE TOTAL AMOUNT FOR DEPRECIATION."  
180 INPUT A  
190 PRINT"ENTER THE STARTING YEAR OF DEPRECIATION"  
200 INPUT Y:PRINTCHR$(147)  
210 PRINT TAB(6)"FIVE YEAR DEPRECIATION SCHEDULE"  
220 PRINT TAB(6)"USING THE SUM OF THE YEARS METHOD."  
230 GOSUB 360  
240 PRINT  
250 PRINT"TOTAL AMOUNT FOR DEPRECIATION=$";A  
260 PRINT  
270 PRINT"YEAR #","DEPRECIA","AMOUNT LEFT"  
280 PRINT  
290 PRINT Y,B*Q,Q-(B*Q)  
300 PRINT Y+1,C*Q,Q-(H+I)  
310 PRINT Y+2,D*Q,Q-(H+I+J)  
320 PRINT Y+3,E*Q,Q-(H+I+J+K)  
330 PRINT Y+4,Q-(H+I+J+K),S  
340 PRINT  
350 END  
360 REM DATA FOR YEARS 1 THROUGH 5  
370 Q=A  
380 B=.33  
390 C=.26  
400 D=.2  
410 E=.13  
420 F=.07  
430 H=B*Q  
440 I=C*Q  
450 J=D*Q  
460 K=E*Q  
470 L=F*Q  
480 S=0  
490 RETURN
```

ACRS Depreciation Schedule

This program will calculate and display the accelerated cost recovery system (ACRS) depreciation schedule, mandatory for most tangible property that you place into service after December 31, 1980. ACRS applies to both new and used "recovery property." Recovery property is most tangible property that is either used in a trade or business, or held for the production of income. The expected salvage value of the property is not subtracted from the total amount for depreciation. The program is written in BASIC for your microcomputer. See Program 19-1 for the program listing.

THE PROGRAM

The program will calculate the ACRS depreciation schedule for 3-year, 5-year, and 10-year property. After you run the program, enter a 1 for 3-year depreciation, enter a 2 for 5-year depreciation, or enter a 3 for 10-year depreciation. Then enter the beginning year of depreciation and the total amount for depreciation. The ACRS depreciation schedule will be calculated and displayed starting with the beginning year of depreciation. See Fig. 19-1 for a sample run.

```

ACRS DEPRECIATION SCHEDULE
COMMODORE 64
COPYRIGHT (C) 1984 BY HOWARD BERENBON

THIS PROGRAM WILL DISPLAY THE ACRS
DEPRECIATION SCHEDULE MANDATORY FOR
ASSETS PLACED INTO SERVICE AFTER
DECEMBER 31, 1980.

ENTER 1 FOR 3-YEAR DEPRECIATION
ENTER 2 FOR 5-YEAR DEPRECIATION
ENTER 3 FOR 10-YEAR DEPRECIATION
? 1

ENTER BEGINNING YEAR OF DEPRECIATION
? 1983

ENTER TOTAL AMOUNT FOR DEPVECIATION
? 34520

ACRS DEPRECIATION SCHEDULE

BEGINNING YEAR: 1983
TOTAL AMOUNT FOR DEPRECIATION: 34520

YEAR          AMOUNT
1983          8630
1984          13117.6
1985          12772.4
    
```

Fig. 19-1. ACRS Depreciation Schedule sample run.

Program 19-1. ACRS Depreciation Schedule Program Listing.

```
100 PRINTCHR$(147);"ACRS DEPRECIATION SCHEDULE"  
110 PRINT"COMMODORE 64"  
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
130 PRINT  
140 PRINT"THIS PROGRAM WILL DISPLAY THE ACRS"  
150 PRINT"DEPRECIATION SCHEDULE MANDATORY FOR"  
160 PRINT"ASSETS PLACED INTO SERVICE AFTER"  
170 PRINT"DECEMBER 31, 1980."  
180 PRINT:PRINT"ENTER 1 FOR 3-YEAR DEPRECIATION"  
190 PRINT"ENTER 2 FOR 5-YEAR DEPRECIATION"  
200 PRINT"ENTER 3 FOR 10-YEAR DEPRECIATION"  
210 INPUTA:IFA<1ORA>3THEN180  
220 ONAGOTO230,340,470  
230 PRINTCHR$(147):GOSUB670:REM 3-YEAR DEPRECIATION  
240 GOSUB690  
250 P1=.25:P2=.38:P3=.37  
260 GOSUB710  
270 D1=INT(P1*T*100+.5)/100  
280 D2=INT(P2*T*100+.5)/100  
290 D3=INT(P3*T*100+.5)/100  
300 GOSUB750:PRINTY,D1  
310 PRINTY+1,D2  
320 PRINTY+2,D3  
330 END  
340 PRINTCHR$(147):GOSUB670:REM 5-YEAR DEPRECIATION  
350 GOSUB690  
360 P1=.15:P2=.22:P3=.21  
370 GOSUB710  
380 D1=INT(P1*T*100+.5)/100  
390 D2=INT(P2*T*100+.5)/100  
400 D3=INT(P3*T*100+.5)/100  
410 GOSUB750:PRINTY,D1  
420 PRINTY+1,D2  
430 PRINTY+2,D3  
440 PRINTY+3,D3  
450 PRINTY+4,D3  
460 GOTO330  
470 PRINTCHR$(147):GOSUB670:REM 10-YEAR DEPRECIATION  
480 GOSUB690  
490 P1=.08:P2=.14:P3=.12:P4=.1:P5=.09  
500 GOSUB710  
510 D1=INT(P1*T*100+.5)/100  
520 D2=INT(P2*T*100+.5)/100  
530 D3=INT(P3*T*100+.5)/100  
540 D4=INT(P4*T*100+.5)/100  
550 D5=INT(P5*T*100+.5)/100  
560 GOSUB750:PRINTY,D1  
570 PRINTY+1,D2  
580 PRINTY+2,D3  
590 PRINTY+3,D4  
600 PRINTY+4,D5  
610 PRINTY+5,D5  
620 PRINTY+6,D5
```


Program 19-1—cont. ACRS Depreciation Schedule Program Listing.

```
630 PRINTY+7,D5
640 PRINTY+8,D5
650 PRINTY+9,D5
660 GOTO330
670 PRINT"ENTER BEGINNING YEAR OF DEPRECIATION"
680 INPUTY:PRINT:RETURN
690 PRINT"ENTER TOTAL AMOUNT FOR DEPRECIATION"
700 INPUTT:PRINT:RETURN
710 PRINTCHR$(147);"ACRS DEPRECIATION SCHEDULE":PRINT
720 PRINT"BEGINNING YEAR:";Y
730 PRINT"TOTAL AMOUNT FOR DEPRECIATION:";T
740 RETURN
750 PRINT:PRINT"YEAR","AMOUNT":PRINT:RETURN
```

Bar Chart of Sales

Bar charts are useful in helping interpret business activities. Here's a program that will chart yearly business unit sales, color coded, for up to eight items on a horizontal bar chart. It is written in BASIC for your microcomputer. See Program 20-1 for the program listing.

THE PROGRAM

After you run the program, it will request your entry of the year of the chart. Then it will ask for the number of items to chart (limit your entry to eight or less). Now enter the item name (limit to fourteen characters) and the unit sales for all the items in your chart. The quantity may vary from one unit to up to 1,000,000 units. After all quantities are entered, the program finds the highest quantity and uses that number to adjust the scale factor of the chart. But it is recommended that you chart items of relatively close sales quantities to help simplify the chart and comparisons. An example of this would be to chart unit sales for products that have sold quantities from 100 to 1000 instead of, say, 100 to 10,000. Because of the great difference in quantity between 100 and 10,000, the 10,000 units sales would produce a bar, but the 100 units would not. Also, if the quantity

entered is above the 1,000,000 unit limit of the program, then the computer will display RESTART and the program will start over.

THE CHART

After all data is entered, the program will display a horizontal color bar chart of your business sales of the desired items, for the year entered. On the left side of the display is the item number, and to the right is the colored bar representing the scaled quantity of the units entered. The words UNITS TIMES and the scale factor is displayed below the chart. The scale factor may be a 1, 10, 100, 1000, or 10000, depending upon the highest number entered for unit sales.

After the chart is displayed, a legend follows with the item number and the item description for each of the items entered. The program then displays:

ANOTHER CHART 1-YES 0-NO.

Enter a 1 to run the program again, or enter a 0 to end.

See Fig. 20-1 for a sample run.

BAR CHART OF SALES
 COMMODORE 64
 COPYRIGHT (C) 1984 BY HOWARD BERENBON

THIS PROGRAM WILL CHART YEARLY BUSINESS
 UNIT SALES USING A HORIZONTAL BAR CHART
 -COLOR CODED-FOR UP TO EIGHT ITEMS.

ENTER THE YEAR OF THE CHART
 ? 1983
 ENTER THE NUMBER OF ITEMS TO CHART
 (LIMIT TO 8 OR LESS)
 ? 4

ITEM 1

ENTER NAME OF ITEM 1
 (LIMIT TO 14 CHARACTERS)
 ? CALCULATORS
 ENTER UNIT SALES OF ITEM 1
 ? 250

ITEM 2

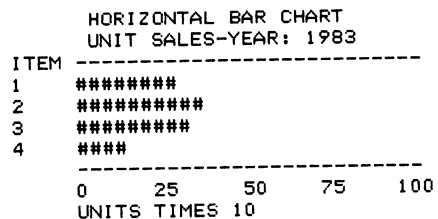
ENTER NAME OF ITEM 2
 (LIMIT TO 14 CHARACTERS)
 ? LCD WATCHES
 ENTER UNIT SALES OF ITEM 2
 ? 350

ITEM 3

ENTER NAME OF ITEM 3
 (LIMIT TO 14 CHARACTERS)
 ? 14K EARRINGS
 ENTER UNIT SALES OF ITEM 3
 ? 305

ITEM 4

ENTER NAME OF ITEM 4
 (LIMIT TO 14 CHARACTERS)
 ? CLOCKS
 ENTER UNIT SALES OF ITEM 4
 ? 110



#	ITEM	UNITS
1	CALCULATORS	250
2	LCD WATCHES	350
3	14K EARRINGS	305
4	CLOCKS	110

ANOTHER CHART 1-YES 0-NO ?

Fig. 20-1. Bar Chart of Sales sample run.

Program 20-1. Bar Chart of Sales Program Listing.

```
100 POKE53281,11:PRINTCHR$(5);CHR$(147)"BAR CHART OF SALES"  
110 PRINT"COMMODORE 64"  
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
130 PRINT  
140 PRINT"THIS PROGRAM WILL CHART YEARLY BUSINESS"  
150 PRINT"UNIT SALES USING A HORIZONTAL BAR CHART"  
160 PRINT"-COLOR CODED-FOR UP TO 8 ITEMS.":PRINT  
170 PRINT"ENTER THE YEAR OF THE CHART":INPUTY  
180 PRINT"ENTER NUMBER OF ITEMS TO CHART"  
190 PRINT"(LIMIT TO 8 OR LESS)"  
200 INPUTI:IFI>8THEN180  
210 FORB=1TOI:PRINTCHR$(147)  
220 PRINT"ITEM ";B:PRINT  
225 PRINT"ENTER NAME OF ITEM ";B:PRINT"(LIMIT TO 14 CHARACTERS)"  
230 INPUTN$(B)  
235 PRINT"ENTER UNIT SALES OF ITEM ";B  
240 INPUTB1:S(B)=B1  
250 NEXTB:PRINTCHR$(147);  
260 GOSUB480:IFH>1000000THENPRINT"RE-START":PRINT:GOTO170  
270 IFH<=100THENS=1:GOTO330  
280 IFH<=1000THENS=10:GOTO330  
290 IFH<=10000THENS=100:GOTO330  
300 IFH<=100000THENS=1000:GOTO330  
310 IFH<=1000000THENS=10000:GOTO330  
320 REM DISPLAY CHART  
330 PRINTTAB(7);"HORIZONTAL BAR CHART"  
340 PRINTTAB(7);"UNIT SALES-YEAR:";Y  
350 PRINT" ITEM -----"  
360 FORE=1TOI:READX:PRINTCHR$(X);E;  
370 T=(S(E)/S)/4:T=INT(T+.5)  
380 FORF=0TOT:PRINTTAB(F+6);CHR$(184);  
390 NEXTF:PRINT:NEXTE:RESTORE:PRINTCHR$(5);  
400 PRINT"-----"  
410 PRINT"      0      25      50      75      100"  
420 PRINT"      UNITS TIMES";S:PRINT  
430 PRINT"#","ITEM",,"UNITS"  
440 FORE=1TOI:PRINTE,N$(E);TAB(29);S(E):NEXTE  
450 PRINT"ANOTHER CHART 1-YES 0-NO ";:INPUTR  
460 IFR=1THENPRINTCHR$(147):GOTO170  
470 END  
480 D=S(1)  
490 FORB=2TOI  
500 H=S(B)  
510 IFH>DTHEN530  
520 H=D  
530 NEXTB:RETURN  
540 DATA5,28,30,31,144,156,158,159
```

CHAPTER 21

Bond Analysis

The purchase of bonds is a common type of investment called debt investing. A bond is a form of an I.O.U. that usually has a face value of \$1000, but may also have values from \$25 up to \$10,000. They are issued by companies or government agencies that promise to pay the owner the face value, or par value, after a definite time. Bonds also pay a specific interest rate, calculated on the par value, each year until maturity.

Here's a program that calculates the bond yield, the annual income, and the total income from bond investments. It is written in BASIC for your microcomputer. See Program 21-1 for the program listing.

THE PROGRAM

After you run the program, enter the actual cost of the bond and the face value, or par value. Then enter the yearly interest rate, in percent, and the number of years to maturity. Finally, enter the number of bonds invested in, and the cost of the transaction (if any). The program will calculate and display the percent yield, the annual income from one bond, the annual income from all bonds invested in, and the total income from your investment. The program will then display:

ANOTHER ANALYSIS 1-YES 0-NO.

Enter a 1 to run the analysis again, or enter a 0 to end the program.

See Fig. 21-1 for a sample run.

```
BOND ANALYSIS
COMMODORE 64
COPYRIGHT (C) 1984 BY HOWARD BERENBON
```

```
THIS PROGRAM WILL CALCULATE THE
BOND YIELD, THE ANNUAL INCOME,
AND THE TOTAL INCOME FROM
BOND INVESTMENTS.
```

```
ENTER ACTUAL COST OF ONE BOND
? 850
ENTER PAR VALUE OF BOND
? 1000
ENTER THE YEARLY INTEREST RATE (%)
? 6
```

```
ENTER THE NUMBER OF YEARS TO MATURITY
? 5
ENTER THE NUMBER OF BONDS INVESTED IN
? 4
ENTER THE COST OF THE TRANSACTION
? 25
```

```
BOND ANALYSIS
```

```
PERCENT YIELD= 7
```

```
ANNUAL INCOME FROM ONE 6 %, $ 1000 BOND
IS $ 60
```

```
ANNUAL INCOME FROM INVESTMENT OF
4 $ 1000 BOND(S) IS $ 240
```

```
TOTAL INCOME FROM INVESTMENT=$ 1775
```

```
ANOTHER ANALYSIS? 1-YES 0-NO
? 1
```

Fig. 21-1. Bond Analysis sample run.

Program 21-1. Bond Analysis Program Listing.

```
100 PRINTCHR$(147);"BOND ANALYSIS"  
110 PRINT"COMMODORE 64"  
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
130 PRINT  
140 PRINT"THIS PROGRAM WILL CALCULATE THE"  
150 PRINT"BOND YIELD, THE ANNUAL INCOME,"  
160 PRINT"AND THE TOTAL INCOME FROM"  
170 PRINT"BOND INVESTMENTS."  
180 PRINT  
190 PRINT"ENTER ACTUAL COST OF ONE BOND"  
200 INPUTP  
210 PRINT"ENTER PAR VALUE OF BOND"  
220 INPUTM  
230 PRINT"ENTER THE YEARLY INTEREST RATE (%)"  
240 INPUTI:IR=I:I=I/100  
250 PRINT"ENTER THE NUMBER OF YEARS TO MATURITY"  
260 INPUTY  
270 PRINT"ENTER THE NUMBER OF BONDS INVESTED IN"  
280 INPUTN  
290 PRINT"ENTER THE COST OF THE TRANSACTION"  
300 INPUTC:PRINTCHR$(147)  
310 PRINT"BOND ANALYSIS"  
320 PRINT  
330 IN=M*I  
340 YR=IN*N:T=N*P+C  
350 YI=YR/T:YP=YI*100:YL=INT(YI*10000)/10000:YL=YL*100  
360 PRINT:PRINT:PRINT"PERCENT YIELD=";YL  
370 PRINT:PRINT"ANNUAL INCOME FROM ONE";IR;"%, $";M;"BOND"  
380 PRINT"IS $";IN  
390 PRINT:PRINT"ANNUAL INCOME FROM INVESTMENT OF"  
400 PRINTN;"-$";M;"BOND(S) IS $";N*IN  
410 PRINT:B=M-P  
420 BT=B*N+IN*N*Y-C  
430 PRINT"TOTAL INCOME FROM INVESTMENT=$";BT  
440 PRINT:PRINT"ANOTHER ANALYSIS? 1-YES 0-NO":INPUTA  
450 IFA=1THEN100  
460 END
```

SECTION IV

Home Applications

This section describes some useful home application programs including an electric usage analysis program; a diet program for the overweight or underweight person; a recipe amount calculator; a gas mileage calculator for checking your car engine performance; a message taker that accepts and displays 6 separate messages; and, finally, a medical expense record program to keep those expenses in order.

Electric Energy Usage

Conservation is the key to reducing our energy consumption and costs, with the rising price and pending shortages of all types of energy. You can help out by using the electric energy usage program. It will indicate differences in electric usage from one year to another, so that you can see possible imbalances in usage, and correct them. The program is written in BASIC for your microcomputer, but it will run in most home computer BASICs without modification. See Program 22-1 for the program listing.

THE PROGRAM

The program requires that your yearly electric usage data be stored in DATA statements at program lines 1000 and 1010. The first DATA element in line 1000 must be the comparison year (base year) followed by 12 months of electric usage units, beginning with January of that year. Program line 1010 holds the data for the "recent" year. Example:

```
1000 DATA 1980,400,300,425,355,
      275,290,320,425,350,455,
      470, 525
1010 DATA 1983,450,320,478,350,
      325,310,340,490,450,500,
      510, 600
```

The "base" year can be any past year; possibly the year you moved into your house or apartment, or even the previous year. The "recent" year would be a full year's data for recent energy consumption. See Fig. 22-1 for a sample run.

The program prints the "base" year data including average units used per month, total units used, and the percent of total units used per month. Then it prints the "recent" year's data, with a comparison to the "base" year. It gives the difference between the two years, with monthly increase (+) or decrease (-) from the "base" year.

ANALYSIS

If there's a significant monthly increase in electric usage, pay close attention to those months. You may be using more energy than necessary. Check your insulation for possible air leaks. This can cause your furnace or air conditioner to work overtime and use more electricity than necessary.

Other increases may be due to neglect. Make sure that lights and electrical appliances are shut off when not needed. Alternately, you may have an appliance that is defective, and using more electricity than it should. Check that your appliances are in proper working order.

BASE YEAR 1980			AV/MO= 382.5
TOTAL UNITS= 4590			
MONTH	UNITS	% TOTAL	
1	400	8.71	
2	300	6.53	
3	425	9.25	
4	355	7.73	
5	275	5.99	
6	290	6.31	
7	320	6.97	
8	425	9.25	
9	350	7.62	
10	455	9.91	
11	470	10.23	
12	525	11.43	

ENTER '1' FOR COMPARISON?

RECENT YEAR 1983			AV/MO= 426.917
TOTAL UNITS= 5123			RECENT-BASE= 533
MO.	UNITS	% TOTAL	+ OR - FROM BASE
1	450	8.78	50
2	320	6.24	20
3	478	9.33	53
4	350	6.83	-5
5	325	6.34	50
6	310	6.05	20
7	340	6.63	20
8	490	9.56	65
9	450	8.78	100
10	500	9.75	45
11	510	9.95	40
12	600	11.71	75

Fig. 22-1. Electric Energy Usage sample run.

Program 22-1. Electric Energy Usage Program Listing.

```
100 DIM A(50):PRINTCHR$(147)
110 PRINT"ELECTRIC ENERGY USAGE"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
130 PRINT
140 PRINT"THIS PROGRAM WILL COMPARE AND DISPLAY"
150 PRINT"A 'BASE' YEAR AND 'RECENT' YEAR ELECTRIC";
160 PRINT"ENERGY USAGE, IN UNITS."
170 PRINT
180 PRINT"ENTER THE 'BASE' YEAR DATA AT LINE 1000,";
190 PRINT"AND THE 'RECENT' YEAR DATA AT LINE 1010."
200 PRINT
210 PRINT"ENTER A '1' TO DISPLAY"
220 PRINT"THE 'BASE' YEAR DATA"
230 INPUT A:PRINTCHR$(147)
240 B=0:R=0
250 READ P
260 FOR E=1TO12
270 READ C
280 A(E)=C
290 B=A(E)+B
300 NEXT E
310 READ T
320 FOR E=13TO24
330 READ C
340 A(E)=C
350 R=A(E)+R
360 NEXT E
370 PRINT"BASE YEAR";P,"AV/MO=";B/12
380 PRINT"TOTAL UNITS=";B
390 PRINT"MONTH","UNITS","% TOTAL"
400 FOR A=1TO12
410 PRINT A,A(A),INT(A(A)/B*10000)/100
420 NEXT A
430 PRINT"ENTER '1' FOR COMPARISON";
440 INPUT A:PRINTCHR$(147)
450 PRINT
460 PRINT
470 PRINT"RECENT YEAR";T,"AV/MO=";R/12
480 PRINT"TOTAL UNITS=";R;" RECENT-BASE=";R-B
490 PRINT"MO. UNITS % TOTAL + OR - FROM BASE"
500 FOR A=13TO24
510 PRINT A-12;TAB(6);A(A);TAB(15);INT(A(A)/R*10000)/100;TAB(26);A
(A)-A(A-12)
520 NEXT A
530 GOTO 530
980 REM ENTER 'BASE' YEAR ELECTRIC DATA IN LINE 1000
990 REM ENTER 'RECENT' YEAR ELECTRIC DATA IN LINE 1010
1000 DATA 1980,400,300,425,355,275,290,320,425,350,455,470,525
1010 DATA 1983,450,320,478,350,325,310,340,490,450,500,510,600
```

CHAPTER 23

The Basic Diet

Are you noticing your waistline expand while you spend more and more time in front of your system? If so, it's probably due to a lack of exercise and improper diet. Now you can get help from the basic diet program. See Program 23-1 for the program listing.

The program will help you to your weight loss goal, or tell you if you're underweight. It will decide what your proper weight should be (within

5%), from the input of your current weight, height, and sex. It will determine the number of pounds you should lose to attain your goal. Then, a weight loss table is printed, derived from your input of the desired weekly weight loss. Finally, a daily calorie value is given (within 10%) to maintain your weight, after you reach your goal. A sample run is given in Fig. 23-1.

```
? 1
ENTER CURRENT WEIGHT (LBS)
? 152
ENTER HEIGHT (FT,IN)
? 5,8
ENTER SEX 1=MALE 2=FEMALE
? 1

YOUR CURRENT WEIGHT IS 152 LBS

YOUR PROPER WEIGHT SHOULD BE 150 LBS
YOUR WEIGHT LOSS GOAL IS 2 LBS

ENTER DESIRED WEEKLY WEIGHT LOSS IN LBS
? .5

                WEIGHT LOSS TABLE

CURRENT WEIGHT= 152 LBS
WEEK #      WEIGHT      TOTAL LOSS (LBS)
1           151.5      .5
2           151        1
3           150.5      1.5
4           150        2

YOU HAVE 4 WEEKS TO REACH 150 LBS
AFTER REACHING YOUR GOAL, YOU SHOULD
MAINTAIN YOUR WEIGHT WITH 1900 CALORIES
PER DAY (WITHIN 10%).

READY
>
```

Fig. 23-1. The Basic Diet sample run.

Table 23-1. 1100 Calorie Diet

Breakfast		
1 egg with 1 teaspoon of margarine		
1 piece of melba toast		
Coffee or tea, with milk and sugar substitute		
Tomato juice		
Lunch		
4 oz meat, fish, or chicken with 1 teaspoon of margarine		
1 piece of melba toast		
1 cup of salad with diet dressing		
or		
1 cup cooked vegetables		
1 cup fresh fruit or ½ cup jello		
Dinner		
5 oz meat, fish, or chicken with 1 teaspoon of margarine		
1 piece of melba toast		
1 cup of salad with diet dressing		
1 cup cooked vegetables		
1 cup fresh fruit or ½ cup jello		
Anytime Drinks		
Coffee or tea, with milk and sugar substitute		
Diet soda		
Tomato juice		
Skim milk		
Food Between Meals		Condiments
Raw vegetables	Mustard	Catsup
Dill pickles	Relish	Horseradish
Diet gelatin	Onions	Herbs
Mushrooms	Spices	Soy sauces

THE DIET

A 1100 calorie diet is provided to help you lose weight. See Table 23-1 for the diet. A list of calorie and protein values for some of the more common foods is given in Table 23-2. Before following the diet, consult your physician for the go-ahead.

EXERCISE

Set up a plan of exercise. Daily running, walking, or bicycling will help burn off some of those unused calories; and it's good for you.

THE PROGRAM

The program is written in BASIC, and is compatible with most systems. It calculates an adult's weight, above the age of 25, using his or her height and sex. It also calculates a daily calorie value, for maintaining the proper weight. You may find that the calculated weight is less than expected. But this lower weight is healthier for you, unless your doctor says otherwise.

Table 23-2. Food Calorie List With Protein Values

Food	Portion	Calories	Protein (grams)
Meat, Fish, Eggs			
Meat, fish, poultry	3 oz cooked	245	23
Hot dog	1 medium	155	6
Ham	1 oz	80	6
Tuna	2 oz	115	16
Bacon	2 slices	100	5
Eggs	1 medium	80	6
Dairy			
Milk, whole	8 oz	160	9
Milk, skim	8 oz	90	9
Milk, chocolate	8 oz	190	9
Cheese, American or Swiss	1 oz	110	8
Cheese Food	1 oz	90	6
Cottage cheese	1 oz	30	4
Butter	1 tablespoon	100	-
Cream, light	2 tablespoons	60	1
Half-and-half	¼ cup	80	2
Ice cream, vanilla	½ cup	145	3
Main Dishes			
Spaghetti, Italian	1 cup, with cheese	260	9
Macaroni and cheese	¾ cup	350	14
Meat and vegetable stew	¾ cup	160	12
Bread			
Bread	1 slice	60	2
Biscuit	1 medium	140	3
Crackers	2 medium	35	1
Rye wafers	2 small	45	2

Table 23-2.—cont.

Food	Portion	Calories	Protein (grams)
Vegetables			
Green beans	4 oz cooked	15	1
Carrots	4 oz cooked	20	2
Green leafy	4 oz cooked	20	2
Peas	4 oz cooked	60	5
Corn	4 oz cooked	85	3
Potatoes	1 medium, cooked	80	2
Tossed salad	¾ cup, without dressing	30	2
Salad dressing	1 tablespoon	75	-
Fruits			
Orange	1	60	1
Melon	½	60	1
Peach	1	35	1
Strawberries	8 oz	55	1
Apple	1	70	-
Avocado	¼	90	1
Cooked fruits, lightly sweetened	4 oz	100	1
Fruit juice	4 oz	50	1
Cookies, Cakes, Candy			
Cookies, plain	2 small	120	1
Cupcakes, iced	1 medium	185	2
Brownies	1 - 2" x 2" x ¾"	140	2
Doughnut	1 medium	125	1
Cake, iced	medium piece	370	4
Cake, sponge	medium piece	115	3
Candy bar, chocolate	¾ oz	130	2
Fudge	1" square	100	-
Marshmallows	1 average	25	-
Snacks			
Nuts, roasted	30 peanuts	165	6
Potato chips	10 medium	115	1
Popcorn, lightly buttered	½ cup	35	-
Pizza	1 medium piece	185	7
Hamburger and bun	1 medium	300	17
Hot dog and bun	1 medium	270	9
Drinks			
Milkshake, 5 oz milk, 2 scoops ice cream	1 medium	340	8
Malted milkshake	1 medium	300	13
Cocoa, with milk	1 cup	175	7
Eggnog	8 oz	290	15
Soda, cola	8 oz	95	-
Lemonade	10 oz	130	-
Beer, Wine, Liquor			
Beer	8 oz	114	-
Wine, red	4 oz	85	-
Gin, whisky, rum, vodka	1½ oz	107	-
Miscellaneous			
Jelly, honey, syrup	1 tablespoon	60	-
Chocolate sauce	2 tablespoons	90	1
Sugar, granulated	1 tablespoon	45	-

Program 23-1. The Basic Diet Program Listing.

```
100 PRINTCHR$(147):PRINT"THE BASIC DIET"
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
120 PRINT
130 PRINT"THIS PROGRAM CALCULATES YOUR PROPER      WEIGHT"
140 PRINT"(WITHIN 5%) TO DETERMINE IF YOU HAVE A"
150 PRINT"POTENTIAL WEIGHT PROBLEM."
160 PRINT"IT THEN PRINTS THE NUMBER OF LBS YOU ARE";
170 PRINT"REQUIRED TO LOSE TO ATTAIN YOUR GOAL,  AND  "
180 PRINT"A WEIGHT LOSS TABLE WITH YOUR DESIRED"
190 PRINT"WEEKLY WEIGHT LOSS. FINALLY, A DAILY      CALORIE"
200 PRINT"REQUIREMENT IS GIVEN TO HELP IN MAINTAINING ";
210 PRINT"YOUR PROPER WEIGHT."
220 PRINT
230 PRINT"ENTER A '1' TO CONTINUE"
240 INPUT A:PRINTCHR$(147)
250 PRINT
260 PRINT"ENTER CURRENT WEIGHT (LBS) "
270 INPUT W
280 PRINT"ENTER HEIGHT (FT,IN) "
290 INPUT F,I
300 IF F<4 THEN 280
310 IF F>7 THEN 280
320 PRINT"ENTER SEX  1=MALE  2=FEMALE"
330 INPUT S
340 PRINT
350 REM CALCULATE WEIGHT
360 GOSUB 750
370 IF W2=W THEN 1050
380 W4=W-W2
390 IF W<W2 THEN 850
400 GOSUB 960
410 PRINT
420 GOSUB 930
430 PRINT"YOUR WEIGHT LOSS GOAL IS";W4;"LBS"
440 PRINT
450 PRINT"ENTER DESIRED WEEKLY WEIGHT LOSS IN LBS"
460 INPUT A:PRINTCHR$(147)
470 N=1
480 PRINT
490 PRINT TAB(10)"WEIGHT LOSS TABLE"
500 PRINT
510 PRINT"CURRENT WEIGHT=";W;"LBS"
520 PRINT"WEEK #","WEIGHT","TOTAL LOSS (LBS)"
530 V=A
540 W6=W
550 Y=W4/A
560 IF Y>INT(Y) THEN Y=Y+1
570 FOR M=1TOY
580 IF(W6-A)<W2 THEN 1100
590 PRINT N,W6-A,V
600 V=V+A
610 W6=W6-A
620 N=N+1
```

Program 23-1—cont. The Basic Diet Program Listing.

```
630 FOR Q=1TO600
640 NEXT Q
650 NEXT M
660 PRINT
670 PRINT"YOU HAVE";N-1;"WEEKS TO REACH";W2;"LBS"
680 REM CALCULATE DAILY CALORIES
690 GOSUB 980
700 PRINT"AFTER REACHING YOUR GOAL, YOU SHOULD"
710 PRINT"MAINTAIN YOUR WEIGHT WITH";Z;"CALORIES"
720 PRINT"PER DAY (WITHIN 10%)."
730 PRINT
740 END
750 REM CALCULATE WEIGHT FROM HEIGHT
760 I1=F*12
770 I2=I1+I
780 IF S=1 THEN 820
790 REM FEMALE WEIGHT
800 W2=95+((I2-59)*5)
810 RETURN
820 REM MALE WEIGHT
830 W2=110+((I2-60)*5)
840 RETURN
850 GOSUB 960
860 REM UNDERWEIGHT MESSAGE
870 PRINT
880 GOSUB 930
890 PRINT"YOU ARE UNDERWEIGHT BY";W2-W;"LBS"
900 PRINT
910 GOSUB 980
920 GOTO 700
930 REM LIST WEIGHT GOAL
940 PRINT"YOUR PROPER WEIGHT SHOULD BE";W2;"LBS"
950 RETURN
960 PRINT"YOUR CURRENT WEIGHT IS";W;"LBS"
970 RETURN
980 IF S=1 THEN 1020
990 U=(W2-90)/5
1000 Z=1150+U*50
1010 RETURN
1020 X=(W2-100)/5
1030 Z=1400+X*50
1040 RETURN
1050 PRINT"YOU ARE AT THE PROPER WEIGHT OF";W;"LBS"
1060 PRINT"NO WEIGHT LOSS IS REQUIRED"
1070 PRINT
1080 GOSUB 980
1090 GOTO 700
1100 A=W6-W2
1110 PRINT N,W2,W4
1120 GOTO 620
```

CHAPTER 24

Recipe Amount Calculator

The recipe amount calculator is a program used to calculate the required amount of ingredients for the desired number of servings in a recipe. It's

written in BASIC for your microcomputer. See Program 24-1 for the program listing.

```
RECIPE AMOUNT CALCULATOR
COPYRIGHT (C) 1984 BY HOWARD BERENSON

THIS PROGRAM CALCULATES THE REQUIRED AMOUNT
OF INGREDIENTS FOR THE NUMBER OF SERVINGS
IN A PARTICULAR RECIPE

ENTER THE RECIPE NAME
? IRISH COFFEE

ENTER THE NUMBER OF INGREDIENTS IN THE RECIPE
? 4

ENTER THE NUMBER OF SERVINGS ALLOWED
? 1

ENTER THE NUMBER OF SERVINGS REQUIRED
? 12

ENTER EACH INGREDIENT AMOUNT, AS GIVEN IN THE RECIPE.
THIS AMOUNT MUST BE IN A DECIMAL FORM (1 1/2=1.5).
INSERT A COMMA, THEN ENTER THE 'LABEL' OF THE INGREDIENT.
EXAMPLE:
1.5,TBL BUTTER

INGREDIENT # 1
? 1,JIGGER IRISH WHISKEY

INGREDIENT # 2
? 1,TEASPOON SUGAR

INGREDIENT # 3
? 1,CUP HOT COFFEE

INGREDIENT # 4
? 2,TBLS WHIPPED CREAM

RECIPE NAME: IRISH COFFEE
SERVINGS: 12

INGREDIENT #    AMOUNT    LABEL
1                12    JIGGER IRISH WHISKEY
2                12    TEASPOON SUGAR
3                12    CUP HOT COFFEE
4                24    TBLS WHIPPED CREAM
```

Fig. 24-1. Recipe Amount Calculator sample run.

THE PROGRAM

After you run the program, enter the recipe name and number of ingredients in the recipe. Then enter the number of servings allowed and the number of servings required for that recipe.

Enter each ingredient amount and its label. Insert a comma between the amount and the

label. The amount must be in decimal form. Example: 1.5,TBL BUTTER is a correct entry for 1½ TBL BUTTER. When all of the ingredients are entered, the program will print a list of the converted amounts beginning with ingredient number 1. See Fig. 24-1 for a sample run.

Program 24-1. Recipe Amount Calculator Program Listing.

```
100 PRINTCHR$(147):PRINT"RECIPE AMOUNT CALCULATOR"  
110 PRINT"COMMODORE 64"  
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
130 PRINT  
140 PRINT"THIS PROGRAM CALCULATES THE REQUIRED"  
150 PRINT"AMOUNT OF INGREDIENTS FOR THE NUMBER"  
160 PRINT"OF SERVINGS IN A PARTICULAR RECIPE."  
170 PRINT  
180 PRINT"ENTER THE RECIPE NAME"  
190 INPUT R$  
200 PRINT  
210 PRINT"ENTER THE # OF INGREDIENTS IN RECIPE"  
220 INPUT I  
230 PRINT  
240 PRINT"ENTER THE NUMBER OF SERVINGS ALLOWED"  
250 INPUT A  
260 PRINT  
270 PRINT"ENTER THE NUMBER OF SERVINGS REQUIRED"  
280 INPUT B:PRINTCHR$(147)  
290 PRINT  
300 DIM A$(I)  
310 DIM A(I)  
320 PRINT"ENTER EACH INGREDIENT AMOUNT, AS GIVEN"  
330 PRINT"IN THE RECIPE. THIS AMOUNT MUST BE IN"  
340 PRINT"A DECIMAL FORM (1 1/2=1.5). INSERT A"  
350 PRINT"COMMA, THEN ENTER THE 'LABEL' OF THE"  
360 PRINT"INGREDIENT."  
370 PRINT"EXAMPLE:"  
380 PRINT"1.5,TBL BUTTER"  
390 PRINT  
400 FORX=1 TO I  
410 PRINT"INGREDIENT #";X  
420 INPUT A(X),A$(X)  
430 NEXT X  
440 PRINT  
450 REM CALCULATE AND LIST INGREDIENT AMOUNTS  
460 PRINTCHR$(147):PRINT"RECIPE NAME: ";R$  
470 PRINT"SERVINGS: ";B  
480 PRINT  
490 PRINT"ING #    AMOUNT    LABEL"  
500 C=B/A  
510 FOR X=1 TO I  
520 PRINT X;TAB(8);C*A(X);TAB(17);A$(X)  
530 FOR T=1 TO 1000  
540 NEXT T  
550 NEXT X  
560 END
```

CHAPTER 25

Gas Mileage Calculator

A good way of checking the performance of your car engine is to periodically test its gas mileage. This program can help you out. It's written in BASIC for your microcomputer, but will run in most home computer BASICs. See Program 25-1 for the program listing.

THE PROGRAM

The program begins by accepting the EPA mileage value. If your engine has two values listed (for city and highway), then take an average before entering the value. This data will be used in determining the performance of your engine.

Next, enter the data for calculating mileage. Enter the odometer reading taken before filling your gas tank. Then, enter the mileage reading taken after the next fill up, and the number of gallons required for the fill up.

The program displays the mileage, from the data entered, and checks to see if your engine is meeting the EPA mileage value (within 10%). It will recommend a tune-up, if your mileage is 10% below the EPA value. See Fig. 25-1 for a sample run.

```

RUN
GAS MILEAGE CALCULATOR
COPYRIGHT (C) 1984 BY HOWARD BERENBON

THIS PROGRAM CALCULATES GAS MILEAGE,
AND CHECKS YOUR ENGINES PERFORMANCE

ENTER THE EPA MILEAGE VALUE
? 19

ENTER ODOMETER MILEAGE BEFORE FILLING TANK
? 27059

ENTER ODOMETER MILEAGE AFTER NEXT FILL UP
? 27270

ENTER NO. OF GALLONS OF GAS REQUIRED FOR FILL UP
? 13

MILEAGE= 16.2308 MILES PER GALLON
THE EPA MILEAGE VALUE= 19

YOUR CAR ENGINE IS PERFORMING BELOW THE
EPA VALUE BY 2.76923 MILES PER GALLON.
HAVE YOUR ENGINE CHECKED.
IT MAY BE IN NEED OF A TUNE-UP.
READY
>
```

Fig. 25-1. Gas Mileage Calculator sample run.

Program 25-1. Gas Mileage Calculator Program Listing.

```
100 PRINTCHR$(147):PRINT"GAS MILEAGE CALCULATOR"  
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
120 PRINT  
130 PRINT"THIS PROGRAM CALCULATES GAS MILEAGE,"  
140 PRINT"AND CHECKS YOUR ENGINES PERFORMANCE"  
150 PRINT  
160 PRINT"ENTER THE EPA MILEAGE VALUE"  
170 INPUT E  
180 PRINT  
190 PRINT"ENTER ODOMETER MILEAGE BEFORE FILLING TANK"  
200 INPUT M  
210 PRINT  
220 PRINT"ENTER ODOMETER MILEAGE AFTER NEXT FILL UP"  
230 INPUT M1  
240 PRINT  
250 PRINT"ENTER NO. OF GALLONS OF GAS REQUIRED FOR FILL UP"  
260 INPUT G  
270 REM CALCULATE MILEAGE, AND CHECK PERFORMANCE"  
280 S=(M1-M)/G:S=INT(S*10000)/10000  
290 T=.9*E  
300 PRINT  
310 PRINT"MILEAGE=";S;"MILES PER GALLON"  
320 PRINT"THE EPA MILEAGE VALUE=";E"  
330 PRINT  
340 IF S<T THEN 390  
350 PRINT"YOUR MILEAGE IS CONSISTENT WITH THE"  
360 PRINT"EPA VALUE (WITHIN 10%). YOUR CAR"  
370 PRINT"ENGINE SHOULD BE PERFORMING WELL."  
380 END  
390 PRINT  
400 PRINT"YOUR CAR ENGINE IS PERFORMING BELOW THE"  
410 PRINT"EPA VALUE BY";E-S;"MILES PER GALLON."  
420 PRINT"HAVE YOUR ENGINE CHECKED."  
430 PRINT"IT MAY BE IN NEED OF A TUNE-UP."  
440 GOTO 380
```

Message Taker

The Message Taker is a program that accepts 6 messages to be displayed by your home computer. It's written in BASIC for your microcomputer. See Program 26-1 for the program listing.

THE PROGRAM

The program begins by displaying the commands. Enter an L to access the message list, or an E to enter a message.

To exit the program press the RUN/STOP and RESTORE keys.

Message Entry Mode

In the message entry mode you can enter 1 or all 6 messages. Enter the number of the message that you wish to enter or change. If there is an

existing message under that message number, then the computer will indicate it. Then enter "who the message is from" and "who the message is directed to." Finally, enter the message from the keyboard. When entering, do not use the coma (,) or colon (:) otherwise errors will result. The program will accept three separate line entries per message, totaling 237 characters.

Message Access Mode

In the message access mode, a list of the 6 messages will be displayed. A '0' after the message number indicates empty and a '1' indicates full. Each message number includes "who the message is from" and "who the message is directed to." Enter the message number to display the message. See Fig. 26-1 for a sample run.

RUN
MESSAGE TAKER
COPYRIGHT (C) 1984 BY HOWARD BERENBON

THIS PROGRAM ACCEPTS 6 MESSAGES AS DATA
STRINGS AND DISPLAYS EACH ON COMMAND.

COMMANDS:

ENTER 'L' TO DISPLAY A MESSAGE
ENTER 'E' TO ENTER/CHANGE A MESSAGE
? E

MESSAGE ENTRY MODE: ENTER/CHANGE

ENTER MESSAGE # (1-6)
ENTER '7' TO RETURN TO 'COMMAND'
? 1

MESSAGE # 1

MESSAGE 'FROM' (NAME)?
? RICK

MESSAGE 'TO' (NAME)?
? DAVID

MESSAGE # 1
ENTER MESSAGE (LIMIT TO 79 CHAR/LINE)

? DAVID I STOPPED BY EARLIER BUT YOU WEREN'T HOME. I'LL SEE YOU
LATER FOR A 'GO' GAME. RICK

MESSAGE ENTRY MODE: ENTER/CHANGE

ENTER MESSAGE # (1-6)
ENTER '7' TO RETURN TO 'COMMAND'
? 2

MESSAGE # 2

MESSAGE 'FROM' (NAME)?
? HOWARD

MESSAGE 'TO' (NAME)?
? DAVID

MESSAGE # 2
ENTER MESSAGE (LIMIT TO 79 CHAR/LINE)

? DAVID I'LL BE A LITTLE LATE TONIGHT. WILL YOU CALL RICK AND
BRUCE TO REMIND THEM OF THE 'DUNGEONS AND DRAGONS' GAME CALLED
FOR TONIGHT? I'VE ALREADY TALKED TO HARRY. THANKS

MESSAGE ACCESS MODE: LIST
(0 INDICATES EMPTY)

Fig. 26-1. Message Taker sample run.

#		FROM	TO	
1	=	1	RICK	DAVID
2	=	1	HOWARD	DAVID
3	=	0		
4	=	0		
5	=	0		
6	=	0		

ENTER # (1-6) TO DISPLAY MESSAGE
ENTER A '7' TO RETURN TO 'COMMAND'

? 1

MESSAGE # 1

FROM: RICK TO: DAVID

DAVID I STOPPED BY EARLIER BUT YOU WEREN'T HOME. I'LL SEE YOU
LATER FOR A 'GO' GAME. RICK

ENTER # (1-6) TO DISPLAY MESSAGE
ENTER A '7' TO RETURN TO 'COMMAND'

? 2

Fig. 26-1—cont. Message Taker sample run.

Program 26-1. Message Taker Program Listing.

```
100 PRINTCHR$(147):PRINT"MESSAGE TAKER: COMMODORE 64"  
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
120 PRINT  
130 PRINT"THIS PROGRAM ACCEPTS 6 MESSAGES AS DATA"  
140 PRINT"STRINGS AND DISPLAYS EACH ON COMMAND."  
150 REM DIMENSION ARRAYS  
160 DIM A$(10),B$(10),C$(10),D$(10),E$(10),Z(10)  
170 PRINT  
180 PRINT"COMMANDS:"  
190 PRINT  
200 PRINT"ENTER 'L' TO DISPLAY A MESSAGE"  
210 PRINT"ENTER 'E' TO ENTER/CHANGE A MESSAGE"  
220 INPUT A$  
230 IF A$="L" THEN 260  
240 IF A$="E" THEN 480  
250 GOTO 170  
260 PRINTCHR$(147)  
270 PRINT"MESSAGE ACCESS MODE: LIST"  
280 PRINT "('0' INDICATES EMPTY-'1' FULL)"  
290 PRINT  
300 PRINT"#","FROM","TO"  
310 PRINT  
320 FOR A=1TO6  
330 PRINT A;" = ";Z(A),A$(A),B$(A)  
340 NEXT A  
350 PRINT  
360 PRINT"ENTER # (1-6) TO DISPLAY MESSAGE"  
370 PRINT"ENTER A '7' TO RETURN TO 'COMMAND'"  
380 PRINT  
390 INPUT Z  
400 IF Z=0 THEN 360  
410 IF Z>6 THEN 170  
420 GOSUB 860  
430 PRINT  
440 PRINT C$(Z)  
450 PRINT D$(Z)  
460 PRINT E$(Z)  
470 GOTO 350  
480 PRINTCHR$(147)  
490 PRINT"MESSAGE ENTRY MODE: ENTER/CHANGE"  
500 PRINT  
510 PRINT"ENTER MESSAGE # (1-6)"  
520 PRINT"ENTER '7' TO RETURN TO 'COMMAND'"  
530 PRINT  
540 INPUT Z  
550 IF Z(Z)=0 THEN 630  
560 PRINT"MESSAGE #";Z;" IS FILLED"  
570 PRINT  
580 PRINT"DO YOU WISH TO CHANGE MESSAGE #";Z  
590 PRINT"ENTER '1' YES OR '0' NO"  
600 INPUT B  
610 IF B=1 THEN 630  
620 GOTO 480
```


Program 26-1—cont. Message Taker Program Listing.

```
630 IF Z=0 THEN 480
640 IF Z>6 THEN 170
650 PRINTCHR$(147)
660 PRINT
670 PRINT"MESSAGE #";Z
680 PRINT
690 PRINT"MESSAGE 'FROM' (NAME)?"
700 INPUT A$(Z)
710 PRINT
720 PRINT"MESSAGE 'TO' (NAME)?"
730 INPUT B$(Z)
740 PRINTCHR$(147)
750 PRINT"MESSAGE #";Z
760 PRINT"ENTER MESSAGE (LIMIT TO 79 CHAR/LINE)"
770 PRINT
780 PRINT"ENTER LINE #1"
790 INPUT C$(Z)
800 PRINT"ENTER LINE #2"
810 INPUT D$(Z)
820 PRINT"ENTER LINE #3"
830 INPUT E$(Z)
840 Z(Z)=1
850 GOTO 480
860 PRINTCHR$(147)
870 PRINT"MESSAGE # ";Z
880 PRINT
890 PRINT"FROM: ";A$(Z),"TO: ";B$(Z)
900 PRINT
910 RETURN
```

CHAPTER 27

Medical Expense Record

This program is used to display your medical expenses, with expense type, cost, and cumulative total. It's written in BASIC for your micro-computer. It should also run without modifications in most home computer BASICs. See Program 27-1 for the program listing.

beginning with program line 1000. Enter the type of expense and the cost, until all your yearly medical expenses are entered. The last DATA statement must be DATA "END".

After you run the program, enter the year of the record. Then enter a 1 to display your medical expense record. See Fig. 27-1 for a sample run.

THE PROGRAM

The data is entered using DATA statements

```
MEDICAL EXPENSE RECORD
COPYRIGHT (C) 1984 BY HOWARD BERENBON

USE THIS PROGRAM TO DISPLAY A RECORD OF YOUR
YEARLY MEDICAL EXPENSES.

ENTER THE TOTAL YEARLY EXPENSE DATA IN DATA STATEMENTS,
BEGINNING AT LINE 1000. ENTER IN THE FOLLOWING FORMAT:
1000 DATA DENTAL APP.,63,EYE EXAM,45,PHYSICAL,79
      (EXPENSE TYPE),(COST)
THE LAST DATA STATEMENT MUST READ, DATA END. SOME BASICS
REQUIRE QUOTES AROUND STRINGS IN DATA STATEMENTS,
ADD THEM WHERE REQUIRED.

ENTER YEAR OF RECORD
? 1980

ENTER '1' TO BEGIN
?

1
MEDICAL EXPENSE RECORD
YEAR 1980
NUMBER      EXPENSE TYPE      COST      CUM. TOTAL
1           EYE EXAM          45         45
2           DENTAL APP.       63        108
3           PHYSICAL        79        187
4           DENTAL APP.       25        212
5           EMERGENCY       12.5      224.5
6           DERMATOLOGIST    15        239.5
7           BLOOD TEST       15        254.5
8           THROAT EXAM      15        269.5
9           DERMATOLOGIST    10.5      280
TOTAL MEDICAL EXPENSE FOR YEAR 1980 IS $ 280
```

Fig. 27-1. Medical Expense Record sample run.

Program 27-1. Medical Expense Record Program Listing.

```
100 PRINTCHR$(147):PRINT"MEDICAL EXPENSE RECORD: COMMODORE 64"  
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
120 PRINT  
130 PRINT"USE THIS PROGRAM TO DISPLAY A RECORD OF YOUR"  
140 PRINT"YEARLY MEDICAL EXPENSES."  
150 PRINT  
160 PRINT"ENTER THE TOTAL YEARLY EXPENSE DATA IN DATA STATEMENTS,  
"  
170 PRINT"BEGINNING AT LINE 1000. ENTER IN THE FOLLOWING FORMAT  
:"  
180 PRINT"1000 DATA DENTAL APP.,63,EYE EXAM,45,PHYSICAL,79  
190 PRINT" (EXPENSE TYPE),(COST)"  
200 PRINT"THE LAST DATA STATEMENT MUST READ, DATA END. SOME BASICS  
"  
210 PRINT"REQUIRE QUOTES AROUND STRINGS IN DATA STATEMENTS,"  
220 PRINT"ADD THEM WHERE REQUIRED."  
230 PRINT  
240 PRINT"ENTER YEAR OF RECORD"  
250 INPUT A  
260 PRINT  
270 PRINT"ENTER '1' TO BEGIN"  
280 INPUT B:PRINTCHR$(147)  
290 PRINT"MEDICAL EXPENSE RECORD"  
300 PRINT"YEAR";A  
310 PRINT  
320 N=1  
330 M1=0  
340 PRINT"NUM. EXPENSE TYPE COST CUM. TOT"  
350 PRINT  
360 READ M$  
370 IF M$="END" THEN 470  
380 READ M  
390 M1=M+M1  
400 PRINTN;TAB(6);M$;TAB(24);M;TAB(32);M1  
410 GOSUB 440  
420 N=N+1  
430 GOTO 360  
440 FOR C=1 TO 700  
450 NEXT C  
460 RETURN  
470 PRINT  
480 PRINT"TOTAL MEDICAL EXPENSE FOR YEAR ";A;" IS $";M1  
490 END  
900 REM ENTER MEDICAL EXPENSE DATA IN DATA STATEMENTS BEGINNING  
910 REM WITH LINE 1000. FIRST ENTER THE TYPE OF EXPENSE THE  
920 REM THE COST. ALTERNATE BETWEEN TYPE AND COST UNTIL YOU  
930 REM HAVE ENTERED ALL YOUR EXPENSES. THE LAST DATA  
940 REM STATEMENT MUST READ, DATA "END"  
1000 DATA "EYE EXAM",45,"DENTAL APP.",63,"PHYSICAL",79  
1010 DATA "DENTAL APP.",25,"EMERGENCY",12.50,"DERMATOLOGIST",15  
1020 DATA "BLOOD TEST",15,"THROAT EXAM",15,"DERMATOLOGIST",10.50  
1030 DATA "END"
```



SECTION V

Utilities

This section includes programming techniques for BASIC time delays and random number generation; a hex to decimal and decimal to hex conversion program; and a digital dice program.

Generating Random Numbers

Random number generation is required for programming games and simulations. It's fairly straightforward to program random numbers in BASIC using the RND statement. Here are some examples for generating random numbers with the Commodore 64 computer.

It's easy to program random number generation with your microcomputer. All that's required is using the statements:

```
X=INT(RND(1)*Y+1)
```

and

```
S=RND(-TI)
```

where Y is the largest random number required, and X is the number generated each time the statement is used. The statement `S=RND(-TI)` is used when you want to reseed the random number generator. It is used to change the sequence of random numbers, usually at the beginning of a program, to change the seed with each run.

See Program 28-1 for the program listing to generate random numbers from 1 to 52, for a 52

card shuffle and draw. All card numbers are displayed as they appear in array B. Program line 1070 is used to generate the random numbers. Each time a number is generated, the array A is checked to see if the number has already been chosen. If not, then the number is stored in array B. This continues until all 52 cards are drawn. Finally, lines 1120 through 1140 display the card numbers in the order that they were drawn. The program may be used as a subroutine when designing card games.

A sample run for the 52 card shuffle and draw program is seen in Fig. 28-1.

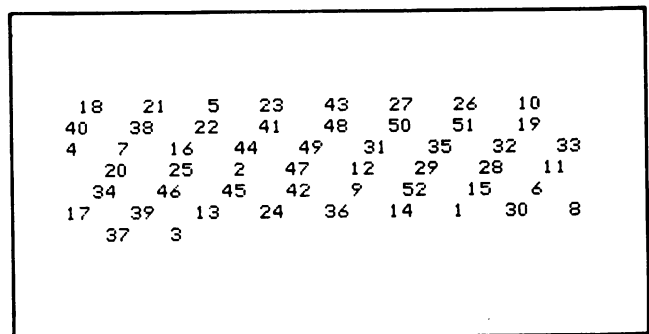


Fig. 28-1. 52 Card Shuffle and Draw sample run.

Program 28-1. 52 Card Shuffle and Draw Program Listing.

```
1000 S=RND(-TI):REM COMMODORE 64-52 CARD SHUFFLE AND DRAW
1020 DIM A(52),B(52)
1030 FOR X=1TO52
1040 A(X)=X
1050 NEXTX
1060 FOR Y=1TO52
1070 X=INT(RND(1)*52+1)
1080 IFA(X)=0THEN1070
1090 A(X)=0
1100 B(Y)=X
1110 NEXTY
1120 FOR A=1TO52
1130 PRINT B(A);" ";
1140 NEXTA
1150 END
```


Hex to Decimal and Decimal to Hex Conversion

Here's a base conversion program for your microcomputer. It's written in BASIC, and will run in any system with 4K BASIC or higher. The program converts a hex number (base 16) to decimal (base 10), and decimal to hex. See Program 29-1 for the program listing.

In the decimal to hex mode, you can enter any decimal number up to 65535 (that's hex FFFF). Its equivalent will be displayed.

In the hex to decimal mode, you must enter each hex number individually, as follows:
enter

3
5
F
D

if the hex number is 35FD.

Then its decimal equivalent will be displayed. See Fig. 29-1 for a sample run.

```

HEX TO DEC-DEC TO HEX

1-HEX TO DEC
2-DEC TO HEX
3-END
? 1

HEX TO DEC
HEX DIGIT 1
ENTER SINGLE DIGIT
? F
HEX DIG 2

ENTER SINGLE DIGIT
? E
HEX DIG 3

ENTER SINGLE DIGIT
? D
HEX DIG 4

ENTER SINGLE DIGIT
? C

HEX FEDC=DEC 65244

HEX TO DEC-DEC TO HEX

1-HEX TO DEC
2-DEC TO HEX
3-END
? 2

DEC TO HEX

ENTER DECIMAL #
? 65244

DEC 65244 =HEX FEDC

HEX TO DEC-DEC TO HEX

1-HEX TO DEC
2-DEC TO HEX
3-END
?
    
```

Fig. 29-1. Hex to Decimal and Decimal to Hex sample run.

Program 29-1. Hex to Decimal and Decimal to Hex Program Listing.

```
10 DIM A(40),A$(40)
15 PRINTCHR$(147)
20 PRINT"HEX TO DEC-DEC TO HEX"
25 PRINT
30 PRINT"1-HEX TO DEC"
35 PRINT"2-DEC TO HEX"
40 PRINT"3-END"
45 INPUT Z
50 IF (Z<1) OR (Z>3) THEN 15
55 ON Z GOTO 60,250,485
60 PRINTCHR$(147)
65 PRINT "HEX TO DEC"
70 PRINT
75 FOR A=1 TO 4
80 PRINT"HEX DIG";A
85 PRINT
90 PRINT"ENTER SINGLE DIGIT"
95 INPUT A$(2)
100 A$(30+A)=A$(2)
105 NEXT A:PRINT
110 FOR A=1 TO 4
115 L$=A$(30+A)
120 IF L$="0" THEN M=0
125 IF L$="1" THEN M=1
130 IF L$="2" THEN M=2
135 IF L$="3" THEN M=3
140 IF L$="4" THEN M=4
145 IF L$="5" THEN M=5
150 IF L$="6" THEN M=6
155 IF L$="7" THEN M=7
160 IF L$="8" THEN M=8
165 IF L$="9" THEN M=9
170 IF L$="A" THEN M=10
175 IF L$="B" THEN M=11
180 IF L$="C" THEN M=12
185 IF L$="D" THEN M=13
190 IF L$="E" THEN M=14
195 IF L$="F" THEN M=15
200 A(35+A)=M
205 NEXT A
210 C=A(36)*4096
215 D=A(37)*256
220 E=A(38)*16
225 F=A(39)
230 K=C+D+E+F:PRINTCHR$(147)
235 PRINT"HEX ";A$(31);A$(32);A$(33);A$(34);"=DEC";K
240 PRINT
245 GOTO 20
250 PRINTCHR$(147)
255 PRINT "DEC TO HEX"
260 PRINT
265 PRINT"ENTER DECIMAL #"
270 INPUT H
```

Program 29-1—cont. Hex to Decimal and Decimal to Hex Program Listing.

```
275 IF H>65535 THEN 250
280 W=0
285 G=0
290 Y=0
300 Z=0
305 W=INT(H)/16
310 G=INT(W)/16
315 Y=INT(G)/16
320 Z=INT(Y)/16
325 N=W-INT(W)
330 A(3)=N*16
335 O=G-INT(G)
340 A(4)=O*16
345 P=Y-INT(Y)
350 A(5)=P*16
355 Q=Z-INT(Z)
360 A(6)=Q*16
365 FOR A=4 TO 1 STEP -1
370 M=A(A+2)
375 IF M=0 THEN L$="0"
380 IF M=1 THEN L$="1"
385 IF M=2 THEN L$="2"
390 IF M=3 THEN L$="3"
395 IF M=4 THEN L$="4"
400 IF M=5 THEN L$="5"
405 IF M=6 THEN L$="6"
410 IF M=7 THEN L$="7"
415 IF M=8 THEN L$="8"
420 IF M=9 THEN L$="9"
425 IF M=10 THEN L$="A"
430 IF M=11 THEN L$="B"
435 IF M=12 THEN L$="C"
440 IF M=13 THEN L$="D"
445 IF M=14 THEN L$="E"
450 IF M=15 THEN L$="F"
455 A$(30+A)=L$
460 NEXT A
465 PRINT CHR$(147)
470 PRINT"DEC";H;"=HEX ";A$(34);A$(33);A$(32);A$(31)
475 PRINT
480 GOTO 20
485 END
```

BASIC Time Delays

Most of the programs described in Section I of this book use BASIC time delays to slow the computer from the world of microseconds to the world of seconds. This may be done in BASIC using the FOR-NEXT loop. The following is a FOR-NEXT loop that may be used to create any length delay:

```
1000 FOR A=1 TO X
1010 NEXT A
```

where X is the number of times the computer runs through the loop, for the required delay.

The value of X is dependent upon the speed of the BASIC and the required delay length.

1 SECOND DELAY

A 1 second delay requires $X = 690$. For a delay longer than 1 second, multiply X by the number of seconds required in the delay. (Note: the time may vary slightly, depending on the individual

microprocessor and operating temperature. Should your timing be off, adjust the 690 figure up or down as necessary.)

MILLISECOND DELAY

The 1 second delay program can be changed for shorter delay lengths. Divide X by 1000 and multiply by the required number of milliseconds for a millisecond delay. Let M equal the number of milliseconds. The following subroutine will create a 100 millisecond delay:

```
1000 M=100
1010 FOR A=1 to X/1000*M
1020 NEXT A
1030 RETURN
```

where X is the number of loops the BASIC requires for a delay of 1 second.

CHAPTER 31

Digital Dice

This program may be used as a subroutine in games. Each time it's run it generates the throw of a pair of six-sided dice. The program is written in BASIC for your microcomputer. See Program 31-1 for the program listing.

The dice are drawn using asterisks (*). See Fig. 31-1 for a sample run.

```

RUN
DIGITAL DICE:
COPYRIGHT (C) 1984 BY HOWARD BERENBON

THIS PROGRAM GENERATES A RANDOM
THROW OF THE DICE.

ENTER A '1' TO THROW THE DICE
? 1

*****
* 3 *
*****

*****
* 6 *
*****

TOTAL DICE THROW = 9

ENTER A '1' TO THROW THE DICE
?
```

Fig. 31-1. Digital Dice sample run.

Program 31-1. Digital Dice Program Listing.

```
100 S=RND(-TI):PRINTCHR$(147);"DIGITAL DICE: COMMODORE 64"  
110 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
120 PRINT  
130 PRINT"THIS PROGRAM GENERATES A RANDOM"  
140 PRINT"THROW OF THE DICE."  
150 PRINT  
160 PRINT"ENTER A '1' TO THROW THE DICE"  
170 INPUT A  
180 IF A<>1 THEN 320  
190 GOSUB 330  
200 PRINT  
210 PRINT"*****"  
220 PRINT"*";TAB(2);X;TAB(6)"*"  
230 PRINT"*****"  
240 PRINT  
250 PRINT  
260 PRINT"*****"  
270 PRINT"*";TAB(2);Y;TAB(6)"*"  
280 PRINT"*****"  
290 PRINT  
300 PRINT"TOTAL DICE THROW =";X+Y  
310 GOTO 150  
320 END  
330 FOR A=1 TO 6  
340 X=INT(RND(1)*6+1)  
350 Y=INT(RND(1)*6+1)  
360 NEXT A  
370 FOR A=1 TO 625  
380 NEXT A  
390 RETURN
```

SECTION VI

The Unusual

This section deals with the subject of fortune telling, with the Tarot Card Reader Program. Not only is it unusual, but it's the longest program in the book. It requires almost 16K to run.

The Tarot Card Reader

Are you open to the unusual? Do you believe that there are things in life that cannot be explained, yet have a profound effect on us? The positions of the planets may affect us, as astrologers believe. The moon has a tidal effect on the oceans and seas, causing their levels to change over a period of time.

In ancient times, picture cards were used to predict the future and explain the past. These cards, called The Tarot, are still used today. In fact, the modern deck of 52 cards is based on The Tarot.

The Tarot consists of 78 cards, with pictures and symbols. There are four suits:

1. Cups
2. Wands
3. Pentacles
4. Swords

There are 14 cards per suit, plus 22 other cards called the Major Arcana. When any of the Major Arcana appear in a card layout, called a reading, their meaning has a greater influence than other cards in the reading.

The cards are numbered Ace through 10, and named Page, Knight, Queen, and King. Some of the names are different from the modern deck. It appears that the Jack has replaced the Page, and the Knight is gone from the modern deck.

THE PROGRAM

The Tarot Card Reader program is based on the ancient deck of 78 cards, used in fortune telling. It's written in BASIC for your microcomputer. See Program 32-1 for the program listing. It requires 16K to run.

Each card has two meanings, one for right-side-

up and another for reversed. The meaning of each picture is stored in PRINT statements, beginning at line 1310. There are 156 meanings in all. Since the pictures are too detailed to draw graphically, their meanings are interpreted from the symbols and subjects, and listed briefly.

THE READING

The person who desires a prediction thinks of a question on any subject, or asks the question out loud. Ten cards are randomly selected, using the numbers from 1 through 78, and stored in Array A. If a duplicate number appears, then another card is drawn. The meanings are accessed using the ON GOSUB statements at lines 1130, 1133, 1135, 1137, 1139, and 1141.

Each card is dealt with a position meaning, as well as a face meaning. See Fig. 32-1 for the sample run. The first card drawn has position number 1. Its position in the reading relates to the Atmosphere That Surrounds the Question. The second card drawn relates to the Opposing Forces. The meaning of each card is interpreted with its position meaning.

Enter a 1 to draw each card. If the card is reversed, this will be indicated. Read the reversed meaning, just below the right-side-up meaning. After all 10 cards are drawn, you may review the reading by entering an R. Enter a 1 to display each card. To start a new reading, enter an A. To end the program, enter an E.

ACCURACY

There is no guarantee that the readings will prove accurate. But if they appear to hold some truth, then you may be dealing with forces beyond your control, if not a coincidence.

THE TAROT CARD READER
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THE TAROT READER WILL ATTEMPT TO PREDICT YOUR
FUTURE AND DETERMINE YOUR DESTINY USING THE 78 CARD
TAROT DECK. IT IS SIMILAR TO A MODERN DAY CARD DECK
EXCEPT IT HAS 1 EXTRA CARD PER SUIT AND 22 OTHER
CARDS CALLED THE MAJOR ARCANA.
THE MAJOR ARCANA ARE SAID TO BE SUGGESTIVE OF MAGIC
AND MYSTERY, WITH CARDS LIKE 'THE TOWER' AND 'THE WHEEL
OF FORTUNE'. THEY ARE NOT RELATED TO THE MODERN DAY CARDS.
PRESS ENTER TO CONTINUE?

THE TAROT CARD READER

THE TAROT READER WILL DEAL 10 CARDS FROM
THE DECK OF 78. 1ST YOU MUST THINK OF A QUESTION
TO ASK IT. THEN YOU WILL BE ASKED TO SHUFFLE THE
DECK. THE CARDS WILL BE DEALT ONE AT A TIME.
EACH CARD HAS TWO MEANINGS, ONE FOR RIGHT-SIDE-UP
AND ANOTHER FOR REVERSED. THAT'S 156 POSSIBLE MEANINGS.
IN THE DECK, EACH CARD ALSO HAS A POSITION MEANING.
1ST THE POSITION MEANING WILL BE PRINTED, THEN THE
CARD MEANING. EVALUATE EACH CARD MEANING IN RELATION
TO YOUR QUESTION AND ITS POSITION IN THE DEAL.
PRESS ENTER TO CONTINUE?

POSITION MEANINGS

#1-ATMOSPHERE THAT SURROUNDS THE QUESTION
#2-OPPOSING FORCES
#3-BASIS OF THE MATTER
#4-INFLUENCE THAT IS JUST PASSING
#5-SOMETHING THAT MAY HAPPEN IN THE FUTURE
#6-THINGS THAT WILL COME TO PASS IN THE NEAR FUTURE
#7-NEGATIVE FEELINGS, THE QUERENT'S FEARS
#8-FAMILY OPINION
#9-HOPES AND IDEAS IN THE MATTER
#10-THE FINAL OUTCOME

THINK OF A QUESTION TO ASK
PRESS ENTER TO SHUFFLE THE CARDS?

NOW SHUFFLING

THE TAROT CARD READER
PRESS ENTER TO DRAW?

THE TAROT CARD READER
CARD # 1

#1-ATMOSPHERE THAT SURROUNDS THE QUESTION
3 OF SWORDS
TEARS, SEPARATION, QUARRELING
REVERSED-CONFUSION, LOSS, SORROW

THE TAROT CARD READER
PRESS ENTER TO DRAW?

Fig. 32-1. The Tarot Card Reader sample run.

THE TAROT CARD READER
CARD # 2

#2-OPPOSING FORCES

10 OF SWORDS
DISPAIR, RUIN, DEFEAT, TEARS, TROUBLE
REVERSED-SOME SUCCESS, COURAGE

THE TAROT CARD READER

PRESS ENTER TO DRAW?

THE TAROT CARD READER
CARD # 3

#3-BASIS OF THE MATTER

4 OF SWORDS
REST AFTER WAR, BANISHMENT, RELAXATION OF ANXIETY
REVERSED-RENEWED ACTIVITY, QUALIFIED SUCCESS, SOCIAL UNREST

THE TAROT CARD READER

PRESS ENTER TO DRAW?

Fig. 32-1—cont. The Tarot Card Reader sample run.

Program 32-1. The Tarot Card Reader Program Listing.

```
100 S=RND(-TI):POKE53281,11:DIMA(80),B(80),C(80):GOTO330
110 REM RANDOM
120 FORA=1TO78
130 C(A)=0
140 NEXTA
150 REM MIX AND DRAW CARDS
160 FORA=1TO78
170 X=INT(RND(1)*78+1)
180 A(A)=X
190 IFC(A)=1THEN170
200 C(A)=1
210 B(A)=INT(RND(1)*2+1)
220 NEXTA
230 RETURN
330 XX=0:Q=1:PRINTCHR$(5);CHR$(147)"THE TAROT CARD READER":PRINT"C
    OMMODORE 64"
340 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
350 PRINT
360 Z$="REVERSED-":W$=" OF WANDS":X$=" OF CUPS"
365 Y$=" OF SWORDS":V$=" OF PENTACLES"
370 PRINT"THE TAROT READER WILL ATTEMPT TO PREDICT YOUR"
380 PRINT"FUTURE AND DETERMINE YOUR DESTINY USING THE 78 CARD"
390 PRINT"TAROT DECK. IT IS SIMILAR TO A MODERN DAY CARD DECK"
400 PRINT"EXCEPT IT HAS 1 EXTRA CARD PER SUIT AND 22 OTHER"
410 PRINT"CARDS CALLED THE MAJOR ARCANA."
420 PRINT"THE MAJOR ARCANA ARE SAID TO BE SUGGES- TIVE OF MAGIC"
430 PRINT"AND MYSTERY, WITH CARDS LIKE 'THE TOWER' AND 'THE WHEEL"
440 PRINT"OF FORTUNE'. THEY ARE NOT RELATED TO THE MODERN DAY CARD
    S."
450 PRINT"ENTER A '1' TO CONTINUE":INPUTC1
460 GOTO590
470 PRINTCHR$(147)
480 PRINT"THE TAROT CARD READER"
490 REM GET A CARD
500 PRINT"CARD #";PP
510 PRINT:PRINT
520 IF XX=1THEN1260
530 REM CHECK FOR REVERSED
540 IF B(PP)=2THEN560
550 RETURN
560 PRINTZ$
570 PRINT
580 RETURN
590 PRINTCHR$(147)
600 PRINTTAB(9)"THE TAROT CARD READER"
610 PRINT
620 PRINT"THE TAROT READER WILL DEAL 10 CARDS FROM";
630 PRINT"THE DECK OF 78. 1ST YOU MUST THINK OF A QUESTION"
640 PRINT"TO ASK IT. THEN YOU WILL BE ASKED TO SHUFFLE THE"
650 PRINT"DECK. THE CARDS WILL BE DEALT ONE AT A TIME."
660 PRINT"EACH CARD HAS TWO MEANINGS, ONE FOR RIGHT-SIDE-UP"
670 PRINT"AND ANOTHER FOR REVERSED. THAT'S 156 CLOSE POSSIBLE MEA
    NINGS."
```

Program 32-1—cont. The Tarot Card Reader Program Listing.

```
680 PRINT"IN THE DECK, EACH CARD ALSO HAS A          POSITION MEANING
."
690 PRINT"1ST THE POSITION MEANING WILL BE PRINTED, THEN THE"
700 PRINT"CARD MEANING. EVALUATE EACH CARD MEANING IN RELATION"
710 PRINT"TO YOUR QUESTION AND ITS POSITION IN THE DEAL."
720 PRINT"ENTER A '1' TO CONTINUE":INPUTC1
730 PRINTCHR$(147)
740 PRINTTAB(10)"POSITION MEANINGS"
750 GOTO4430
760 PRINT"1-ATMOSPHERE THAT SURROUNDS THE QUESTION";
770 RETURN
780 PRINT"2-OPPOSING FORCES"
790 RETURN
800 PRINT"3-BASIS OF THE MATTER"
810 RETURN
820 PRINT"4-INFLUENCE THAT IS JUST PASSING"
830 RETURN
840 PRINT"5-SOMETHING THAT MAY HAPPEN IN THE          FUTURE"
850 RETURN
860 PRINT"6-THINGS THAT WILL COME TO PASS IN THE  NEAR FUTURE"
870 RETURN
880 PRINT"7-NEGATIVE FEELINGS, THE QUERENT'S FEARS";
890 RETURN
900 PRINT"8-FAMILY OPINION"
910 RETURN
920 PRINT"9-HOPES AND IDEAS IN THE MATTER"
930 RETURN
940 PRINT"10-THE FINAL OUTCOME"
950 RETURN
960 PRINT
970 PRINT"THINK OF A QUESTION TO ASK"
990 PRINT"ENTER A '1' TO SHUFFLE CARDS":INPUTC1
1000 PRINTCHR$(147)
1010 PRINT"NOW SHUFFLING"
1020 REM DRAW AND DISPLAY CARDS
1030 GOSUB110
1040 FORPP=1TO10
1050 PRINT:PRINT"THE TAROT CARD READER":PRINT
1060 PRINT"ENTER A '1' TO DRAW":INPUTC1
1070 GOSUB470
1080 ON PP GOSUB760,780,800,820,840,860,880,900,920,940
1090 PRINT
1100 C=A(PP)
1105 IFC<=13THEN1133
1110 IFC<=26THENC=C-13:GOTO1135
1115 IFC<=39THENC=C-26:GOTO1137
1120 IFC<=52THENC=C-39:GOTO1139
1125 IFC<=65THENC=C-52:GOTO1141
1127 C=C-65
1130 ONCGOSUB3910,3950,3990,4030,4070,4110,4150,4190,4230,4270,431
0,4350,4390
1131 NEXTPP
1132 GOTO1160
```

Program 32-1—cont. The Tarot Card Reader Program Listing.

```
1133 ONCGOSUB1310,1350,1390,1430,1470,1510,1550,1590,1630,1670,171
    0,1750,1790
1134 GOTO1131
1135 ONCGOSUB1830,1870,1910,1950,1990,2030,2070,2110,2150,2190,223
    0,2270,2310
1136 GOTO1131
1137 ONCGOSUB2350,2390,2430,2470,2510,2550,2590,2630,2670,2710,275
    0,2790,2830
1138 GOTO1131
1139 ONCGOSUB2870,2910,2950,2990,3030,3070,3110,3150,3190,3230,327
    0,3310,3350
1140 GOTO1131
1141 ONCGOSUB3390,3430,3470,3510,3550,3590,3630,3670,3710,3750,379
    0,3830,3870
1142 GOTO1131
1150 NEXT PP
1160 BZ$=" ":PRINT:PRINT"ANOTHER READING-ENTER 'A'"
1170 PRINT"REPEAT LAST READING-ENTER 'R'"
1180 PRINT"END PROGRAM-ENTER 'E'"
1190 INPUT BZ$
1200 IF BZ$="A"THEN330
1210 IF BZ$="R"THEN1250
1220 IF BZ$="E"THEN1240
1230 GOTO1160
1240 END
1250 XX=1:Q=1:GOTO1040
1260 X=B(Q)
1270 IFX=2THEN1290
1280 Q=Q+1:RETURN
1290 PRINTZ$:PRINT:Q=Q+1
1300 RETURN
1310 PRINT"KEY 0-THE FOOL"
1320 PRINT"A DREAMER HAS THE DESIRE TO ACCOMPLISH A GREAT GOAL."
1330 PRINTZ$;"FOLLY, INDISCRETION, THOUGHTLESS ACTION"
1340 RETURN
1350 PRINT"KEY 1-THE MAGICIAN"
1360 PRINT"WILL, MASTERY, CREATIVE, ORGANIZER"
1370 PRINTZ$;"INDECISION, WEAK WILL, INEPTITUDE"
1380 RETURN
1390 PRINT"KEY 2-HIGH PRIESTESS"
1400 PRINT"HIDDEN INFLUENCES, UNREVEALED FUTURE"
1410 PRINTZ$;"CONCEIT, SENSUAL ENJOYMENT"
1420 RETURN
1430 PRINT"KEY 3-THE EMPRESS"
1440 PRINT"WEALTH, MARRIAGE, FERTILITY"
1450 PRINTZ$;"INFERTILITY, INACTION, LOSS OF POSSESSIONS"
1460 RETURN
1470 PRINT"KEY 4-THE EMPEROR"
1480 PRINT"LEADERSHIP, AUTHORITY, MENTAL ACTIVITY, DOMINATION"
1490 PRINTZ$;"LOSS OF CONTROL, INJURY IN BATTLE"
1500 RETURN
1510 PRINT"KEY 5-THE HIEROPHANT"
1520 PRINT"PREFER RELIGION, RITUAL, SOCIAL APPROVAL"
```

Program 32-1—cont. The Tarot Card Reader Program Listing.

1530 PRINTZ\$;"UNCONVENTIONALITY, INVENTOR, NEW IDEAS"
1540 RETURN
1550 PRINT"KEY 6-THE LOVERS"
1560 PRINT"CHOICE, TEMPTATION, ATTRACTION"
1570 PRINTZ\$;"QUARRELS, INFIDELITY, POSSIBLE WRONG CHOICE"
1580 RETURN
1590 PRINT"KEY 7-THE CHARIOT"
1600 PRINT"TRIUMPH, SUCCESS"
1610 PRINTZ\$;"RESTLESSNESS, DECADENT DESIRES"
1620 RETURN
1630 PRINT"KEY 8-STRENGTH"
1640 PRINT"SPIRITUAL POWER, LOVE TRIUMPHS"
1650 PRINTZ\$;"DISCORD, ABUSE OF POWER"
1660 RETURN
1670 PRINT"KEY 9-THE HERMIT"
1680 PRINT"SILENT COUNSEL, PRUDENCE, DISCRETION"
1690 PRINTZ\$;"IMMATURITY, FOOLISH VICES"
1700 RETURN
1710 PRINT"KEY 10-WHEEL OF FORTUNE"
1720 PRINT"SUCCESS, GOOD LUCK"
1730 PRINTZ\$;"FAILURE, SETBACKS"
1740 RETURN
1750 PRINT"KEY 11-JUSTICE"
1760 PRINT"JUSTICE, BALANCE, EDUCATION"
1770 PRINTZ\$;"INJUSTICE; INEQUALITY"
1780 RETURN
1790 PRINT"KEY 12-THE HANGED MAN"
1800 PRINT"WISDOM, SUSPENDED DECISIONS"
1810 PRINTZ\$;"ARROGANCE, WASTED EFFORT"
1820 RETURN
1830 PRINT"KEY 13-DEATH"
1840 PRINT"TRANSFORMATION, CHANGE, DESTRUCTION & RENEWAL"
1850 PRINTZ\$;"DISASTER, REVOLUTION, TEMPORARY STAGNATION"
1860 RETURN
1870 PRINT"KEY 14-TEMPERANCE"
1880 PRINT"ADAPTION, TEMPERING, HARMONY"
1890 PRINTZ\$;"COMPETING INTERESTS, CORRUPTION, SEPARATION"
1900 RETURN
1910 PRINT"KEY 15-THE DEVIL"
1920 PRINT"BLACK MAGIC, DISCONTENT, DEPRESSION, ILLNESS"
1930 PRINTZ\$;"THE BEGINNING OF SPIRITUAL UNDERSTANDING"
1940 RETURN
1950 PRINT"KEY 16-THE TOWER"
1960 PRINT"CHANGE, CONFLICT, CATASTROPHE"
1970 PRINTZ\$;"THE GAIN OF FREEDOM AT GREAT COST, OPPRESSION"
1980 RETURN
1990 PRINT"KEY 17-THE STAR"
2000 PRINT"INSIGHT, INSPIRATION, HOPE, GOOD HEALTH"
2010 PRINTZ\$;"PESSIMISM, STUBBORNNESS"
2020 RETURN
2030 PRINT"KEY 18-THE MOON"
2040 PRINT"INTUITION, IMAGINATION, DECEPTION"
2050 PRINTZ\$;"STORMS WILL BE WEATHERED, PEACE AT A COST"

Program 32-1—cont. The Tarot Card Reader Program Listing.

2060 RETURN
2070 PRINT"KEY 19-THE SUN"
2080 PRINT"HAPPINESS, SUCCESS, ATTAINMENT"
2090 PRINTZ\$;"FUTURE PLANS CLOUDED"
2100 RETURN
2110 PRINT"KEY 20-JUDGMENT"
2120 PRINT"A LIFE WELL LIVED, AWAKENING, RENEWAL"
2130 PRINTZ\$;"WEAKNESS,DISILLUSION,SEPARATION";
2140 RETURN
2150 PRINT"KEY 21-THE WORLD"
2160 PRINT"COMPLETION, REWARD, SUCCESS, TRAVEL, CHANGE OF RESID
ENCE"
2170 PRINTZ\$;"SUCCESS YET TO BE WON, FEAR OF TRAVEL-CHANGE"
2180 RETURN
2190 PRINT"ACE";W\$
2200 PRINT"BEGINNING OF AN ENTERPRISE, INVENTION, JOURNEY, OR FAM
ILY"
2210 PRINTZ\$;"JOURNEY DEFERRED, CLOUDED JOY, FALSE STARTS"
2220 RETURN
2230 PRINT"2";W\$
2240 PRINT"BOLDNESS, COURAGE, KINDNESS & GENEROSITY";
2250 PRINTZ\$;"RESTLESSNESS, OBSTINACY, FEAR"
2260 RETURN
2270 PRINT"3";W\$
2280 PRINT"REALIZATION OF HOPE,ESTABLISHED STRENGTH, WEALTH, POWER
"
2290 PRINTZ\$;"BEWARE OF HELP OFFERED. WEALTH MAY SLIP AWAY"
2300 RETURN
2310 PRINT"4";W\$
2320 PRINT"PEACE, PROSPERITY, HARMONY, ROMANCE"
2330 PRINTZ\$;"MEANING REMAINS THE SAME"
2340 RETURN
2350 PRINT"5"W\$
2360 PRINT"STRIFE, COMPETITION, OBSTACLES, LAWSUIT"
2370 PRINTZ\$;"GENEROSITY, VICTORY"
2380 RETURN
2390 PRINT"6";W\$
2400 PRINT"GOOD NEWS, VICTORY AFTER STRIFE,PLEASURE, SUCCESS"
2410 PRINTZ\$;"REWARDS ARE DELAYED, WATCH FOR ENEMY"
2420 RETURN
2430 PRINT"7";W\$
2440 PRINT"VICTORY, SUCCESS"
2450 PRINTZ\$;"IGNORANCE, PRETENSE, THREAT"
2460 RETURN
2470 PRINT"8";W\$
2480 PRINT"GREAT HASTE, HOPE, MESSAGES, JOURNEY"
2490 PRINTZ\$;"DELAY, STAGNATION, JEALOUSY"
2500 RETURN
2510 PRINT"9";W\$
2520 PRINT"STRENGTH, POWER, HEALTH"
2530 PRINTZ\$;"WEAKNESS, ILL HEALTH, OBSTACLES"
2540 RETURN
2550 PRINT"10";W\$

Program 32-1—cont. The Tarot Card Reader Program Listing.

```
2560 PRINT"POWER UNWISELY USED"
2570 PRINTZ$;"INTRIGUES,SEPARATION,EMIGRATION";
2580 RETURN
2590 PRINT"PAGE";W$
2600 PRINT"COURAGE, BEAUTY, DESIRES POWER,MESSENGER";
2610 PRINTZ$;"CRUEL, UNSTABLE, DOMINEERING, BAD NEWS"
2620 RETURN
2630 PRINT"KNIGHT";W$
2640 PRINT"A HASTY YOUNG MAN, DEPARTURE"
2650 PRINTZ$;"JEALOUS LOVER, DISCORD,FRUSTRA-TION"
2660 RETURN
2670 PRINT"QUEEN";W$
2680 PRINT"SHE HAS GREAT POWER, SUCCESS, KINDNESS"
2690 PRINTZ$;"DOMINEERING, OBSTINATE,REVENGE-FUL"
2700 RETURN
2710 PRINT"KING";W$
2720 PRINT"HANDSOME & PASSIONATE, HONESTY, FRIENDLY";
2730 PRINTZ$;"INTOLERANT, PREJUDICED, SEVERE"
2740 RETURN
2750 PRINT"ACE";X$
2760 PRINT"GREAT LOVE, JOY, CONTENTMENT"
2770 PRINTZ$;"FALSE LOVE. CLOUDED JOY. INSTA-BILITY"
2780 RETURN
2790 PRINT"2";X$
2800 PRINT"HARMONY, FRIENDSHIP, LOVE AFFAIR"
2810 PRINTZ$;"FALSE LOVE, FOLLY, PASSION, MISUNDERSTANDING"
2820 RETURN
2830 PRINT"3";X$
2840 PRINT"SUCCESS, ABUNDANCE, PLEASURE, VICTORY"
2850 PRINTZ$;"PLEASURE TURNS TO PAIN, SUCCESS TO ASHES"
2860 RETURN
2870 PRINT"4";X$
2880 PRINT"STATIONARY, WEARINESS, DISSATISFACTION WITH SUCCESS"
2890 PRINTZ$;"AWAKENING, NEW GOALS, NEW AMBI-TION"
2900 RETURN
2910 PRINT"5";X$
2920 PRINT"DISAPPOINTMENT,SORROW,LOSS OF FRIENDSHIP, REGRET"
2930 PRINTZ$;"RETURN OF ENJOYMENT, A FRIEND OR LOVED ONE"
2940 RETURN
2950 PRINT"6";X$
2960 PRINT"HAPPINESS, ENJOYMENT, FROM THE PAST. NEW OPPORTUNITIES"
2970 PRINTZ$;"CLINGING TO THE PAST. WORTHLESS ASSOCIATES"
2980 RETURN
2990 PRINT"7";X$
3000 PRINT"DREAMS, IMAGINATION. FORCES SCATTERED. DECEPTION"
3010 PRINTZ$;"GOOD RESOLUTIONS,NEW DETERMINA-TION"
3020 RETURN
3030 PRINT"8";X$
3040 PRINT"SUCCESS ABANDONED.JOURNEYING.DISAPPOINT-MENT IN LOVE"
3050 PRINTZ$;"JOY, A NEW LOVE"
3060 RETURN
3070 PRINT"9";X$
3080 PRINT"MATERIAL SUCCESS, SATISFACTION"
```

Program 32-1—cont. The Tarot Card Reader Program Listing.

3090 PRINTZ\$;"FALSE FREEDOM, DECEPTION OR ILLNESS"
3100 RETURN
3110 PRINT"10";X\$
3120 PRINT"CONTENTMENT, HAPPINESS, SUCCESS, FRIEND-SHIP"
3130 PRINTZ\$;"LOSS OF FRIENDSHIP. BETRAYAL. WASTE"
3140 RETURN
3150 PRINT"PAGE";X\$
3160 PRINT"ARTS. NEWS, A MESSAGE"
3170 PRINTZ\$;"OBSTACLES, SEDUCTION.DECEPTION, UNPLEASANT NEWS"
3180 RETURN
3190 PRINT"KNIGHT";X\$
3200 PRINT"PROPOSITION, INVITATION, MESSAGES"
3210 PRINTZ\$;"SENSUAL, IDLE, UNTRUTHFUL"
3220 RETURN
3230 PRINT"QUEEN";X\$
3240 PRINT"SUCCESS, HAPPINESS, PLEASURE"
3250 PRINTZ\$;"DISHONESTY. IMMORALITY"
3260 RETURN
3270 PRINT"KING";X\$
3280 PRINT"LIBERALITY, GENEROSITY,CREATIVE INTELLI-GENCE"
3290 PRINTZ\$;"FIERCE NATURE UNDER CALM EXTE- RIOR"
3300 RETURN
3310 PRINT"ACE";Y\$
3320 PRINT"CONQUEST, POWER, ACTIVITY"
3330 PRINTZ\$;"CONQUEST, DISASTER, OBSTACLES, LOSS"
3340 RETURN
3350 PRINT"2";Y\$
3360 PRINT"TENSION, INDECISION. BALANCED FORCES, STALEMATE"
3370 PRINTZ\$;"RELEASE. DISLOYALTY. MOVEMENT OF AFFAIRS"
3380 RETURN
3390 PRINT"3";Y\$
3400 PRINT"TEARS, SEPARATION, QUARRELING"
3410 PRINTZ\$;"CONFUSION, LOSS, SORROW"
3420 RETURN
3430 PRINT"4";Y\$
3440 PRINT"REST AFTER WAR, BANISHMENT, RELAXATION OF ANXIETY"
3450 PRINTZ\$;"RENEWED ACTIVITY, QUALIFIED SUCCESS, SOCIAL UNRES
T"
3460 RETURN
3470 PRINT"5";Y\$
3480 PRINT"FAILURE, DEFEAT. DEGRADATION. UNFAIRNESS";
3490 PRINTZ\$;"CHANCE OF LOSS. SORROW.WEAKNESS";
3500 RETURN
3510 PRINT"6";Y\$
3520 PRINT"SUCCESS AFTER ANXIETIES. JOURNEY"
3530 PRINTZ\$;"NO IMMEDIATE WAY OUT OF DIFFIC-ULTIES"
3540 RETURN
3550 PRINT"7";Y\$
3560 PRINT"UNSTABLE EFFORT, PARTIAL SUCCESS"
3570 PRINTZ\$;"UNEXPECTED GOOD. SOUND ADVICE"
3580 RETURN
3590 PRINT"8";Y\$
3600 PRINT"IMPRISONMENT, FEAR, BETRAYAL"

Program 32-1—cont. The Tarot Card Reader Program Listing.

3610 PRINTZ\$;"NEW BEGINNINGS, FREEDOM"
 3620 RETURN
 3630 PRINT"9";Y\$
 3640 PRINT"SUFFERING, LOSS, MISERY. OPPRESSION. ILLNESS"
 3650 PRINTZ\$;"PATIENCE, UNSELFISHNESS. TIME HEALS"
 3660 RETURN
 3670 PRINT"10";Y\$
 3680 PRINT"DISPAIR, RUIN, DEFEAT, TEARS, TROUBLE"
 3690 PRINTZ\$;"SOME SUCCESS. COURAGE"
 3700 RETURN
 3710 PRINT"PAGE";Y\$
 3720 PRINT"MESSAGE, SPYING. GRACE, DEXTERITY"
 3730 PRINTZ\$;"FRIVOLITY AND CUNNING.UNEXPECT-ED"
 3740 RETURN
 3750 PRINT"KNIGHT";Y\$
 3760 PRINT"COMING OR GOING OF MISFORTUNE"
 3770 PRINTZ\$;"EXTRAVAGENCE. TYRANNY"
 3780 RETURN
 3790 PRINT"QUEEN";Y\$
 3800 PRINT"MOURNING, PRIVATION. KINDNESS. GRACEFULNESS"
 3810 PRINTZ\$;"UNRELIABILITY. GOSSIP. DECEIT. MALICE"
 3820 RETURN
 3830 PRINT"KING";Y\$
 3840 PRINT"POWER, STRENGTH, AUTHORITY"
 3850 PRINTZ\$;"DISTRUSTFUL. HARSH, PLOTTING, BARBARITY"
 3860 RETURN
 3870 PRINT"ACE";V\$
 3880 PRINT"WEALTH, MATERIAL GAIN, PROSPERITY, PLEASURE, BEAUT
 Y"
 3890 PRINTZ\$;"MISERLINESS, GREED. A FALSE START"
 3900 RETURN
 3910 PRINT"2";V\$
 3920 PRINT"JUGGLE TWO SITUATIONS, GAIETY, HARMONY. NEWS, MESSAGES"
 3930 PRINTZ\$;"SIMULATED ENJOYMENT"
 3940 RETURN
 3950 PRINT"3";V\$
 3960 PRINT"MATERIAL INCREASE. MASTER CRAFTSMAN, SKILLED ARTIST"
 3970 PRINTZ\$;"LACK OF SKILL. IGNORANCE. SELF-ISHNESS"
 3980 RETURN
 3990 PRINT"4";V\$
 4000 PRINT"MATERIAL GAIN, SUCCESS, GIFTS, INHERIT- ANCE, MISERLY"
 4010 PRINTZ\$;"PREJUDICE, SUSPICION, SETBACKS. SPENDTHRIFT"
 4020 RETURN
 4030 PRINT"5";V\$
 4040 PRINT"UNEMPLOYMENT, LOSS, LONELINESS, DESTITU-TION"
 4050 PRINTZ\$;"CHARITY, NEW EMPLOYMENT, MONEY REGAINED"
 4060 RETURN
 4070 PRINT"6";V\$
 4080 PRINT"GAIN, GIFTS, INHERITANCE"
 4090 PRINTZ\$;"JEALOUS. BRIBES. BAD DEBTS"
 4100 RETURN
 4110 PRINT"7";V\$
 4120 PRINT"LOSS OF FORTUNE. PAUSE. DISAPPOINTMENT"

Program 32-1—cont. The Tarot Card Reader Program Listing.

```
4130 PRINTZ$;"IMPATIENCE. LITTLE GAIN"  
4140 RETURN  
4150 PRINT"8";V$  
4160 PRINT"LEARNING A TRADE OR PROFESSION. SKILL. EMPLOYMENT"  
4170 PRINTZ$;"DANGER OF FAILURE. INTRIGUE. FALSE VANITY"  
4180 RETURN  
4190 PRINT"9";V$  
4200 PRINT"SOLITARY ENJOYMENT. INHERITANCE.MATERIAL WELL BEING"  
4210 PRINTZ$;"DANGER OF LOSS, OF HOME,FRIEND-SHIP. CANCELLED PROJE  
CT"  
4220 RETURN  
4230 PRINT"10";V$  
4240 PRINT"RICHES, INHERITANCE. FAMILY MATTERS"  
4250 PRINTZ$;"FAMILY MISFORTUNE, LOSS OF INHERITANCE"  
4260 RETURN  
4270 PRINT"PAGE";V$  
4280 PRINT"REFLECTION, CAREFULNESS, GOOD MANAGEMENT";  
4290 PRINTZ$;"DISSIPATION AND EXCESS. WASTE- FULNESS, LUXURY"  
4300 RETURN  
4310 PRINT"KNIGHT";V$  
4320 PRINT"UTILITY, SERVICEABLENESS, WORTHINESS"  
4330 PRINTZ$;"STATIC, DULL, TIMID, IDLE, CARELESS"  
4340 RETURN  
4350 PRINT"QUEEN";V$  
4360 PRINT"OPULENCE, SECURITY, TRUST. MOODY"  
4370 PRINTZ$;"MISTRUST, SUSPICION,DEPENDENCE. CHANGEABLE"  
4380 RETURN  
4390 PRINT"KING";V$  
4400 PRINT"STEADY TEMPERAMENT, SLOW TO ANGER. MONE-TARY SUCCESS"  
4410 PRINTZ$;"STUPIDITY. THRIFTLESS. VICE"  
4420 RETURN  
4430 PRINT  
4440 GOSUB760  
4450 GOSUB780  
4460 GOSUB800  
4470 GOSUB820  
4480 GOSUB840  
4490 GOSUB860  
4500 GOSUB880  
4510 GOSUB900  
4520 GOSUB920  
4530 GOSUB940  
4540 GOTO960
```

SECTION VII

Graphics and Sound

This section includes a joystick message writer program that uses only a single joystick and trigger button to enter and display messages. Also included is an electronic harpsichord that simulates the sound of a harpsichord and five other musical instruments; a color crosshatch program used to check the linearity of your television picture; a graphics version of digital dice called electronic dice; a moving stars program that simulates motion through space; and finally, a joystick test program with sound.

Stick Message Writer

Here's a program that allows you to enter and display messages using only a joystick. It may be useful for people who are handicapped, who could move a joystick and press a button, but cannot type at a terminal without difficulty. The operator moves the joystick to display the desired character in the upper right-hand corner of the screen. Then the trigger button is pressed to record the character, and move it to the message area below. There is also a printout option. It's written in BASIC for your microcomputer. See Program 33-1 for the program listing.

THE PROGRAM

Connect your joystick to game control port 1. After you run the program, using joystick 1, first set the joystick to its center position and then press the trigger button for message entry. The screen is used to build and display your message with the character available, displayed at the upper right-hand corner. You have a 255 character message limit.

To move through the character set, you move the joystick up or down, and as you do this, a tone is sounded; a higher tone is heard when moving

the joystick up and a lower one when moving it down. Once you find the desired character, press the trigger button to transfer it to the message area below. To add spaces between words, either move the joystick to the right, momentarily, or find SP displayed in the lower end of the character set, and press the trigger button to transfer it to your message. To backspace and erase what you just wrote, move the joystick to the left, momentarily. Finally, to end your message session, move the joystick, diagonally, towards the trigger button. The computer will display the following:

```
----END OF MESSAGE  
STICK UP-PRINTOUT  
STICK RIGHT-MESSAGE  
STICK DOWN-END
```

Moving the joystick up, momentarily, will give you a printout of your message (make sure that your printer is switched on). Moving the joystick to the right, momentarily, will allow you to enter another message. And moving the joystick down will end the program.

See Fig. 33-1 for a sample run.

STICK MESSAGE WRITER
COMMODORE 64
COPYRIGHT (C) 1984 BY HOWARD BERENBON

THIS PROGRAM ALLOWS YOU TO ENTER
AND DISPLAY MESSAGES USING ONLY A
JOYSTICK. IT MAY BE USEFUL FOR PEOPLE
WHO ARE HANDICAPPED, WHO COULD MOVE A
JOYSTICK, BUT NOT TYPE AT A TERMINAL.

THE OPERATOR MOVES THE JOYSTICK TO
DISPLAY THE DESIRED CHARACTER IN THE
UPPER RIGHT-HAND CORNER OF THE SCREEN.
THEN THE TRIGGER BUTTON IS PRESSED TO
RECORD THE CHARACTER, AND MOVE IT TO
THE MESSAGE AREA BELOW. THERE IS ALSO
A MESSAGE PRINTOUT OPTION.

PRESS TRIGGER BUTTON TO START ENTRY

S T I C K M E S S A G E W R I T E R

T

T H I S I S A T E S T -

----- END OF MESSAGE
STICK UP-PRINTOUT
STICK RIGHT-MESSAGE
STICK DOWN-END

Fig. 33-1. Stick Message Writer sample run.

Program 33-1. Stick Message Writer Program Listing.

```
100 GOSUB750:PRINTCHR$(147);"STICK MESSAGE WRITER"  
110 PRINT"COMMODORE 64"  
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"  
130 PRINT:DIMA$(500)  
140 PRINT"THIS PROGRAM ALLOWS YOU TO ENTER"  
150 PRINT"AND DISPLAY MESSAGES USING ONLY A"  
160 PRINT"JOYSTICK. IT MAY BE USEFUL FOR PEOPLE"  
170 PRINT"WHO ARE HANDICAPPED, WHO COULD MOVE A"  
180 PRINT"JOYSTICK, BUT NOT TYPE AT A TERMINAL."  
190 PRINT  
200 PRINT"THE OPERATOR MOVES THE JOYSTICK TO"  
210 PRINT"DISPLAY THE DESIRED CHARACTER IN THE"  
220 PRINT"UPPER RIGHT-HAND CORNER OF THE SCREEN."  
230 PRINT"THEN THE TRIGGER BUTTON IS PRESSED TO"  
240 PRINT"RECORD THE CHARACTER, AND MOVE IT TO"  
250 PRINT"THE MESSAGE AREA BELOW. THERE IS ALSO"  
260 PRINT"A MESSAGE PRINTOUT OPTION."  
270 PRINT  
280 PRINT"PRESS TRIGGER BUTTON TO START ENTRY"  
290 J=PEEK(56321):B=JAND16:IFB=16THEN290  
300 PRINTCHR$(147):A$=""  
310 PRINT"STICK MESSAGE WRITER":C$="- ":PRINT  
320 PRINTTAB(28)"-----":PRINTCHR$(19):FORK=1TO6:PRINT:NEXTK  
330 PRINTTAB(28)"-----":J=PEEK(56321):J=15-(JAND15)  
340 Z=64:REM CHOOSE CHARACTERS  
350 Z=Z+1:IFZ=91THENZ=90  
360 PRINTCHR$(19):FORK=1TO4:PRINT:NEXTK  
370 IFZ=32THENPRINTTAB(30)"SP":GOTO390  
380 PRINTTAB(30);CHR$(Z);" "  
390 REM JOYSTICK INPUT ROUTINE  
400 J=PEEK(56321):B=JAND16:J=15-(JAND15)  
410 IFLEN(A$)>0THENIFJ=4THEN530  
420 IFJ=5THEN550  
430 IFJ=1THENH=68:L=149:GOSUB720:GOTO350  
440 IFB<>16THEN480:REM ADD CHARACTER TO STRING  
450 IFJ=2THENH=34:L=75:GOSUB720:Z=Z-1:IFZ<32THENZ=32  
460 IFJ=8THENB$=" ":GOSUB700:GOTO490  
470 GOTO360  
480 GOSUB700:B$=CHR$(Z)  
490 A$=A$+B$  
500 PRINTCHR$(19):FORK=1TO8:PRINT:NEXTK:PRINTA$;C$  
510 GOTO400  
520 END  
530 GOSUB700:I=LEN(A$):A$=LEFT$(A$,I-1):GOTO500  
540 GOTO400  
550 PRINTCHR$(19):FORK=1TO19:PRINT:NEXTK:PRINT"---- END OF MESSAGE"  
"  
560 PRINT"STICK UP-PRINTOUT"  
570 PRINT"STICK RIGHT-MESSAGE"  
580 PRINT"STICK DOWN-END"  
590 J=PEEK(56321):J=15-(JAND15):IFJ=0THEN590  
600 GOSUB700:IFJ=1THEN640  
610 IFJ=8THEN300
```

Program 33-1—cont. Stick Message Writer Program Listing.

```
620 IFJ=2THEN520
630 GOTO590
640 OPEN4,4:CMD4:GOSUB670
650 PRINTA$:GOSUB670
660 PRINT#4:CLOSE4:GOTO590
670 FORA=1TO5
680 PRINT" ":NEXTA
690 RETURN
700 FORA=1TO120:NEXTA
710 RETURN
720 POKE54273,H:POKE54272,L
730 POKE54276,33:FORT=1TO50:NEXTT
740 POKE54276,32:RETURN
750 FORA=0TO24:POKE54272,A:NEXTA
760 POKE54296,15:POKE54277,15:RETURN
```

Electronic Harpsichord

Here's a simple program that uses some of the sound capabilities of the Commodore 64 to generate the sound of a harpsichord and five other musical instruments. You can play notes directly, by typing at the keyboard, or load a previously saved music file from cassette (or disk), and have the computer play it. The bottom two rows of keys are used to create notes, and the second row is used to change octaves and sound duration. Also, the "space bar" is used for rests, and the "=" is used for half notes. The program is written in BASIC for your microcomputer. See Program 34-1.

THE PROGRAM

After you run the program, enter a 1 to begin. A menu will be displayed, giving you five options. Enter a 1 to load a previously stored music file, enter a 2 to save a file, enter a 3 to input music at the keyboard, enter a 4 to play music that was just typed or loaded from a file, or enter a 5 to end the program. If a subdued tone lingers after ending, depress the RUN/Stop *and* RESTORE keys.

Load File

Before entering a 1 to load a previously stored music data file, position your cassette tape at the point where your data is stored. Then enter a 1 to load the music data. Press PLAY on your cassette recorder. It will search the cassette tape until it finds the data file. When the file is found, it will load the file, and then the program will return to the main menu for your desired action.

Save File

Before entering a 2, position your cassette tape on a blank section where your music data will be stored. Then enter a 2 to save a previously typed

music session. After the file is saved to cassette, the program will return to the main menu.

Input Music

Enter a 3 to input and play notes at the keyboard. The program first displays the bottom three rows of keys and the space bar. Above each key is its function. See Table 34-1.

Table 34-1. Assigned Key Functions

Row No.	Key	Function
1	0	Exit input music mode
2	Q	Harpsichord
2	W	Organ
2	E	Flute
2	R	Accordion
2	T	Trumpet
2	Y	Piano
2	U	Longest duration (SL-slow)
2	I	Medium duration (ME-medium)
2	O	Shortest duration (FA-fast)
3	S	Note-C#
3	D	Note-D# (E flat)
3	F	Not used
3	G	Note-F#
3	H	Note-G#
3	J	Note-A#
3	K	Not used
3	L	Note-C#
3	:	Note-D#
3	;	Not used
3	=	Half note
4	Z	Note-C
4	X	Note-D
4	C	Note-E
4	V	Note-F
4	B	Note-G
4	N	Note-A
4	M	Note-B
4	,	Note-C
4	.	Note-D
4	/	Note-E
5	SP	Rest-space bar

Instrument Type and Note Duration

The type of instrument simulated is controlled by the keys Q, W, E, R, T, and Y. Pressing a Q will simulate the sound of a harpsichord (default setting); W simulates an organ; E simulates a flute; R simulates an accordion; T simulates a trumpet; and Y simulates a piano. The duration of each note is controlled by the keys U, I, and O.

Notes, Half Notes, and Rests

The third row of keys, beginning with A and ending with =, generates the notes C#, D# (E Flat), F#, G#, A#, C#, and D# up the scale. The fourth row of keys, beginning with Z and ending with /, generate the notes, C, D, E, F, G, A, B, C, D, and E up the scale. Half notes are played by pressing the = key, and rests are entered by pressing the "space bar." Also, each note is displayed as it is played. To exit the INPUT MUSIC mode, and return to the main menu, enter a 0.

254 Note File Limit

You may play notes as long as you like, but if you intend to save the music to a cassette file, only the first 254 key presses will be stored.

Play Music

Enter a 4 to have the computer to play music loaded from a file, or replay something you just typed in. First, you will be asked to enter the playing speed. Enter 1 for slow, 2 for medium, or 3 for fast. Next you will be requested to enter the type of instrument desired. Enter a 1 for harpsichord, 2 for organ, 3 for flute, 4 for accordion, 5 for trumpet, or 6 for piano. Then it will play your music, displaying each note as it is played. If no data is present, the computer will display

```
NO MUSIC DATA AVAILABLE.
```

After all notes are played, it will return to the main menu. See Fig. 34-1 for a sample run.

MODIFICATIONS FOR DISK USERS

If you have a disk drive for your computer you can modify the program to save your music data to disk instead of cassette tape. Make the following modifications to Program 34-1.

Change lines 455, 460, 540, 545, 555, and 560. And add lines 547 and 630:

```
ELECTRONIC HARPSICHORD  
COMMODORE 64  
COPYRIGHT (C) 1984 BY HOWARD BERENBON
```

```
THIS PROGRAM SIMULATES THE SOUND OF A  
HARPSICHORD AND FIVE OTHER INSTRUMENTS  
USING THE SOUND POKES AND THE GETV$  
STATEMENT. YOU CAN PLAY NOTES BY TYPING  
AT THE KEYBOARD, OR HAVE THE COMPUTER  
PLAY A PREVIOUSLY SAVED FILE. THE BOTTOM  
TWO ROWS OF KEYS ARE USED TO CREATE  
NOTES, AND THE SECOND ROW IS USED TO  
CHANGE THE INSTRUMENT TYPE AND SOUND  
DURATION. ALSO, THE [SPACE BAR] IS USED  
FOR RESTS AND THE [=] KEY IS USED FOR  
HALF NOTES.
```

```
ENTER A 1 TO BEGIN  
? 1
```

```
ELECTRONIC HARPSICHORD
```

```
1-LOAD CASSETTE FILE 4-PLAY MUSIC  
2-SAVE CASSETTE FILE 5-END  
3-INPUT MUSIC  
? 3
```

```
ELECTRONIC HARPSICHORD
```

```
HA OR FL AC TR PI SL ME FA  
[Q][W][E][R][T][Y][U][I][O][P][@][*]  
C# D# F# G# A# C# D# HF  
[A][S][D][F][G][H][J][K][L][:][;][=]  
C D E F G A B C D E  
[Z][X][C][V][B][N][M][,][.][/] ]  
[ SPACE BAR - REST ]  
ENTER A 0 TO END
```

Fig. 34-1. Electronic Harpsichord sample run.

```
455 PRINT"1-LOAD DISK FILE 4-  
PLAY MUSIC"  
460 PRINT"2-SAVE DISK FILE 5-  
END"  
540 PRINT:PRINT"LOAD MUSIC DATA"  
:PRINT:GOSUB630  
545 S$="" :OPEN1,8,4,MD$+" ,S,R"  
:INPUT#1,B$:B=VAL(B$):IF  
B=0THEN550  
547 FORC=1TOB:GET#1,D$:S$=S$+D$  
:NEXTC  
555 PRINT:PRINT"SAVE MUSIC FILE"  
:PRINT:GOSUB630  
560 B$=STR$(LEN(S$)):OPEN1,8,4,  
MD$ =" ,S,W" :PRINT#1,B$;CHR$  
(13);S$:GOTO550  
630 PRINT"ENTER FILE NAME":INPUT  
MD$:RETURN
```

Line 630 allows you to specify a music data file name for disk file storage and retrieval.

Program 34-1. Electronic Harpsichord Program Listing.

```
100 PRINTCHR$(147):PRINT"ELECTRONIC HARPSICHORD"
105 Q=9:R=0:J=33:K=32:GOSUB565
110 PRINT"COMMODORE 64"
115 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON":PRINT
120 PRINT"THIS PROGRAM SIMULATES THE SOUND OF A"
125 PRINT"HARPSICHORD AND FIVE OTHER INSTRUMENTS"
130 PRINT"USING THE SOUND POKES AND THE GETV$"
135 PRINT"STATEMENT. YOU CAN PLAY NOTES BY TYPING"
140 PRINT"AT THE KEYBOARD, OR HAVE THE COMPUTER"
145 PRINT"PLAY A PREVIOUSLY SAVED FILE. THE BOTTOM";
150 PRINT"TWO ROWS OF KEYS ARE USED TO CREATE"
155 PRINT"NOTES, AND THE SECOND ROW IS USED TO"
160 PRINT"CHANGE THE INSTRUMENT TYPE AND SOUND"
165 PRINT"DURATION. ALSO, THE [SPACE BAR] IS USED"
170 PRINT"FOR RESTS AND THE [=] KEY IS USED FOR"
175 PRINT"HALF NOTES."
180 PRINT:PRINT"ENTER A 1 TO BEGIN"
185 INPUTB:S$="":GOTO440
190 IFP=0THENGETV$:IFV$=""THEN190
195 IFP=1THEN380
200 IFV$="U"THEN T=5
205 IFV$="I"THEN T=3
210 IFV$="O"THEN T=1
215 IFV$="Q"THENQ=9:R=0:J=33:K=32:GOSUB570:REM HARPSICHORD
220 IFV$="W"THENQ=0:R=240:J=17:K=16:GOSUB570:REM ORGAN
225 IFV$="E"THENQ=96:R=40:J=17:K=16:GOSUB570:REM FLUTE
230 IFV$="R"THENQ=102:R=40:J=33:K=32:GOSUB570:REM ACCORDIAN
235 IFV$="T"THENQ=96:R=40:J=33:K=32:GOSUB570:REM TRUMPET
240 IFV$="Y"THENQ=9:R=0:J=17:K=16:GOSUB570:REM PIANO
245 IFV$=" "THENFORG=1TOT1*T:NEXTG:GOTO365
250 IFV$="Z"THENX=34:Y=75:N$="C":GOTO350
255 IFV$="X"THENX=38:Y=126:N$="D":GOTO350
260 IFV$="C"THENX=43:Y=52:N$="E":GOTO350
265 IFV$="V"THENX=45:Y=198:N$="F":GOTO350
270 IFV$="B"THENX=51:Y=97:N$="G":GOTO350
275 IFV$="N"THENX=57:Y=172:N$="A":GOTO350
280 IFV$="M"THENX=64:Y=188:N$="B":GOTO350
285 IFV$=","THENX=68:Y=149:N$="C":GOTO350
290 IFV$="."THENX=77:Y=189:N$="D":GOTO350
295 IFV$="/"THENX=85:Y=229:N$="E":GOTO350
300 IFV$="S"THENX=36:Y=85:N$="C#":GOTO350
305 IFV$="D"THENX=40:Y=200:N$="D#":GOTO350
310 IFV$="G"THENX=48:Y=127:N$="F#":GOTO350
315 IFV$="H"THENX=54:Y=111:N$="G#":GOTO350
320 IFV$="J"THENX=61:Y=126:N$="A#":GOTO350
325 IFV$="L"THENX=72:Y=169:N$="C#":GOTO350
330 IFV$=":"THENX=80:Y=209:N$="D#":GOTO350
335 IFV$="="THEN T1=T1/2:HF=1:GOTO365
340 IFV$="0"THEN440
345 GOTO190
350 PRINTN$;" ";:POKE54273,X:POKE54272,Y:POKE54276,J
355 IFHF=1THENHF=0:T1=T1*2
360 FORG=1TOT1*T:NEXTG:POKE54276,K
```

Program 34-1—cont. Electronic Harpsichord Program Listing.

```

365 IFA=3THENS$=S$+V$:V$="":IFLEN(S$)>254THENS$=LEFT$(S$,254)
370 GOTO190
375 PRINTCHR$(147):GOSUB585:P=1:C1=LEN(S$)
380 V$=MID$(S$,C,1):C=C+1
385 IFSP=3THENT=1
390 IFSP=2THENT=3
395 IFSP=1THENT=5
400 IFC=C1+2THEN440
405 GOTO200
410 GOSUB585:S$="":V$="":GOTO200
415 IFS$=""THEN580
420 PRINT:PRINT"PLAY MUSIC":PRINT:GOSUB485
425 PRINT"ENTER SPEED: 1-SLOW 2-MEDIUM 3-FAST":INPUTSP
430 IFSP<1ORSP>3THEN425
435 GOTO375
440 PRINTCHR$(147)
445 PRINT"ELECTRONIC HARPSICHORD":PRINT
450 T=5:T1=50:C=1:P=0
455 PRINT"1-LOAD CASSETTE FILE 4-PLAY MUSIC"
460 PRINT"2-SAVE CASSETTE FILE 5-END"
465 PRINT"3-INPUT MUSIC"
470 INPUTA:IFA<1ORA>5THEN440
475 ONAGOTO540,555,410,415,480
480 END
485 PRINT"ENTER INSTRUMENT TYPE"
490 PRINT:PRINT"1-HARPSICHORD 4-ACCORDIAN"
495 PRINT"2-ORGAN 5-TRUMPET":PRINT"3-FLUTE 6-PIANO"
500 INPUTV:PRINT:IFV<1ORV>6THEN500
505 ONVGOTO510,515,520,525,530,535
510 Q=9:R=0:J=33:K=32:GOSUB570:RETURN
515 Q=0:R=240:J=17:K=16:GOSUB570:RETURN
520 Q=96:R=40:J=17:K=16:GOSUB570:RETURN
525 Q=102:R=40:J=33:K=32:GOSUB570:RETURN
530 Q=96:R=40:J=33:K=32:GOSUB570:RETURN
535 Q=9:R=0:J=17:K=16:GOSUB570:RETURN
540 PRINT:PRINT"LOAD MUSIC DATA":PRINT
545 OPEN1,1,0,"MUSIC DATA":INPUT#1,D$:S$=D$
550 CLOSE1:GOTO440
555 PRINT:PRINT"SAVE MUSIC FILE":PRINT
560 OPEN1,1,1,"MUSIC DATA":PRINT#1,S$:GOTO550
565 FOR A=0 TO 24:POKE 54272+A,0:NEXT A
570 POKE54296,15:POKE54277,Q:POKE54278,R
575 RETURN
580 PRINT"NO MUSIC DATA AVAILABLE":PRINT:FORG=1TO990:NEXTG:GOTO440
585 PRINTCHR$(147):PRINT"ELECTRONIC HARPSICHORD":PRINT:PRINT
590 PRINT" HA OR FL AC TR PI SL ME FA"
595 PRINT"[Q][W][E][R][T][Y][U][I][O][P][@][*]"
600 PRINT" C# D# F# G# A# C# D# HF"
605 PRINT"[A][S][D][F][G][H][J][K][L][:][;][=]"
610 PRINT" C D E F G A B C D E"
615 PRINT"[Z][X][C][V][B][N][M][,][.][/]
620 PRINT"[ SPACE BAR - REST ]"
625 PRINT" ENTER A 0 TO END":PRINT:RETURN

```

CHAPTER 35

Color Crosshatch

This program may be used to test the linearity of your television or monitor picture. It generates three different patterns in seven different colors to allow you to check the alignment of your picture's horizontal and vertical lines. The program is written in BASIC for your microcomputer. See Program 35-1 for the program listing.

THE PROGRAM

After you run the program, enter a 1 to display

horizontal lines, enter a 2 to display vertical lines, enter a 3 to display a crosshatch of horizontal and vertical lines, or enter a 4 to end the program. After your entry of 1, 2, or 3, you will be requested to enter the number (1-7) of the color of the lines to be displayed. These numbers correspond to the color codes in your BASIC manual. Then the program will display the desired pattern. Press RETURN to return to the main menu.

Program 35-1. Color Crosshatch Program Listing.

```
10 PRINTCHR$(147)
15 PRINT"COLOR CROSSHATCH"
20 PRINT
25 PRINT"ENTER CHOICE?"
30 PRINT
35 PRINT"1-HORIZONTAL LINES"
40 PRINT"2-VERTICAL LINES"
45 PRINT"3-HORIZONTAL/VERTICAL LINES"
50 PRINT"4-END PROGRAM"
55 INPUT L
60 IF (L<1) OR (L>4) THEN 10
65 ON L GOTO 70,100,110,120
70 GOSUB 125:S=67
75 FOR A=0 TO 1023
80 POKE 1024+A,S:POKE 55296+A,C
85 NEXT A
90 GOSUB 195
95 GOTO 15
100 GOSUB 125:S=66
105 GOTO 75
110 GOSUB 125:S=91
115 GOTO 75
120 END
125 PRINTCHR$(147)
130 PRINT"ENTER COLOR #":PRINT
135 PRINT"1-WHITE"
140 PRINT"2-RED"
145 PRINT"3-CYAN"
150 PRINT"4-PURPLE"
155 PRINT"5-GREEN"
160 PRINT"6-BLUE"
165 PRINT"7-YELLOW"
170 INPUT C
175 IF (C<1) OR (C>7) THEN 125
180 PRINTCHR$(147)
185 POKE 53280,0:POKE 53281,0
190 RETURN
195 PRINT"PRESS RETURN"
200 GET A$:IF A$="" THEN 200
205 PRINTCHR$(147)
210 POKE 53280,14:POKE 53281,6
215 RETURN
```


CHAPTER 36

Electronic Dice

This program may be used as a subroutine in games. Each time it's run, it graphically generates a throw of a pair of six-sided dice. And, random sounds are generated as the dice are displayed. The program is written in BASIC for your

microcomputer. See Program 36-1 for the program listing.

The dice are drawn using small colored circles on a black background.

Program 36-1. Electronic Dice Program Listing.

```
10 S=RND(-TI):FOR T=54272 TO 54296:POKE T,0
15 NEXT T:POKE 54296,15:POKE 54277,10
20 POKE 53281,0:PRINTCHR$(147)"ELECTRONIC DICE"
25 PRINT
30 PRINT"ENTER A 1 TO THROW"
35 INPUT A
40 PRINTCHR$(147)
45 IF A<>1 THEN 120
50 FOR A=1 TO 5
55 X=INT(RND(1)*6+1)
60 Y=INT(RND(1)*6+1)
65 D=0
70 ON X GOSUB 125,140,160,185,215,250
75 D=5
80 ON Y GOSUB 125,140,160,185,215,250
85 N=INT(RND(1)*200+1)
90 POKE 54273,N:POKE 54272,N+50
95 POKE 54276,33
100 GOSUB 290
105 NEXT A
110 PRINT"TOTAL THROW=";X+Y
115 GOTO 25
120 POKE 54296,0:POKE 53281,6:END
125 REM # 1
130 POKE 1560+D,81:POKE 55832+D,X+1
135 RETURN
140 REM # 2
145 POKE 1519+D,81:POKE 55791+D,X+1
150 POKE 1601+D,81:POKE 55873+D,Y+1
155 RETURN
160 REM # 3
165 POKE 1519+D,81:POKE 55791+D,X+1
170 POKE 1560+D,81:POKE 55832+D,Y+1
175 POKE 1601+D,81:POKE 55873+D,X+1
180 RETURN
185 REM # 4
190 POKE 1519+D,81:POKE 55791+D,X+1
195 POKE 1521+D,81:POKE 55793+D,Y+1
200 POKE 1599+D,81:POKE 55871+D,X+1
205 POKE 1601+D,81:POKE 55873+D,Y+1
210 RETURN
215 REM # 5
220 POKE 1519+D,81:POKE 55791+D,X+1
225 POKE 1521+D,81:POKE 55793+D,Y+1
230 POKE 1560+D,81:POKE 55832+D,X+1
235 POKE 1599+D,81:POKE 55871+D,Y+1
240 POKE 1601+D,81:POKE 55873+D,X+1
245 RETURN
250 REM # 6
255 POKE 1519+D,81:POKE 55791+D,X+1
260 POKE 1520+D,81:POKE 55792+D,Y+1
265 POKE 1521+D,81:POKE 55793+D,X+1
270 POKE 1599+D,81:POKE 55871+D,Y+1
```

Program 36-1—cont. Electronic Dice Program Listing.

```
275 POKE 1600+D,81:POKE 55872+D,X+1
280 POKE 1601+D,81:POKE 55873+D,Y+1
285 RETURN
290 FOR T=1 TO 10:NEXT T
295 POKE 54276,32
300 IF A<>5 THEN PRINTCHR$(147)
305 RETURN
```

Moving Stars Simulation

Here's a program that can be used as a subroutine for games. It consists of a random star display routine and a moving star routine to simulate motion through space. The program is written in BASIC for your microcomputer. See Program 37-1 for the program listing.

THE PROGRAM

After you run the program, enter a 1 to begin. It generates a star background, using periods (.), at

random locations on the screen. Then it prints an asterisk (*) at the center of the screen, and moves it at random angles in one of four quadrants towards the edges of the screen. As the asterisk is displayed, it appears to move toward you, giving the appearance of motion through space. This is repeated sixteen times, which is determined by the FOR-NEXT loop at line 220. The routine may be converted into a subroutine by deleting lines 110 through 150 and changing line 340 to RETURN.

Program 37-1. Moving Stars Simulation Program Listing.

```
100 S=RND(-TI)
110 PRINTCHR$(147):POKE 53281,1
120 PRINT"MOVING STARS SIMULATION"
130 PRINT"COMMODORE 64"
135 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
140 PRINT:PRINT"ENTER A 1 TO BEGIN"
150 INPUT A
160 PRINTCHR$(147)
170 POKE 53280,0:POKE 53281,0
180 FOR G=1 TO 50
190 S=INT(RND(1)*1024+1):S1=S+1023:C=INT(RND(1)*7+1)
200 POKE S1,46:POKE 55295+S,C
210 NEXT G
220 FOR Z=1 TO 16
230 Y1=1523
240 X=INT(RND(1)*4+1)
250 Y=1
260 FOR J=1 TO 9
270 POKE Y1,42
280 FOR H=1 TO 55-J*6
290 NEXT H
300 POKE Y1,32
310 ON X GOSUB 350,370,390,410
320 NEXT J:NEXT Z
330 PRINTCHR$(147):POKE 53280,14:POKE 53281,6
340 END
350 Y1=Y1+39-Y
360 RETURN
370 Y1=Y1-39-Y
380 RETURN
390 Y1=Y1-39+Y
400 RETURN
410 Y1=Y1+39+Y
420 RETURN
```

Joystick Test Program

This program will test any joysticks plugged into your game control ports. The program is written in BASIC for your microcomputer. See Program 38-1 for the program listing.

THE PROGRAM

After you run the program, it requests that you enter the number of the joystick to test (1 or 2), or 3 to end. If you enter 1, the program will begin by testing the trigger button on joystick 1, by asking you to press the button. After you've pressed the button, then `BUTTON PRESSED` will be displayed. You are now ready to test the nine positions of your joystick, or you may quit the test by

pressing the trigger button. Program lines 290 through 400 are used to test the position of the joystick and print the position numbers near the bottom of the screen. If the joystick is not moved, a 0 will be displayed. See Fig. 38-1 for the joystick positions and their values. Also, a sound is generated for each position of the joystick. Moving the joystick up will sound the musical note middle C, and continuing it in a clockwise motion will take you up through the scale. See Table 38-1 for the position numbers and their corresponding musical notes. To end the test and return to the main menu, just press the trigger button.

See Fig. 38-2 for a sample run.

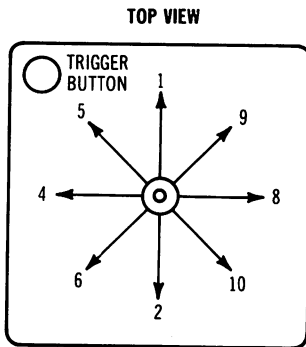


Fig. 38-1. Joystick positions and their values.

Table 38-1. Joystick Position Numbers and Their Corresponding Musical Notes

Position Number	Musical Note
1	C
9	D
8	E
10	F
2	G
6	A
4	B
5	C

JOYSTICK TEST PROGRAM
COMMODORE 64
COPYRIGHT (C) 1984 BY HOWARD BERENBON

PLUG JOYSTICKS INTO YOUR COMMODORE 64
TO TEST JOYSTICKS 1 OR 2 POSITIONS

ENTER THE NUMBER OF THE JOYSTICK TO TEST
1-JOYSTICK 1 2-JOYSTICK 2 3-END
? 1

C H E C K I N G S T I C K 1
P R E S S B U T T O N T O T E S T
B U T T O N P R E S S E D

M O V E J O Y S T I C K
P R E S S B U T T O N T O Q U I T

	1	
5		9
4	0	8
6	2	10

Fig. 38-2. Joystick Test Program sample run.

Program 38-1. Joystick Test Program Listing.

```
100 PRINTCHR$(147):PRINT"JOYSTICK TEST PROGRAM"
110 PRINT"COMMODORE 64"
120 PRINT"COPYRIGHT (C) 1984 BY HOWARD BERENBON"
130 PRINT
140 PRINT"PLUG JOYSTICKS INTO YOUR COMMODORE 64"
150 PRINT"TO TEST JOYSTICKS 1 OR 2 POSITIONS"
160 PRINT:GOSUB750
170 PRINT
180 PRINT"ENTER THE NUMBER OF THE JOYSTICK TO TEST"
190 PRINT"1-JOYSTICK 1 2-JOYSTICK 2 3-END":INPUTS:IFS<1ORS>3THEN
100
200 IFS=3 THEN 460
210 GOSUB430:PRINTCHR$(147):PRINT"C H E C K I N G S T I C K ";S
220 PRINT:PRINT"P R E S S B U T T O N T O T E S T":PRINT
230 J=PEEK(AD):B=JAND16
240 IFB<>16THEN260
250 GOTO230
260 PRINT"B U T T O N P R E S S E D":GOSUB470
270 PRINTCHR$(147):PRINT"M O V E J O Y S T I C K":PRINT
280 PRINT"P R E S S B U T T O N T O Q U I T"
290 REM JOYSTICK INPUT ROUTINE
300 J=PEEK(AD):B=JAND16
310 J=15-(JAND15)
320 IFJ=1THENGOSUB570
330 IFJ=9THENGOSUB590
340 IFJ=8THENGOSUB610
350 IFJ=10THENGOSUB630
360 IFJ=2THENGOSUB650
370 IFJ=6THENGOSUB670
380 IFJ=4THENGOSUB690
390 IFJ=5THENGOSUB710
400 IFJ=0THENGOSUB730
410 IFB<>16THEN100
420 GOTO300
430 IFS=1THENAD=56321
440 IFS=2THENAD=56320
450 RETURN
460 END
470 FORC=1TO800:NEXTC:RETURN
480 POKE54273,H:POKE54272,L:POKE54276,33
490 FORD=1TO250:NEXTD:POKE54276,32
500 FORD=1TO10:NEXTD:GOSUB510:RETURN
510 PRINTCHR$(19):FORK=1TO11:PRINT:NEXTK
520 PRINTTAB(18);" "":PRINT
530 PRINTTAB(14);" ";TAB(22);" "":PRINT
540 PRINTTAB(12);" ";TAB(18);" ";TAB(24);" "":PRINT
550 PRINTTAB(14);" ";TAB(22);" "":PRINT
560 PRINTTAB(18);" "":RETURN
570 H=34:L=75:PRINTCHR$(19):FORK=1TO11:PRINT:NEXTK
580 PRINTTAB(17);J:GOSUB480:RETURN
590 H=38:L=126:PRINTCHR$(19):FORK=1TO13:PRINT:NEXTK
600 PRINTTAB(21);J:GOSUB480:RETURN
610 H=43:L=52:PRINTCHR$(19):FORK=1TO15:PRINT:NEXTK
```


Program 38-1—cont. Joystick Test Program Listing.

```
620 PRINTTAB(23);J:GOSUB480:RETURN
630 H=45:L=198:PRINTCHR$(19):FORK=1TO17:PRINT:NEXTK
640 PRINTTAB(21);J:GOSUB480:RETURN
650 H=51:L=97:PRINTCHR$(19):FORK=1TO19:PRINT:NEXTK
660 PRINTTAB(17);J:GOSUB480:RETURN
670 H=57:L=172:PRINTCHR$(19):FORK=1TO17:PRINT:NEXTK
680 PRINTTAB(13);J:GOSUB480:RETURN
690 H=64:L=188:PRINTCHR$(19):FORK=1TO15:PRINT:NEXTK
700 PRINTTAB(11);J:GOSUB480:RETURN
710 H=68:L=149:PRINTCHR$(19):FORK=1TO13:PRINT:NEXTK
720 PRINTTAB(13);J:GOSUB480:RETURN
730 PRINTCHR$(19):FORK=1TO15:PRINT:NEXTK
740 PRINTTAB(17);J:RETURN
750 FORA=0TO24:POKE54272,A:NEXTA
760 POKE54296,15:POKE54277,15:RETURN
```

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