$6.95

TEXAS INSTRUMENTS

COMPUTER AWARENESS PROGRAM

FOR ADULTS

COMPUTER ADVANTAGE CLUB

Contents

The Computer Awareness Program Manual is a resource for you, both in this course and in your future experiences with computers. Your instructor will refer to this manual throughout the course, and you will find that the manual's coverage of materials on computing, its practice problems in TI BASIC, and its list of groups and magazines with information on computing can help you develop your skills with computers.

COMPUTER AWARENESS PROGRAM

FOR ADULTS

Name _____

Date of Course _____

Your Instructor _____

Texas Instruments invented the integrated circuit, the microprocessor and the microcomputer, which have made TI synonymous with reliability, affordability, and compactness.

A Course Outline

Texas Instruments Computer Advantage Club encourages active involvement with computers in each session of the course.

Session One

Introduction to Your Instructor
An Overview
    The Solid State Cartridge
    The Keyboard and the Monitor
An Introduction to BASIC
    Concepts and Terms
    Programming
Further Practice
    The Home Financial Decisions Cartridge
    Computer Games of Your Choice

New Terms for the Day:

ALPHA LOCK Key
BASIC
CLEAR Key
CTRL (CONTROL) Key
Computer
DONE
Edit
ENTER Key
FCTN (FUNCTION) Key
Input and Output (I/O)
Joysticks (Wired Remote Controllers)
Keyboard
LIST
Loop
Memory
Menu
Program
Programming
RAM
ROM
RUN
SHIFT Key
Solid State Cartridge
Speech Synthesizer
Video Monitor

Session Two

Question and Answer Session
Saving Data
- With Cassettes
- With Disks

More About Programming Languages
- BASIC Programming with Color, Graphics, Sound, and Speech
- Other Programming Languages

New Terms for the Day:

Cassette	Pascal
Cassette Cables	Peripheral Expansion System
Data	PILOT
Disk Drive Controller	SAVE
Disk Memory Drives	TI Extended BASIC
Disk Memory System	TI LOGO
Editor/Assembler	

Session Three

Question and Answer Session
Increasing Your Skills In TI BASIC
An Introduction to TI LOGO

New Terms for the Day:

Assignment Statement	LET
Color Screens	Printer
Grid	Sprites
GOTO	Turtle Graphics
IF. . . THEN	

Session Four

Question and Answer Session
The Home Computer and Your Individual Needs
TEXNET and You
Expanding Your Skills in TI BASIC
Free Time with the Home Computer
Course Evaluation

New Terms for the Day:

RS232 Interface	Terminal Emulator II
Speech Editor	TEXNET
Telephone Coupler (Modem)	The Source

What is a Microcomputer?

For many of us, computers create two powerful images. One is the scene from a science fiction film in which pasteboard walls decorated with lights, switches, and levers are the setting for a trip in space or across time. We don't believe what's happening, and we wonder if the actors do. The other image is a huge room filled with box-like equipment also decorated with lights, switches, and levers. In these rooms, massive computations occur, space flights are monitored, and scientists and mathematicians are able to do research which was previously impossible. With both the science fiction view of the computer and the technological reality, many of us can't believe what we see. The image of the computer is of something far away from reality and certainly far from our everyday lives.

Technology, however, has made the computer part of the possibilities of everyday life with astonishing speed. Five years ago, many of you would not have considered taking this course, much less having a computer in your home. What has happened in a short period of time is that technology has miniaturized the computer. Computations which could formerly be performed only on equipment that required a huge room and over five tons of air conditioning to keep it operable can now be performed with equipment that fits easily on a desk. Having a home computer is now possible, and each year more of us buy computers. Computers offer ways to reduce record-keeping drudgery at home and in business, to expand educational opportunities for ourselves and our children, and–thanks in part to the development of video games–to have fun.

The popularity of the microcomputer has also caused us to be overwhelmed by a new vocabulary. We now hear words such as CPU, RAM, ROM, memory, bytes, input, output, disks, chips, and microcomputer. For many of us, the new terms are as much a stumbling block to our being comfortable with the home computer as is the equipment itself.

One of the easiest ways to think about these new terms is to compare them to something with which all of us are familiar–the human mind. We receive information from the world around us through our senses. Computers, however, are dependent upon people for their information. We "input" into a computer from a keyboard, and–for the computer–the input circuits attached to the keyboard are its eyes and ears.

We process the information we receive and so does the computer. We make decisions based on previous experience. We reason. The computer reasons by using a CPU, or Central Processing Unit.

Like us, the computer also needs "memory," or storage spaces, in order to hold and process information. Humans have long- and short-term memory. For example, we remember how to do addition problems in our long-term memory, but we only remember the numbers we're adding for as long as it takes us to do the problem.

For the computer, these two memories are called ROM (Read Only Memory) and RAM (Random Access Memory). ROM holds information needed permanently, and RAM stores information temporarily–until you clear the memory or turn off the computer. With both RAM and ROM, the information is stored in tiny memory cells. Each cell has an "address" so that the computer can retrieve the particular piece of information you want and not a hodgepodge of information. Information is stored in the computer in bytes, or small units of information. Computers have limits on how much information they can store. For example, a computer with 16K bytes of RAM can store 16,000 bytes of information in its Random Access Memory.

The computer is also similar to the human mind because both can adjust and follow new instructions. For example, if we are given step-by-step instructions, we can operate a new machine, assemble a new toy for our children, or cook a new dish. The computer's equivalent to instructions is a software program. By plugging into hardware (the computer) a set of instructions (a program) stored on software (either a cassette tape, a disk, or a Solid State Cartridge), you can make the computer follow a new set of instructions.

The computer serves us and processes information for us, but that work is useless unless we can receive it. The computer's "output" circuits present its work to us on the video monitor or, in some cases, on a printer. In the same sense, we communicate to others by speaking or writing.

These basic elements of the computer were part of the huge computers of the 1950s. Many inventions have helped to make it possible to minaturize these parts; however, one of the most dramatic innovations was the development of the integrated circuit. Because of the integrated circuit, a chip of silicon can contain thousands of the intricate circuits of the computer. The integrated circuit on the silicon chip has made the microcomputer possible.

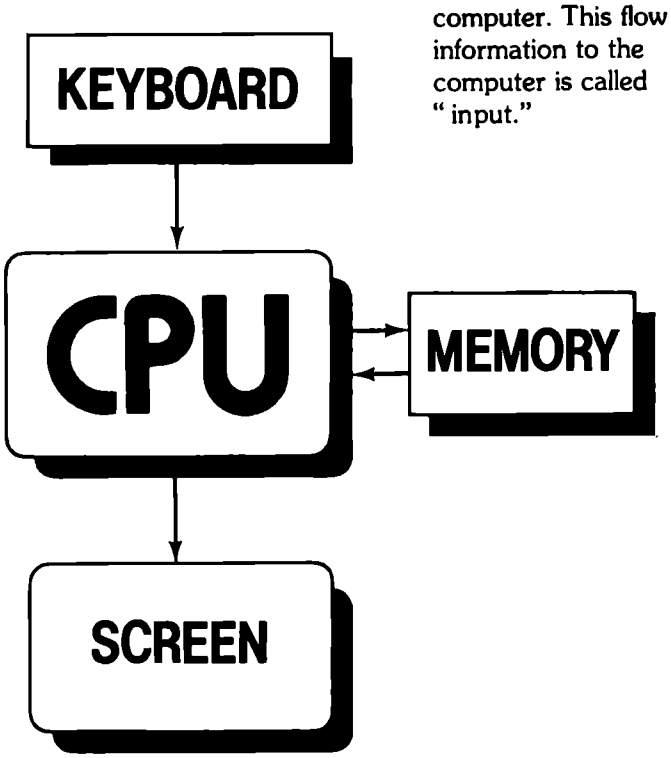
The technology which has made the microcomputer possible has brought us new challenges in getting used to new terms and to new equipment, but it has also brought the power of the computer to our homes. Fortunately, the technology of the microcomputer has been designed to be "user friendly." We can enjoy the technology of the microcomputer without having to become computer specialists, just as we do not have to become mechanics to operate a car or electricians to flip on the living room light.

The computer is no longer simply the pasteboard science fiction movie set. It has become a convenient, exciting, and entertaining part of everyday life.

How a Computer Works

Most computers have the same main parts. As you read, follow the diagram to understand how these parts work together.

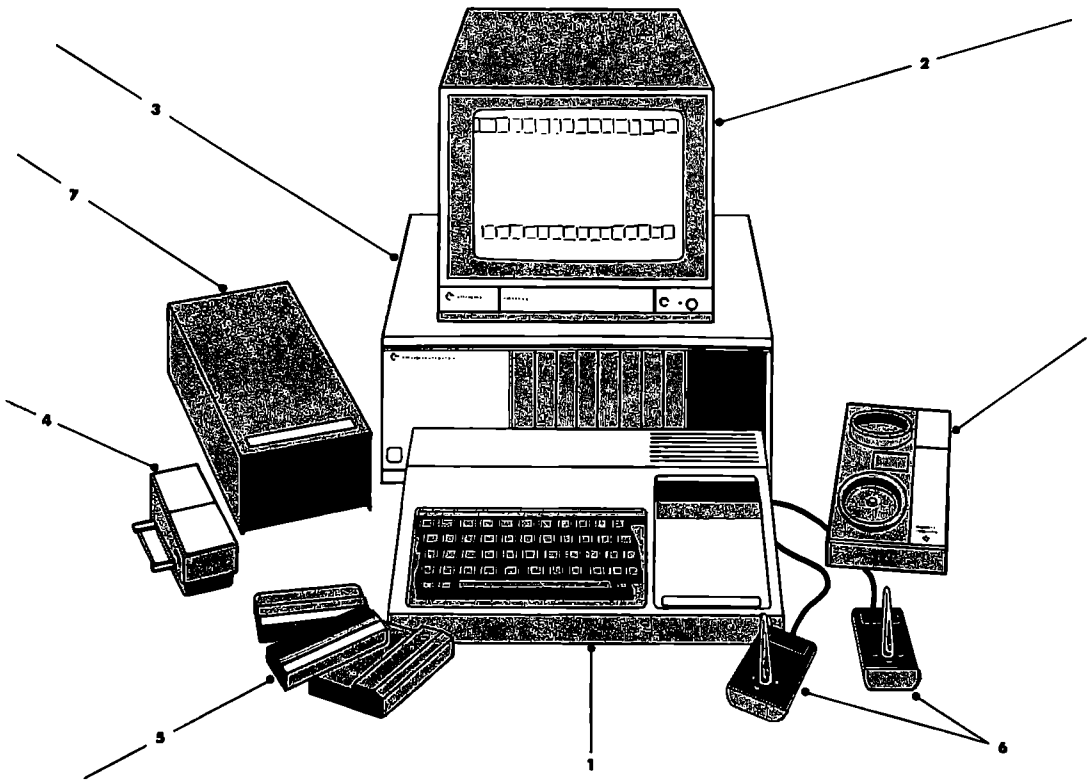
When you type on the keyboard, you send information to the computer. This flow of information to the computer is called "input."



The input goes to the central processing unit (CPU). The CPU calculates, sorts, and compares information. It can also store information in the memory for use later.

The flow of information from the computer is called "output." You see the output on the screen in the form of words and pictures. Some output can also be printed when you attach a printer to the computer.

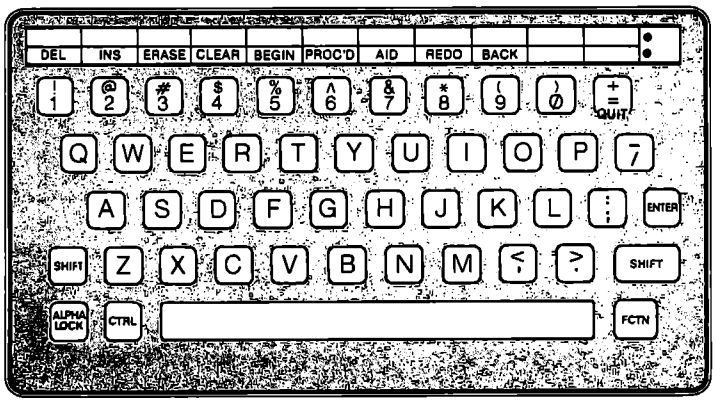
Computer Components



1. TI-99/4A HOME COMPUTER–A typewriter-like console that allows you to enter, store, and manipulate data.
2. VIDEO MONITOR–A ten-inch color screen with a display format for 24 lines of 32 characters and audio capabilities.
3. PERIPHERAL EXPANSION SYSTEM–A compact system designed to centralize the Disk Memory System, the RS232 Interface, the Memory Expansion unit, and other accessories in one place.
4. SPEECH SYNTHESIZER–A device which reproduces human speech electronically and accurately, allowing the computer to communicate verbally.
5. HOME COMPUTER SOFTWARE–A large library of preprogrammed cassettes, diskettes, and Solid State Cartridges designed to help you learn, keep household records, or play stimulating games.
6. WIRED REMOTE CONTROLLERS—Eight-position remote control with top-mounted action button allows you to move objects on the screen.
7. DISK MEMORY SYSTEM–Stores data or programs that you wish to save for later use.
8. TI TELEPHONE COUPLER (MODEM)–Allows your Home Computer to send or receive information through a telephone.

A Tour of the Keyboard

1. ENTER
2. SHIFT
3. ALPHA LOCK
4. SPACE BAR
5. FUNCTION
6. CONTROL



A Tour of the Keyboard

1. ENTER — Press this key to enter information into the computer's memory.

2. SHIFT — Press this key and any alphabetic key to produce uppercase letters. For example, SHIFT A produces "A".

3. ALPHA LOCK — In locked (down) position, ALPHA LOCK produces uppercase (capital) alphabetic characters. In unlocked (up) position, it produces lowercase (small) alphabetic characters. Number keys will print numbers regardless of ALPHA LOCK position. When using joysticks, ALPHA LOCK should always be in the unlocked (up) position.

4. SPACE BAR — Press to type a space. Typing a space over a displayed character erases it.

5. FCTN — Pressing FUNCTION and any of the number keys activates the features printed on the overlay strip above the row of number keys. For example, FCTN 1 activates the delete editing feature, FCTN 2 the insert feature, and so on. Pressing FCTN and a key with a character imprinted on the side facing you produces that character. For example, FCTN P produces quotation marks ("), and FCTN I produces a question mark (?). Exceptions are the arrow keys (S and D), which when pressed simultaneously with FCTN can cause the cursor to move left or right without erasing printed characters.

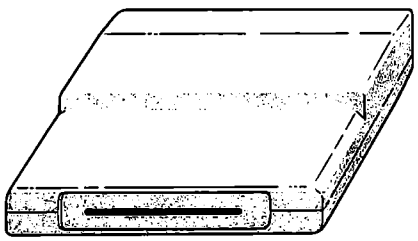
   FCTN = (QUIT), pressed once and released, will stop most programs in progress. It will also erase anything in the computer's memory.

6. CTRL — Used mainly in telecommunicating with other computers, this key works in manner similar to the FCTN key.

NOTE: Any key held down for more than one second will automatically repeat its character until the key is released. For more information regarding the keyboard, consult the **TI-99/4A User's Reference Guide** and software manuals.

Three Types of Program and Data Storage

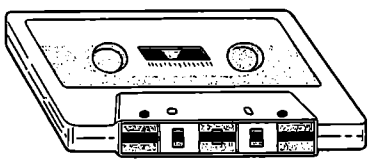
SOLID STATE CARTRIDGES



Equipment needed:
- computer console
- TI Color Monitor or TV with adapter (Video Modulator)
- cartridge (contains a printed-circuit board with chips)

The cartridge medium is an excellent way to take advantage of the wide assortment of preprogrammed software currently available. Most of these cartridges available require no extra peripherals because they plug right into the console. Cartridges, most of which are not erasable, are fast and very easy to use. You can even store your own data (temporarily or permanently) on the specialized Mini Memory cartridge.

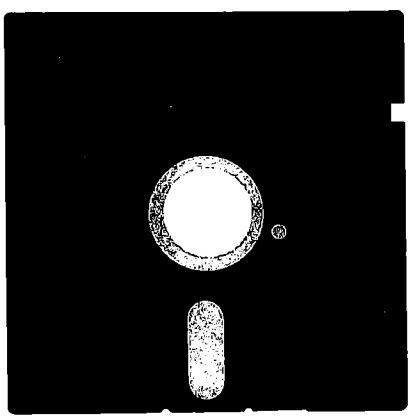
CASSETTES



Equipment needed:
- computer console
- TI Color Monitor or TV with adapter (Video Modulator)
- compatible cassette recorder
- cassette tape (a high quality tape)
- Cassette Cable

Using cassettes is an inexpensive way to store your own programs and data files and to enjoy preprogrammed software. The small amount of equipment which is needed is relatively inexpensive and, of course, has uses other than with the computer. One or two cassette recorders can be controlled from the console. Although using cassettes sometimes involves waiting and repetition of the procedure in order to successfully load data into the computer, it is an especially good method if you want to store your own data but want to avoid the higher cost of a disk system.

DISKETTES



Equipment needed:
- computer console
- TI Color Monitor or TV with adapter (Video Modulator)
- TI Disk Controller peripheral (or Disk Controller card with the Peripheral Expansion System)
- One or more TI Disk Memory Drives
- diskettes (5¼ inch floppy disk)

The TI Disk Memory System is the most sophisticated method to store your own data. Preprogrammed software is also available in this medium (usually the same programs are available on both diskette and cassette). Though the equipment involved requires more of an investment, the speed and efficiency of using diskettes is well worth it. This disk system uses 5¼ inch single-sided, single-density, soft-sectored diskettes. When a blank diskette is prepared for use, it is divided into forty tracks, each of which is divided into nine sectors, so that the computer can access information quickly. About 90,000 keystrokes of information can be stored on a single disk.

Tips on Using Software

SOLID STATE CARTRIDGES

To Insert Solid State Cartridges

Turn on your console and monitor or TV. The TI master title screen should automatically display on your screen.

Insert a solid state cartridge firmly into the slot to the right of the keyboard. The screen will go blank for a second and the the TI master title screen should reappear.

Press any key to move to the next screen.

Select the name of the cartridge you inserted (usually by pressing the number 2--the number 1 will always take you into TI BASIC).

To Remove Solid State Cartridges

Return to the master TI title screen by pressing FCTN and the "=" key, or by exiting according to instructions included in the cartridge's program.

Remove the cartridge from its slot.

In Case Of Difficulty

If a cartridge does not seem to operate properly, try reinserting the cartridge. Or, if the screen locks or produces unusual displays, try turning the console off and waiting a few seconds before turning it back on.

CASSETTE SOFTWARE

Load and Save with Cassette

Use only high-quality cassette tapes of sixty minutes or less.

Connect a compatible cassette recorder to your computer by means of the Dual Cassette Cables. The red-wired plug at the end of the cable connects into the cassette microphone jack. The white-wired plug connects into the earphone or auxiliary cassette jack. It is not necessary to insert the black-wired remote plug into the cassette deck (it can cause some cassette recorders not to function). The single plug at the other end of the cable is inserted into the back of the console.

Check to make sure that ALPHA LOCK is in locked (down) position.

Loading a Program

Make sure the cassette player is either plugged in or contains good batteries.
Insert a cassette with a program on it into the cassette player.
Turn on the console and monitor or TV.
Select TI BASIC from the menu on the screen following the master TI title screen.
When TI BASIC READY appears, type: OLD CS1
Press ENTER.
Follow the directions which appear on the screen to "walk" you through the loading procedure.
When the DATA OK statement appears on the screen, wait for the flashing cursor to reappear.
Type: RUN
Press ENTER. (It may take several seconds for the program to display its first screen on your video.)

Saving a Program

Have a program in your computer's memory.
Insert a blank cassette tape into your cassette recorder.
Turn on your console and monitor or TV.
Select TI BASIC.
Type: SAVE CS1
Press ENTER.
Follow the instructions which appear on the screen to "walk" you through the save procedure.
When the save procedure is completed, you are asked if you want the recording checked--it is a good idea to respond "yes."

If You Have Difficulties

You may receive an error message which reads "NO DATA FOUND." If this happens, you should check for the following problems and correct them:

-an unplugged cassette recorder or weak batteries
-improperly placed or loose connections
-cassette volume level (it should be around 8)
-cassette tone level (it should be around 6)
-an excessively long leader on your cassette tape (after you press the PLAY button on your recorder, wait a few seconds and then press ENTER)

If you have ruled out these common problems and continue to receive error messages, it is possible you may have a damaged cassette, an incompatible cassette recorder, or improperly functioning equipment.

DISKETTE SOFTWARE

To Load and Save from Diskette

Follow the set-up procedures outlined in the Disk Memory System manual.
Use standard 5¼-inch, soft-sectored, 40-track floppy diskettes.
Make sure ALPHA LOCK is in the locked (down) position.

Loading a Program

Insert the diskette with programs saved on it into the disk drive.
Close the disk drive door.
Turn on the disk drive and controller (or the Peripheral Expansion System), the monitor or TV, and finally the computer.
Select TI BASIC.
When TI BASIC READY appears on your screen, type: OLD DSK1.----------
(where------ represents program name.)
Press ENTER.
When the flashing cursor reappears on the screen (this may take several seconds to occur), type: RUN
Press ENTER.

Saving a Program

Initialize a blank diskette using the Disk Manager cartridge. Refer to the Disk Manager manual for instructions on initialization.
Have a program in your computer's memory.
Insert the initialized diskette into the disk drive unit.
Close the disk drive unit door. (Never open a disk drive door when the red light is on.)
Type: SAVE DSK1.----------
(Where----------represents the name of your program.)
Press ENTER.
Remove the diskette when the save procedure is completed. For future reference, make a label to put on the diskette with the name of the program you just saved.

SOME FINAL TIPS

As a strict rule, keep all software away from heat (especially diskettes and cassettes), magnetic fields (metal detectors, TV's, monitors, magnets), and static electricity.
Handle disks with care–be careful not to soil the magnetic surface or to bend or warp the disks.
Reading (and keeping on hand) the instruction booklets that come with software and hardware can save you a lot of time and aggravation.

Programming Languages

Just like any other language, a computer programming lanquage is utilized as a means of exchanging information. The languages that are intelligible to a computer are written in a coded, specialized form that enables you to dictate instructions to your computer system. Without any programming language input, your computer would have no information to transmit back to you–its screen would be blank and useless.

Many languages are used in computer programming. The following is a brief overview of some of those languages.

BASIC

BASIC stands for Beginners All-purpose Symbolic Instruction Code. BASIC is very much like our own English language. For instance, terms such as PRINT, GOTO, RUN, and END have almost identical meanings in BASIC and English. This is why BASIC is the most popular programming language in use today.

BASIC, like English, may be "spoken" in various dialects. The BASIC dialect in the TI-99/4A console is called TI BASIC. TI BASIC gives your computer a full range of programming capability for most home and personal applications. Many personal computer owners find that BASIC or any one of its dialects are more than satisfactory for their programming purposes.

Requirements for use with the TI-99/4A: None.

TI EXTENDED BASIC

When a programming language with more complex capability is desired, TI Extended BASIC may be considered as the first in a series of increasingly specialized languages for the computer.

TI Extended BASIC is a language often used to program business and professional software. This language contains many commands that are not available in TI BASIC. For example, TI Extended BASIC provides commands that enable you to produce moving, animated graphics on the screen, which isn't possible with TI BASIC.

As a whole, TI Extended BASIC executes commands faster than TI BASIC and allows you to control how information is entered and formatted on the screen. This language also gives you access to the Memory Expansion unit, thereby increasing the amount of information you can process. When used in conjunction with other peripherals, programs of almost unlimited length may be written with TI Extended Basis.

Requirements for use with the TI-99/4A: TI Extended BASIC Solid State Cartridge. Note: For enhancement, add the TI Disk Memory System (TI Disk Drive Controller and one to three Disk Memory Drives) or cassette recorder with the Peripheral Expansion System.

EDITOR/ASSEMBLER (TMS 9900)

Assembly language is very similar to machine language. When a computer program is written in this language, instructions to the computer are automatically converted from the symbolic language code to machine code. Commands issued in Assembly are not translated by the computer, and your programs run much faster than when entered in other programming languages. Because you directly address your computer in Assembly, you have complete control over the entire computer system.

Assembly is not a high-level programming language (meaning it doesn't communicate with the computer using everyday words), and it requires familiarity with the language in order to use it. Therefore, Assembly is not intended for the beginning programmer.

Requirements for use with the TI-99/4A: TI Editor/Assembler Solid State Cartridge and Diskette; TI Disk Memory System; and TI Memory Expansion unit with the Peripheral Expansion System. Note: For enhancement, add the RS232 Interface, an impact printer, additional disk drives, or other TI peripherals.

Pascal

The Pascal programming language gives you access to a large library of technical and professional programs. Pascal programs are relatively easy to read and understand, and unlike BASIC, the Pascal language has been specifically designed to run on various types of computer systems.

To illustrate how Pascal works with the TI-99/4A system, instructions entered in Pascal are translated into "p" or "pseudo" code. Through use of the TI P-code Card peripheral, p-code is then directly translated into the native machine instruction language compatible with your computer.

Requirements for use with the TI-99/4A: P-code Card peripheral; Pascal Compiler diskette; Editor/Filer diskette software; TI Disk Memory System (with at least two disk drives); Memory Expansion Card with the Peripheral Expansion System. Note: For enhancement, add the RS232 Interface, an impact printer, additional Disk Memory Drives, and other TI peripherals.

TI LOGO

TI LOGO is extraordinarily easy to use and makes learning to program fun. The language is especially designed to create an open-ended learning environment for children who are just becoming acquainted with the computer.

Programming in TI LOGO works by allowing you to "share" knowledge with the computer by giving it simple commands that return exciting graphics to the screen. With TI LOGO's easy-to-understand commands, you can progress from sketching, animated graphics, and writing to mathematics and complex problem-solving. TI LOGO lets you experience the world of computer programming through self-paced exploration and discovery.

Requirements for use with the TI-99/4A: TI LOGO Solid State Cartridge; TI Memory Expansion Unit with the Peripheral Expansion System. Note: For enhancement, add the Disk Memory System or cassette recorder.

TI PILOT

PILOT is short for Programmed Inquiry, Learning, Or Teaching. Used to develop educational programs, PILOT programming language is employed specifically for Computer Assisted Instruction (CAI). PILOT can be readily learned by instructors for use in the classroom.

With the growing use of computer-based instructional materials, educators are using computer programs as effective classroom tools, and TI PILOT simplifies that task. Instructors may create programs with TI PILOT which allow them to demonstrate concepts and simulate laboratory-like environments. To further aid students, TI PILOT programming make features such as individualized drill, practice, and testing available.

Requirements for use with the TI-99/4A: TI PILOT Diskette, Memory Expansion Card; P-Code Card; and TI Disk Memory System with the Peripheral Expansion System. Note: For enhancement, add the UCSD p-System* Editor/Filter/Utilities diskette, TI Solid State Speech Synthesizer, an RS232 Interface, and an impact printer.

*UCSD p-System is a trademark of the Regents of the University of California.

TI BASIC Commands

Command	Explanation
LIST	Tells the computer to display the program in its memory.
NEW	Erases the current program in the computer's memory and prepares for entering a new program.
RUN	Tells the computer to "run" or execute the program in its memory.
SAVE	Tells the computer to store the program in is memory onto a cassette tape (SAVE CS1) or diskette (SAVE DSK1.MYFILE).
OLD	Tells the computer to load a program from cassette tape (OLD CS1) or diskette (OLD DSK1.MYFILE) into its memory.
BYE	Leaves TI BASIC.
CALL CLEAR	Clears the screen but doesn't alter program in computer memory.
RANDOMIZE	Resets random number generator to an unpredictable sequence.
EDIT	Displays a line for editing.

Statement	Example	Explanation
INPUT	INPUT A	Stops the program and waits for you to type a number and press ENTER. The value you enter is assigned to the variable A.
LET	LET A=5	Assigns the value 5 to the variable name A. (In TI BASIC, the word LET is optional, so this statement could be written A=5 also.)
PRINT	PRINT "HELLO"	Instructs the computer to print the word HELLO on the screen.
IF... THEN	IF A=5 THEN 40	Tests the value of A. If A is equal to 5, the program transfers to line number 40. If A is not equal to 5, the instruction is ignored and the program goes on to the next program line.
CALL CHAR	CALL CHAR (36,FFF)	Tells the computer to redefine the dollar sign character (ASCII code 36) to a pattern which you want to substitute.
CALL COLOR	CALL COLOR (1,16,13)	Tells the computer to use white (color code 16) as the foreground color and dark green (color code 13) as the background color for all the characters in character set 1.
CALL SOUND	CALL SOUND (1000,440,1)	Tells the computer to play a tone to last one second (1000 milliseconds) at a frequency of 440 cycles per second (middle C on the piano) at a loud volume.
DATA	DATA 34,23,0	Stores the given numbers as data in a program, to be "read in" by a READ statement.
END	90 END	Stops the program.
INT	INT (34.6)	Tells the computer to find the greatest integer (whole number) which is less than or equal to the number in parentheses.

OPEN	OPEN #1:"DSK1.MYFILE	Opens a "file" (a memory segment) on an accessory device so that the computer can output data to the device, in this case, Disk Drive 1.
GOTO	GOTO 20	Directs the program to transfer to line number 20.
FOR... NEXT	FOR A=1 TO 10 ... NEXT A	Creates a program "loop" that repeats ten times, increasing the value of A by 1 each time until the value of A exceeds 10.
CALL SCREEN	CALL SCREEN (9)	Tells the computer to change the screen color to medium red (color code 9).
CALL HCHAR	CALL HCHAR (1,4,42,10)	Tells the computer to place a horizontal line of ten asterisks (character code 42) on the screen (starting at row 1, column 4).
CALL VCHAR	CALL VCHAR (2,5,42,10)	Tells the computer to place a vertical line of ten asterisks (character code 42) on the screen (starting at row 2, column 5).
READ	READ X,Y,Z	Tells the computer to find a DATA statement in the program and assign the first three values there to variables X,Y, and Z respectively.
REM	10 REM PAYROLL PROGRAM	Tells the computer to ignore this line of the program; used for remarks or comments to describe what the program is doing.
RND	PRINT RND	Tells the computer to print a pseudo-random number greater than or equal to zero and less than one.
TAB	TAB (15)	Tells the computer to start at position 15 when printing.

COLOR CODES

Value	Color	Value	Color
1	Transparent	9	Medium Red
2	Black	10	Light Red
3	Medium Green	11	Dark Yellow
4	Light Green	12	Light Yellow
5	Dark Blue	13	Dark Green
6	Light Blue	14	Magenta
7	Dark Red	15	Gray
8	Cyan	16	White

Helpful Sources On BASIC

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Dwyer, Thomas A., and Critchfield, Margot. *BASIC and the Personal Computer.* Reading, Mass.: Addison-Wesley Publishing Company, 1978.

Inman, Don; Zamora, Ramon; Albrecht, Bob; Quiram, Jacquelyn; and O'Dell, Bob. *Beginner's BASIC.* Dallas: Texas Instruments, 1981.

Peckham, Herbert D. *Programming BASIC with the TI Home Computer.* New York: McGraw-Hill Book Company, 1979.

Shelley, John. *Addison-Wesley Pocket Guide to Programming.* Reading, Mass.: Addison-Wesley Publishing Company, 1982.

Texas Instruments. *User's Reference Guide* (for the TI-99/4A Home Computer). Dallas: Texas Instruments, 1981.

TI LOGO Commands

TI LOGO COMMANDS

Command	Example	Explanation
BACK	BK 20	Moves turtle backward without erasing its line; moves sprite backward.
BYE	BYE	Leaves TI LOGO at the end of a session.
COLORBACKGROUND	CB :Orange CB 9	Defines the color of the screen.
END	END	Defines the end of a procedure.
FORWARD	FD 30	Moves turtle in a forward direction, leaving a line in its path; moves sprite in a forward path.
HOME	HOME	Tells a turtle or a sprite to appear in the center of the screen.
LEFT	LT 45	Turns turtle or sprite to the left the angle of degrees specified.
REPEAT	Repeat 4 (FD 30 RT 90)	Cause a sequence of operations to repeat the specified number of times.
RIGHT	RT 90	Turns turtle or sprite to the right the angle of degrees specified.
SETCOLOR	SC :PURPLE SC 13	Assigns color to the line that the turtle draws or to the object that the sprite carries.
SETHEADING	SH 90	Tells a turtle or a sprite in which direction to move.
TELL	TELL TURTLE TELL SPRITE 1 TELL 1 TELL [2 4 6]	Used to indicate who (sprite, turtle, tile) is to be the current listener.
TO (Return by pressing BACK)	TO BOX	Enters the mode that lets you teach the computer a procedure.
WHO	WHO	Tells you whom you are currently addressing (sprite, turtle, etc).

COLORS	NUMBER	COLORS	NUMBER
CLEAR	0	RUST	8
BLACK	1	ORANGE	9
GREEN	2	YELLOW	10
LIME	3	LEMON	11
BLUE	4	OLIVE	12
SKY	5	PURPLE	13
RED	6	GRAY	14
CYAN	7	WHITE	15

TURTLE MODE

Command	Example	Explanation
CLEARSCREEN	CS	Clears screen of writing and lines.
HIDETURTLE	HT	Tells turtle not to appear in the drawing.
NOTURTLE	NOTURTLE	Causes LOGO to leave the turtle mode.
PENDOWN	PD	Reverses PENUP command and returns turtle to the normal state of the pen.
PENERASE	PE	Tells turtle to erase any line it passes over.
PENUP	PU	Prepares turtle to move without drawing a line.
SHOWTURTLE	ST	Reverses HIDETURTLE command and returns the turtle to the screen.

SPRITE MODE

CARRY	CARRY :PLANE CARRY 1	Defines or changes the shape of a sprite; tells a sprite to take a shape created in MAKESHAPE mode.
CLEARSCREEN	CS	Clears screen of writing.
FREEZE	FREEZE	Stops motion of sprites.
MAKESHAPE (Return by pressing BACK)	MS 6	Brings a grid to the screen so that a sprite shape may be created.
SETSPEED	SS 87	Tell a sprite how fast to move. (Negative speed makes the sprite move in the direction opposite to the SETHEADING.)
THAW	THAW	Resumes sprite motion.
WAIT	WAIT 60	Produces a pause.

RESIDENT SPRITES

Number	Shape
1	PLANE
2	TRUCK
3	ROCKET
4	BALL
5	BOX

Helpful Sources On LOGO

"And a Little Child Shall Lead Them." *Instructional Innovator,* February 1982, p.19.

Eyster, Richard H. "Seymour Papert and the LOGO Universe." *Creative Computing,* December 1981, pp.70, 72.

Papert, Seymour. "Computers Are Objects to Think With." *Instructor,* March 1982, pp. 86-87,89.

-------. *Mindstorms: Children, Computers, and Powerful Ideas.* Basic Books, Inc., 1980.

Staples, Betsy. "Turtles and Sprites for the 99/4A." *Creative Computing,* December 1981, pp. 66, 68, 70.

LOGO Programs (Procedures)

To create these LOGO designs:

1) Type in the procedure. (The END statement appears automatically in LOGO.)
2) Press BACK (FCTN 9).
3) Type in the name of your procedure (example, STAR) and press ENTER.

FOR THE TURTLE

```
TO STAR
CLEARSCREEN
TELL TURTLE
FORWARD 50
RIGHT 144
FORWARD 50
RIGHT 144
FORWARD 50
RIGHT 144
FORWARD 50
RIGHT 144
FORWARD 50
END
```

```
TO BUTTERFLY
CLEARSCREEN
TELL TURTLE
RIGHT 50
FORWARD 50
RIGHT 120
FORWARD 50
RIGHT 120
FORWARD 100
LEFT 120
FORWARD 50
LEFT 120
FORWARD 50
END
```

```
TO PENTAGON
CLEARSCREEN
TELL TURTLE
FORWARD 50
RIGHT 72
FORWARD 50
RIGHT 72
FORWARD 50
RIGHT 72
FORWARD 50
RIGHT 72
FORWARD 50
END
```

```
TO BOX
TELL TURTLE
REPEAT 4 [FD 30 RT 90]
RT 20
BOX
END
```

(This procedure repeats itself. To stop it, press BACK)

FOR SPRITES

```
TO SQUARE
TELL SPRITE 1
HOME
CARRY :BALL
SETCOLOR :RED
SETSPEED 10
REPEAT 8 [WAIT 30 RIGHT 90]
SETSPEED 0
END
```

```
TO VANISH
TELL :ALL
CARRY 0
SETCOLOR 0
SETSPEED 0
SETHEADING 0
END
```

Getting Started in TI BASIC Programming

The program samples on the following pages can help you explore the TI BASIC programming language. Beside each program line you'll find a simple explanation of what the line does. Look at the lines, and then read the explanations before entering each program. If you have questions, be sure to ask your instructor for assistance.

Line Numbers

When you type each program line, be sure to include the number shown at the beginning of the line. This number tells the computer the order in which the lines will be performed.

Pressing ENTER

Also, don't forget to press ENTER after typing each line! This is the computer's cue to store the line in its memory.

Running Your Program

When you have finished entering a program and have checked for and corrected any typographical errors, type the word RUN and press ENTER. The RUN command instructs the computer to perform or "execute" your program.

Most important of all, have fun! Programming is an exciting new skill for you, and you may be surprised at how quickly you get "up and running" in TI BASIC.

Simple Averaging Program

This program allows you to enter five numbers, which are then added together. The sum is divided by 5, and the "average" is displayed on the screen.

```
NEW                          Clears the computer's memory for a new program.
10 INPUT A                   Stops the program and waits for you
20 INPUT B                   to enter a number from the keyboard.
30 INPUT C                   When you have typed a number, press ENTER
40 INPUT D                   to go on to the next line.
50 INPUT E
60 N=(A+B+C+D+E) /5          Adds the five numbers and divides by 5
70 PRINT N                   Prints your average on the screen.
```

If you make an error while typing a line, use the left-arrow key (FCTN S) to backspace to the error and correct the error by typing over it.

OR

You can also press ERASE (FCTN 3) to erase the line and start over, including the line number.

If you spot an error after you have already pressed ENTER, retype the line correctly, including the line number, and press ENTER again. The computer will replace the old line with the new correct line in its memory.

Quick Demonstrations with Color, Graphics, Sound, and Speech

Color Program 1

This program gives you a "light show" featuring the screen color of your choice. Try typing any number from 3 through 16 when the computer asks for a number. Then press ENTER and see what color you've chosen!

```
NEW                                      Clears the computer's memory for a new
                                         program.
10 CALL CLEAR                            Clears the screen.
20 PRINT "TYPE A NUMBER FROM 3 TO 16"    Prints a message on the screen.
30 INPUT "THEN PRESS ENTER. ":A          Waits for you to enter a number from
                                         3 to 16.
40 CALL SCREEN (A)                       Turns the screen that color.
50 FOR DELAY=1 TO 200                    Sets up a "time-delay loop"that
60 NEXT DELAY                            repeats 200 times
                                         so you can see the color.
70 GOTO 10                               Goes back to line 10 and starts over.
```

Color Program 2

This program lets you view all the possible screen colors (see Color Code chart, p 15). The computer displays each color, from one through sixteen, for a controlled period of time. When all sixteen colors have been displayed, the program stops.

```
NEW                                      Clears the computer's memory for a new
                                         program.
10 CALL CLEAR                            Clears the screen.
20 FOR K=1 TO 16                         Begins the loop to change screen color.
30 CALL SCREEN (K)                       Changes the screen color to a different
                                         color each time through the loop.
40 FOR DELAY=1 TO 500                    Delays the program so that the screen color
                                         is displayed for a controlled period of time.
50 NEXT DELAY
60 NEXT K                                Closes the change-screen-color loop.
```

Color Graphics Program

This program changes the screen color to dark red and places a cross of asterisks on the screen. Press FCTN 4 to clear the program.

```
NEW                                      Clears the computer's memory for a new program.
10 CALL CLEAR                            Clears the screen.
20 CALL SCREEN (7)                       Changes the screen color to dark red (color code 7).
30 CALL HCHAR (11,1,42,32)               Placed a horizontal line of 32 asterisks
                                         (character code 42) on the screen (starting at
                                         row 11, column 1).
40 CALL VCHAR (1,16,42,24)               Places a vertical line of 24 asterisks (character
                                         code 42) on the screen (starting at row 1, column 16).
50 GOTO 50                               This line returns to "itself", allowing the image
                                         on the screen to remain.
```

Sound Program

This program causes the computer to generate a series of tones. With the CALL SOUND command you can control the duration, frequency (in cycles per second), and volume of the tone.

NEW	Clears the computer's memory for a new program.
10 LET TONE=110	Assigns the value of 110 to the variable TONE; sets the frequency of the first tone at 110 cycles per second.
20 FOR COUNT=1 TO 10	Begins a loop to be repeated ten times.
30 CALL SOUND (100, TONE, 1)	Tells computer to play a tone for 100 thousandths (one tenth) of a second, at the pitch specified by the variable TONE, and at a loud volume.
40 TONE=TONE+100	Each time the computer reaches this line in the loop, the value of TONE becomes a higher pitch (100 cps higher).
50 NEXT COUNT	Repeats the loop.

Text-to-speech Program

(for use with the Terminal Emulator II cartridge)

The word is out--computers can talk! Here's a program that lets you enter any word or phrase you want and listen to the way the computer speaks it.

Don't forget to press ENTER after you type your word or phrase.

NEW	Clears the computer's memory for a new program.
10 OPEN #1: "SPEECH",OUTPUT	Tells the computer you want to use the Speech Synthesizer.
20 INPUT A$	Waits for you to type a word or phrase and press ENTER.
30 PRINT #1:A$	"Passes" your word or phrase to the Speech Synthesizer and "speaks" it.
40 GOTO 20	Returns to line 20 so that you can enter another word or phrase.

If you make an error while typing a line, use the left-arrow key (FCTN S) to backspace to the error and correct the error by typing over it.

OR

You can also press ERASE (FCTN 3) to erase the line and start over, including the line number.

If you spot an error after you have already pressed ENTER, retype the line correctly, including the line number, and press ENTER again. The computer will replace the old line with the new correct line in its memory.

Advanced TI BASIC Programming Examples

The examples on the following page give you a glimpse of some of the more advanced capabilities of the TI BASIC programming language. The emphasis in this section is on "what computers can do for you."

If you don't understand every line in these programs, don't worry. Even though you haven't experimented with them before, you'll probably be able to figure out what's going on just by watching the program's operation.

To help you explore, each line is explained briefly, just as in the earlier examples.

Multiplication Program

Everyone knows that computers can do math very quickly. This program gives you a small sample of the computer's math power–a "times table" based on the number you enter.

10 CALL CLEAR	Clears the screen.
20 INPUT A	Waits for you to type a number and press ENTER.
30 FOR B=1 TO 12	Sets up a "loop" that repeats 12 times.
40 PRINT A; "TIMES"; B; "IS"; A*B	Calculates and prints the multiplication table for the number you entered (for example, 2 TIMES 1 IS 2, 2 TIMES 2 IS 4, etc.).
50 NEXT B	Goes back to line 30 for the next value of B.

If you make an error while typing a line, use the left-arrow key (FCTN S) to backspace to the error and correct the error by typing over it.

OR

You can also press ERASE (FCTN 3) to erase the line and start over, including the line number.

If you spot an error after you have already pressed ENTER, retype the line correctly, including the line number, and press ENTER again. The computer will replace the old line with the new correct line in its memory.

Expanded Averaging Program

This program demonstrates a more versatile averaging program than the one on page 20. Here, you can enter as many numbers as you like, rather than just five. Just think how easy report card time would be if you were a teacher with a program like this!

10 INPUT A	Stops the program and waits for you to enter a number.
20 X=X+1	Keeps a count of your entries.
30 TOTAL=TOTAL+A	Adds your entry to the previous total.
40 INPUT "MORE?(Y/N)":C$	Asks if you have more entries to make. Press Y for yes or N for no; then press ENTER to go on.
50 IF C$="Y" THEN 10	Tests to see if your answer is Y for yes. If so, goes back to line 10 and starts over.
60 PRINT "AVERAGE=";TOTAL/X	Prints the average of the numbers you entered.

If you make an error while typing a line, use the left-arrow key (FCTN S) to backspace to the error and correct the error by typing over it.

OR

You can also press ERASE (FCTN 3) to erase the line and start over, including the line number.

If you spot an error after you have already pressed ENTER, retype the line correctly, including the line number, and press ENTER again. The computer will replace the old line with the new correct line in its memory.

Checkbook Balancing Program

CHECKBOOK BALANCING PROGRAM

Ever wish you had a little help when you were balancing your checkbook? This program shows you a simple way to "let the computer do it."

The program first prompts you to enter your current balance and then continues to ask for each check amount until you have entered all your outstanding checks. The new balance is then displayed, along with a report of how many checks you entered.

Don't forget to press ENTER each time you enter an amount.

10 INPUT "CURRENT BALANCE?":A	Waits for you to enter your current balance.
20 INPUT "CHECK AMOUNT?":B	Waits for you to enter the next check.
30 X=X+1	Keeps a count of your entries.
40 A=A-B	Calculates the new balance.
50 PRINT "NEW BALANCE IS";A	Prints the new balance on the screen.
60 INPUT "MORE?(Y/N)":C$	Asks if you have more checks. Press Y or N and then press ENTER.
70 IF C$="Y" THEN 10	Tests to see if your answer is Y for yes. If so, goes back to line 10 and starts over.
80 PRINT "YOU HAVE ENTERED"; X; "CHECKS."	Tells you how many checks you have entered.

If you make an error while typing a line, use the left-arrow key (FCTN S) to backspace to the error and correct the error by typing over it.

OR

You can also press ERASE (FCTN 3) to erase the line and start over, including the line number.

If you spot an error after you have already pressed ENTER, retype the line correctly, including the line number, and press ENTER again. The computer will replace the old line with the new correct line in its memory.

Chromatic Scale Program

This program makes the computer play a chromatic scale (by half steps) up an octave and back down again to the starting pitch.

100 INPUT A	Waits for you to enter the starting pitch (262 for middle C).
110 FOR B=1 to 12	Begins loop to play 12 tone scale up an octave.
120 CALL SOUND(500,A,0)	Tells the computer to play a tone for 500 milliseconds, at the frequency of the current value of A, and at a loud volume.
130 A=A*2 ^ (1/12)	Tells the computer to step up the frequency by one half step.
140 NEXT B	Ends loop.
150 FOR C =1 TO 12	Begins loop to play 12 tone scale down an octave.
160 CALL SOUND(500,A,0)	(See line 120)
170 A=A*2 ^ –(1/12)	Tells the computer to step down the frequency by one half step.
180 NEXT C	Ends loop.

If you make an error while typing a line, use the left-arrow key (FCTN S) to backspace to the error and correct the error by typing over it.

OR

You can also press ERASE (FCTN 3) to erase the line and start over, including the line number.

If you spot an error after you have already pressed ENTER, retype the line correctly, including the line number, and press ENTER again. The computer will replace the old line with the new correct line in its memory.

Programming Exercises

EDITING

Run the following program. You'll see a row of asterisks moving on the screen. Now let's add some color to your program. Add a line with a CALL COLOR(2,A,A) statement to your program. Use line 30 for this statement.

Color Bar Program

```
NEW
10 FOR A=2 TO 16
20 CALL CLEAR
40 CALL HCHAR(A+5,3,42,28)
50 FOR B=1 TO 300
60 NEXT B
70 NEXT A
```

Deleting lines from a program is very simple–you just type the line number and then press ENTER. The line is automatically removed from the computer's memory.

Type and run the following program just as it's written. Then delete line 10 by typing 10 and pressing ENTER, and run the program again to see the effect of the change.

Football Fan Program

```
NEW
10 CALL CLEAR
20 LET A$="GO"
30 PRINT TAB(13);A$::TAB(12);"TEAM"::TAB(13);A$;"!"
40 FOR Z=1 to 10
50 PRINT
60 NEXT Z
70 FOR Z=1 TO 600
80 NEXT Z
90 GOTO 10
```

In the following program, make these alterations:

Change the number 75 in line 10 to 100
Add a CALL CLEAR statement to the program
Add a line that will print "THE ANSWER IS."

Math Program

```
NEW
10 LET M=75
20 LET R=4/2*M
30 PRINT R
```

"Debugging"

The programs below are filled with typographical errors or "bugs." "Debug" the programs, correcting all errors. Then, run the corrected programs.

Two-dice Roll

```
NEW
5 CALL CLEAR
10 RANDODIZE
20 INPUT "NUMBER OF ROLLS?: "N
30 FOR ROLL=1 TO N
40 DIE1=INT(6*RND+1
50 DIE 2=INT(6*RND)+1
60 PINT  DIE1;DIE2,DIE1+DIE2
70 NEXT ROLL
80 PRINT
90 GOTO 20
```

Diagonal Box Graphics

```
NEW
10 CALL CLER
20 CALL COLOR2,5,5)
30 LET K=1
40 CAL HCHAR (K,K+1,42)
50 K=K+1
60 IF K<25 THEN 40
70 K=1
80 CALL HCHAR K,K+3,42
90 K=K+1
100 IF K<25 THEN 80
110 GOTO 110
```

Programming Challenges

If you've caught on to the programming we've done so far, you may be ready for a new challenge: solving some stated problems for which you will write the programs.

Four problems are stated on the following pages. Read the problem carefully, making sure you fully understand it. Then decide what your program will need to do in order to solve the problem. Be sure to check for errors in your program.

When finished, run your program and correct any errors that you may discover. Then turn to page 32 and compare your program with the one listed there. Don't worry if your program doesn't look exactly like that one. If your program gets the desired results, that is all that matters.

Programming Challenges

Programming Challenge 1: Counting

Write a program to make the computer count from 1 to 20 and print this on the screen. Hint: Use a FOR-NEXT loop and have the computer print the value of the control variable (the variable immediately following the word FOR) each time through the loop.

Programming Challenge 2: Summation

Devise a program to compute the sum of all the whole numbers between 1 and 10 inclusive (including 1 and 10). Hint: Use a loop with a GOTO statement at the end to add numbers into the sum. Use the variable names:

SUM—for sum
COUNT—for the loop counter

Programming Challenges

Programming Challenge 3: Miles Per Gallon

On a 120-mile automobile trip your car uses 8.5 gallons of gasoline at $1.15 per gallon. Write a program which computes and prints the miles per gallon and the total cost of fuel for the trip. Use the following variable names:

DIST - distance in miles
GAL - gallons of gasoline used
CPG - cost per gallon
MPG - miles per gallon
TCOST - total cost of gasoline

Programming Challenge 4: Payroll

An employee is paid an hourly rate of $5.25 per hour. An 18% withholding tax is deducted from the weekly paycheck. Write a payroll program to input the number of hours worked and compute both the gross pay (before the tax deduction) and the net pay (after the tax deduction). Have the computer print the results.

Answer Key

(Answers to Stated Programming Problems on Pages 29 through 31)

1. Counting

```
10 CALL CLEAR
20 FOR B = 1 TO 20
30 PRINT B
40 NEXT B
```

2. Summation

```
10 LET SUM = 0
20 LET COUNT = 1
30 IF COUNT > 10 THEN 70
40 LET SUM = SUM + COUNT
50 LET COUNT = COUNT + 1
60 GO TO 30
70 PRINT "SUM =";SUM
```

3. Miles Per Gallon

```
10 LET DIST = 120                    [or] INPUT "DISTANCE?":DIST
20 LET GAL = 8.5                     [or] INPUT "GALLONS?":GAL
30 LET CPG = 1.15                    [or] INPUT "COST PER GALLON?":CPG
40 MPG = DIST/GAL
50 TCOST = CPG*GAL
60 PRINT "MPG = ";MPG
70 PRINT "TCOST = ";TCOST
```

4. Payroll

```
10 LET HRATE = 5.25                  [HRATE is hourly rate]
20 LET TRATE = .18                   [TRATE is tax rate]
30 INPUT "NO. OF HOURS?":HOURS
40 GROSS = HRATE*HOURS
50 NET = GROSS—TRATE*GROSS
60 PRINT "GROSS =";GROSS
70 PRINT "NET = ";NET
```

Texnet and The Source℠

TEXNET is a special edition of The Source, an on-line computer information and communication service developed by the nation's pioneer information utility: Source Telecomputing Corporation. The Source is a home computer owner's key to over one thousand information and communications services. Once you're on-line with the Source, you are able to receive such things as up to the minute news from United Press International, numerous business services, and much, much more. Here's a small sample index of the information you have at your fingertips from the Source:

Acupuncture	Lectures
Airline Schedules	Mail
American Stock Exchange	Mental Health
Backgammon	National News
Barter Network	New York Stock Exchange
Business News	Office Equipment
Car Rentals	Photography
Chat	Quotations
Cinema	Random Sonnets
Classified Ads	Science Fiction
Commodities	Shopping at Home
Daily News	Software
Dining Out	Spelling Lessons
English Lessons	Stocks
Fairs and Festivals	Student Aid
FORTRAN	Travel Plans
Help Wanted	United Press International
Income Tax	Vintages of Wine
Joint Tax Filing	Weather
Labor and Management	Weekend Getaway

Since TEXNET was created for the Texas Instruments Home Computer, there are many features made exclusively for the enhancement of the TI-99/4A that are not available through the Source, such as:

TI News	TI Software Exchange
TI Voice Chat	TI Phonetic Dictionary
TI Help	TI Software Directory
TI User's Group	TI Service Centers
TI Graphics Library	TI Music and Sound Libary

You can access TEXNET and the Source with a minumum of additional equipment. The only special features you need are the Terminal Emulator II, an RS-232 Interface, and a TI Telephone Coupler (Modem). Then when you want to tap TEXNET or the Source, you just dial a local number in over 270 cities, type in your private ID account number (for the Source, a network number and a password are also required). Once you're on-line, you simply type in your commands in plain English. You don't have to be a computer expert to use it; you can program your own systems into TEXNET and the Source as easily as typing a letter. You're a part of today's communications revolution with TEXNET and the Source!

TI Users' Groups

INTERNATIONAL
USERS GROUP

International 99/4 Users' Group
7908 N.W. 23rd Street, Suite 5
Bethany, Ok. 73008
(405) 787-8521

International Home Computer
Users Association
P.O. Box 371
Rancho Sante Fe, Ca. 92067

99/4 Users of America
Duane Fischer
5028 Merit Drive
Flint, MI. 48506
(313) 736-3774

LOCAL USERS' GROUP

CALIFORNIA

Orange County
Arnold Hirsch
1673 Chatequ
Anaheim, Ca. 92802

L.A./South Bay 99er Users'Group

Bob Saunders
4128 Merrill St.
Torrance, Ca. 90503
(213) 540-1089

San Diego

Larry DeRusha
P.O. Box 2403
Del Mar, Ca. 95030

Los Gatos

Capt. Byron Monroe
16380 E. La. Chiquita
Los Gatos, Ca. 95030

COLORADO

Colorado 99/4 Users' Group
Peter Crowell
15177C East Louisiana Drive
Aurora, Co. 80012
(303) 750-5949

ILLINOIS

Chicago

Jerome Strauss
353 Park Drive
Palatine, IL. 60067
(312) 397-2550

MASSACHUSETTS

Pioneer Valley TI-99/4 Users' Group
Richard Guenette
3 Market Street
Northampton, Mass. 01060

MICHIGAN

99/4 Users' Group
Duane Fischer
5028 Merit Drive
Flint, MI. 48506
(313) 736-3774

MINNESOTA

Greater Minneapolis/St. Paul
Home Computer Users' Group
P.O. Box 12351
St. Paul, Mn. 55112

MISSOURI

99/4 Users' Group of St. Louis
Mark Summer
812 Keswick Place
St. Louis, Mo. 63119
(314) 962-8286

OHIO

Cin-Day Users' Group
Jin Schwaller
11987 Cedarcreek Dr.
Cincinnati, Oh. 45240

OREGON

Pacific Northwest TI-99/4 Users' Group
Gary Kaplan
P.O. Box 5537
Eugene, Or. 97495
(503) 485-8796

PENNSYLVANIA

Northeast

Daniel Cooper
P.O. Box 285
Hazelton, Pa. 18201
(717) 454-3023

Pittsburgh

Pittsburgh Users' Group
P.O. Box 18124
Pittsburgh, Pa. 15236

SOUTH CAROLINA

South Carolina Texas Instruments
Computer Club (TIC)
Danny Pack
225 Wynchwood Drive
Irmo, S.C. 29063
(803) 781-0994

TEXAS

Amarillo

Rafael C. Quinces
P.O. Box 366
Canyon, Texas 79015
(806) 655-4563

Dallas

Dallas TI Home Computer Group
Doyle Kelly
P.O. Box 672
Wylie, Tx. 75098
(214) 995-4068

Fort Worth

Andy Belivacqua
Route 2, Box 75-U
Mansfield, Tx. 76063
(817) 473-0712

Houston

Houston Users' Group
Raymond Wells
8922 Roos Road
Houston, Tx. 77036
(713) 771-3483
(713) 871-8000 Ext. 4516

JSC Users' Group (JUG)
Lewis H. Harris
15727 El Camino Real
Houston, Texas 77062

Lubbock

Lubbock Computer Club
99/4 Users' Group
Brett Pijan
2006B 43rd Street
Lubbock Tx. 79412
(806) 765-0102

Midland

West Texas 99/4 Users' Group
Richard Biddle
P.O. Box 6448 M/S 3030
Midland, TX. 79701

WASHINGTON D.C.

Washington, D.C. 99/4 Users' Group
Bill Whitmore
P.O. Box 267
Leesburgh, Va. 22075

WASHINGTON (STATE)

Puget Sound 99'ers
Jeff Dean
21404 54th PL. W.
Mountlake, Wa. 98665
(206) 695-7002

99/4 Computer Society
R.S. (Bob) Chase
421 Northwest 69th Street
Vancover, Wa. 98665
(206) 695-7002

WISCONSIN
Gene Hitz
"Program Innovators"
2007 North 71st Street
Waauwatosa, WI. 53213
(414) 452-0499

LOGO USERS' GROUP

Young Peoples'
LOGO Association
1208 Hillsdale Drive
Richardson, Tx. 75081
(214) 782-7548

Sources For Additional Information

Many different people–men and women with small businesses, teachers, hobbyists, and professionals in many fields–have begun to use home computers, and popular computing magazines now include articles to match their particular interests. Materials about computing are also becoming part of the coverage of many magazines and journals. Teachers' journals now include suggestions for computer use in the classroom, and general magazines also have articles on computing.

Because of the rapid increase in the number of people who see the value—and the fun—in personal computing, no list of suggested magazines can cover all that is available. Use this list as a introduction to information on computing. A visit to your community's library will show you the wealth of information available on this exciting new field.

General Interest Magazines

BYTE:The Small Systems Journal
POB 590
Martinsville, NJ 08836

Creative Computing
POB 5214
Boulder, CO 80321

99'er Magazine
POB 5537
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Personal Computing
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Box 1408
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Popular Computing
POB 307
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Recreational Computing
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1263 El Camino,POB E
Menlo Park, CA 94025

Journals of Special Interest to Teachers

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The Computing Teacher
The Computer Science Dept.
University of Oregon
Eugene, OR 97403

Computers and Education
Pergamon Press, Inc.
Elmsford, NY 10523

Educational Technology
140 Sylvan Ave.
Englewood Cliffs, NJ 07632

Electronic Learning
902 Sylvan Ave.
Englewood Cliffs, NJ 07632

Technological Horizons in Education Journal
T.H.E. Journal
Information Synergy, Inc.
POB 992
Acton, MA 01720

Most Often Asked Questions and Answers

1. **Questions:** Will it work with my television set?
   Answer: Yes. The TI-99/4A console can be connected to a television set by means of the TI-900 Video Modulator.

2. **Question:** **Is it durable? Will it withstand electrical shock via static electricity, keyboard abuse, etc.?**
   Answer: The TI-99/4A is probably the most durable computer that's ever been made. TI has applied everything that was learned from years of experience in building handheld calculators to the TI-99/4A. For example, the computer has been designed to withstand a static electricity shock in excess of 50,000 volts with no physical damage to the computer. The only change occurring at that particular point is that some data in RAM may be changed or lost. As far as physical abuse to the keyboard, it's probably one of the most rugged keyboards that's ever been put into any computer. We have a very durable, very hard-to-hurt computer. It's been designed to operate under conditions far in excess of those you would ever encounter in your home.

3. **Question:** Will it work like a typewriter or word processor?
   Answer: Yes. The TI-99/4A with the Typing Tutor or the TI Writer Word Processor cartridges can function as a typing or word processing too.

4. **Question:** **Will it drive a large printer?**
   Answer: Yes. The TI-99/4A working with the RS232 Interface unit will drive any printer that can be driven via the RS232 standard. This includes most current line printers, such as the TI-99/4A Printer, the OMNI 810 (which is made by TI), and other printers which are on the market. In addition, the RS232 Interface Card features a parallel interface for those printers which do not use RS232.

5. **Question:** **Can you print the contents of any screen?**
   Answer: **The answer to this is no. However, a TI BASIC program can be written that will print the contents of a screen. It is also possible to print the contents of some screens generated by cartridges.**

6. **Question:** Can I do fine line graphics?
   Answer: **Yes. The screen resolution of the monitor is a 192 by 256 dot matrix. The screen is capable of producing 32 characters by 24 characters, each character being produced from an eight-by-eight dot matrix. Any character can be called by a character number, which allows for the generation of all sorts of graphic elements. The TI-99/4A can do dot-addressable (bit-map) graphics with specialized software.**

7. **Question:** Will the cost come down like the calaculator did?
   Answer: The cost has already come down dramatically. In 1979 the TI-99/4 console cost around $900. The suggested retail price for the TI-99/4A as of September 1982 is $450.00. The important thing to remember is: If you wait around for the cost to come down any more, you may be waiting forever; in the meantime, you are not able to capitalize on the powerful benefits of owning a Home Computer.

8. **Question:** **Will it be obsolete next month?**
   Answer: **An emphatic "No." The TI-99/4A is designed to support a wide variety of peripheral devices which add to its function and usefulness. Therefore, when a new peripheral comes out, you simply plug it into the TI-99/4A and it performs the function of that new peripheral.**

9. **Question:** What is the warranty like?
   Answer: If the computer fails within the first ninety days because of defective materials or workmanship, it will be replaced free of charge. If a failure occurs after the ninety-day period, the computer will be repaired for a small fee, depending on the severity of problem. There are also 42 Exchange Centers located around the United States where, for a small fee, you can exchange your computer for a working computer. These are the same repair and exchange centers that currently handle our calculator products.

10. **Question:** **Can I edit or change Solid State Cartridges?**
    Answer: No. The Solid State Cartridges are programs locked in integrated circuit chips. The user cannot alter them.

11. **Question:** Why are there so few programs for businesses?
Answer: The TI-99/4A was designed from the very outset to be a true home-use computer. This does not rule out its application in many small business situations. In fact, independent sources have written many small business applications. However, the major software thrust will continue to be geared for the home.

12. **Question:** Why should I buy this computer instead of the competition (Apple, TRS-80, Atari, etc.)?
Answer: There are several reasons. First of all TI has, without a doubt, the easiest computer to use that's available on the market today. The use of Solid State Cartridges allows a novice to use the computer with a minimum of effort and experimentation. Second, we believe we offer an unparallelled record of service to consumers. Texas Instruments has for years been in the business of bringing high-powered technology into the home. We stand behind our products after the sale by providing things like quality service, user newsletters, and continuing software support.

13. **Question:** What microprocessor do you use, and what are its advantages?
Answer: We use the TMS9900 series microprocessor. It allows us to operate and do some very sophisticated things as far as signal processing is concerned, especially when using peripheral devices. Why did we use that particular microprocessor? The 9900 series microprocessor is a 16-bit microprocessor makes the computer more accurate, allows two computer words to be processed at a time, has more memory storage, allows the use of disk system with 16K RAM, and is exponentially more powerful than an 8-bit microprocessor.

14. **Question:** Is system documentation (schematics) available?
Answer: Yes. Documentation can be obtained by writing to:
Texas Instruments
c/o The Dealer Parts Department
P.O. Box 53
Lubbock, Texas 79408

15. **Question:** What is the power consumption of the console and the monitor?
Answer: The power consumption of the console plus the monitor is about the same as a 150-watt light bulb.

16. **Question:** Can you connect it to large computer data bases?
Answer: Yes. With the use of the Telephone Coupler (Modem), Terminal Emulator II Solid State Cartridge, and the RS232 Interface, our computer can be connected to large computer data bases such as MICRONET, THE SOURCE, COMPUSERVE, DOW JONES, etc. Information about these data bases can be obtained at your local computer store.

17. **Question:** What cassette recorders can be used to store data on the TI-99/4A?
Answer:

G.E. Model 3-5154A (Silhouette-2)	G.E. Models 510F & G
Cost: $40-50	Cost: $30-50
Features: Tape counter	Features: No counter
Panasonic Model 2309A	Realistic Model CTR-21A
Cost: $40-50	Cost: $50-70
Features: Tape counter	Features: Tape counter, cue review, record meter

18. **Question:** Can the computer do things for my home–turn on lights, regulate the temperature, control burglar alarms, etc.?
Answer: At the present time the only things standing between these sorts of functions and our current computer are simple peripheral devices that will plug into the computer.

19. **Question:** How much information can I store on a diskette?
Answer: The current disk system will store 90K bytes of data, which is about the same as 90,000 keystrokes of information (per diskette, per drive).

20. **Question:** Is the new Peripheral Expansion System compatible with the old "train" peripherals?
Answer: Yes, the new peripheral system will plug into the TI-99/4A console or into the old-style peripherals.

An Overview of the Development of the Computer

3000 B.C.

One of the most ancient counting machines is the abacus, which was invented in Asia. The Chinese abacus, called a "suan-pan," was developed around 3000 B.C. The abacus was modified and improved in the centuries that followed, and it is still used by many people in the world today.

1600s

In the late 1600s, the German Philosopher Gottfried Wilhelm Leibniz invented a machine which multipled by rapid, repeated additions.

In the 1640s, the French philosopher and mathematician Blaise Pascal invented and built the first adding machine that could carry sums.

1800s

The French inventor Joseph M. Jacquard designed a loom for weaving patterned fabric in 1801. The loom selected colored threads for sections of the cloth as directed by punched cards. Jacquard's punched cards enabled him to direct a machine in specific tasks and to change the directions simply by changing the card.

Charles Babbage, an English mathematician, designed a calculating device with all the components of a modern computer in the 1820s. Because the source of power in the 1820s was steam-driven engines, he was unable to complete the design.

In the United States in 1888, William S. Burroughs made the first adding machine which successfully recorded data.

Hermann Hollerith and John Shaw Billings of the United States invented a machine that used punched cards for counting census data. Hollerith's machine was used for the 1890 U.S. census.

1930s

Vannevar Bush, an American electrical engineer in the 1930s, designed and built the first analog computer.

Between 1937 and 1944, Howard H. Aiken of Harvard University designed and built the first digital computer in conjunction with IBM. The Harvard Mark I, or the Automatic Sequence Controlled Calculator, could perform three additions every second. It was eight feet high and fifty-one feet long.

1940s

Electrical engineers at the University of Pennsylvania, John Mauchly and John Presper Eckert, built ENIAC (Electronic Numerical Integrator and Computer) in the 1940s. ENIAC had 18,000 vacuum tubes, but it was faster than earlier machines.
Bell Labs in 1948 invented the transistor, which eventually replaced the bulkly vacuum tubes previously used in computers.

1950s

The Universal Automatic Computer, or UNIVAC, was the first computer produced for sale. In 1951, it was installed at the U.S. Bureau of the Census.

In 1954, Texas Instruments designed the world's first commercially produced transistor radio. As a result of the project, TI became the first company to design and mass-produce low-cost germanium transistors.

1958

In 1958, Jack S. Kilby of TI invented the integrated circuit (IC), a single piece of silicon containing complete electronic circuits.

1967

In 1967, TI produced the first electronic handheld calculator. This miniature electronic calculator is in the permanent collection of the Smithsonian Institute at Washington, D.C.

1970

The single-chip microprocessor, an integrated circuit containing all the elements of a computer's central processing unit (CPU), was invented by Gary Boone of TI in 1970. Today, similar devices are the "brains" of a wide range of electronic products, such as the TI-99/4A Personal Computer.

1971

TI introduced in 1971 the single-chip microcomputer, invented by Gary Boone and Michael Cochran of TI. The device packed all the elements of a computer (CPU, data and instructions memory, input/output circuitry and clock) into a silicon chip the size of a baby's fingernail. The device later evolved into the "miracle chip" that has found wide application in calculators, watches, appliances, automobiles, office equipment, electronic toys and games, and hundreds of other products.

1976

Solid State Software (TM) technology was invented at TI in 1976. The invention allowed electronic devices–calculators, learning aids, home computers–to be "reprogrammed" through the use of interchangeable, plug-in modules.

1978

TI introduced in 1978 the Speak & Spell (TM) electronic learning aid, a device which incorporated TI's invention, the single-chip speech synthesizer. This speech synthesizer–the first integrated circuit to duplicate electronically the human vocal tract–led to the introduction of TI's Solid State Speech (TM) technology which is also used in the TI Home Computer.

1981

In 1981 TI introduced TI LOGO (TM). LOGO was the first microcomputer language to allow children to create a personal learning environment. Using TI LOGO, children "teach" the TI-99/4A Personal Computer to draw lines and create colorful moving shapes.

Applications Programs

HOME MANAGEMENT/PERSONAL FINANCE

Cartidges

- Home Financial Decisions
- Household Budget Management
- Securities Analysis
- Personal Record Keeping
- Tax/Investment Record Keeping
- Personal Real Estate
- Personal Report Generator
- TI WRITER Word Processor**
- Microsoft™Multiplan™***+

Cassettes

- Personal Financial Aids
- Business Aids Library-
  Lease/Purchase Decisions

Diskettes

- Mailing List
- Personal Financial Aids
- Checkbook Manager
- Business Aids Library-Finance Management
- Business Aids Library-Inventory Management
- Business Aids Library-Cash Management
- Business Aids Library-Lease/Purchase Decisions
- Personal Tax Plan*(Aardvark Software Inc.)

EDUCATION/PERSONAL ENRICHMENT

Cartridges: Texas Instruments

- Early Learning Fun
- Beginning Grammar
- Number Magic
- Video Graphs
- Video Chess
- Physical Fitness
- Music Maker
- Weight Control and Nutrition
- TI LOGO
- Touch Typing Tutor***
- TI LOGO II***

Cartridges: Scott, Foresman Reading and Math Packages (Development by Scott, Foresman)

- Early Reading
- Reading On**
- Reading Roundup*
- Reading Rally**
- Reading Flight**
- Addition and Subtraction I
- Addition and Subtraction II
- Multiplication I
- Division I*

Cartridges: Scholastic Packages (Developed by Scholastic, Inc.)

- Scholastic Spelling-Level 3
- Scholastic Spelling-Level 4
- Scholastic Spelling-Level 5
- Scholastic Spelling-Level 6

Cartridges: Addison-Wesley Computer Math Games (Developed by Addison-Wesley Publishing Co.)

- Computer Math II**
- Computer Math Games VI**

Cartridges: Milliken Math Sequences-Kindergarten through 8th grade (Developed by Milliken Publishing Co.)

- Addition***
- Subtraction***
- Multiplication***
- Division***
- Integers***
- Fractions***
- Decimals***
- Percents***

Diskettes: Texas Instruments

- Teach Yourself BASIC
- Music Skills Trainer
- Computer Music Box
- Market Simulation
- Teach Yourself Extended BASIC
- Music Maker Demonstration
- Basketball Statistics
- Bridge Bidding I
- Speak & Spell Program
- Speak & Math Program
- Bridge Bidding II
- Bridge Bidding III
- Spell Writer
- Beginner's BASIC Tutor**

Diskettes: MECC Packages (Developed By Minnesota Educational Computing Consortium)

- Elementary Economics***
- Metric and Counting***
- Elementary Math and Science***
- Astronomy***
- Word Beginnings***
- Exploring***
- Math Practice***
- Science Facts***
- Natural Science***
- Social Science***
- Teacher's Tool Box***

Cassettes: Texas Instruments

- Teach Yourself BASIC
- Music Skills Trainer
- Computer Music Box
- Market Simulation
- Teach Yourself Extended BASIC
- Bridge Bidding I
- Speak & Math Program
- Bridge Bidding II
- Bridge Bidding III
- Spell Writer
- Beginner's BASIC Tutor**

ENTERTAINMENT

Cartridges: Texas Instruments
- Football
- Video Games I
- Hunt the Wumpus
- Indoor Soccer
- Mind Challengers
- A-Maze-Ing
- Tombstone City: 21st Century
- TI Invaders
- Car Wars
- Munch Man
- Tunnels of Doom*
- Alpiner***
- Chisholm Trail**
- Parsec***

Cartridges: Milton Bradley Packages (Developed by Milton Bradley Company)
- The Attack + +
- Blasto + +
- Blackjack and Poker + +
- Hustle + +
- Zerozap + +
- Hangman + +
- Connect Four + +
- Yahtzee + +

Cartridges: Adventure International Packages (Developed by Scott Adams)
- Adventure (with diskette)
- Adventure (with cassette)

Cartridges: Gabriel Industries Package (Developed by Gabriel Industries)
- Othello(3)

OTHER APPLICATIONS PROGRAMS

Cartridges
- Diagnostic
- Demonstration
- Speech Editor
- Statistics
- Extended BASIC
- Terminal Emulator II
- Editor/Assembler
- Mini-Memory
- SMU Electrical Engineering Library(1)*
- Electrical Engineering Library

Cassettes
- Programming Aids I
- Math Routine Library
- Electrical Engineering Library
- Graphing Package
- Structural Engineering Library
- AC Circuit Analysis**

Diskettes: Texas Instruments
- TI-Trek
- Mystery Melody
- Oldies but Goodies-Games I
- Oldies but Goodies-Games II
- Saturday Night Bingo
- Draw Poker
- Tombstone City: 21st Century*
- TI Invaders*
- Munch Man*

Diskettes: Adventure International Adventure Series (Developed by Scott Adams)
- Adventureland
- Mission Impossible
- Voodoo Castle
- The Count
- Strange Odyssey
- Mystery Fun House
- Pyramid of Doom
- Ghost Town
- Savage Island I & II
- Golden Voyage

Cassettes: Texas Instruments
- Mystery Melody
- Oldies But Goodies-Games I
- Oldies But Goodies-Games II
- Saturday Night Bingo
- Draw Poker

Cassettes: Adventure International Adventure Series (Developed by Scott Adams)
- Adventureland
- Mission Impossible
- Voodoo Castle
- The Count
- Strange Odyssey
- Mystery Fun House
- Pyramid of Doom
- Ghost Town
- Savage Island I & II
- Golden Voyage

Diskettes
- Programming Aids I
- Programming Aids II
- Math Routine Library
- Programming Aids III
- Graphing Package
- Structural Engineering Library
- AC Circuit Analysis**
- UCSD Pascal(2) Compiler**
- UCSD p-System(2) Assembler/Linker**
- UCSD p-System(2) Editor/Filer/Utilities**
- TI PILOT**
- Course Designer Authoring Package**
- Text-To-Speech (English)**

Other packages for the TI-99/4A computer are available from independent software developers. See your dealer for information.

*Available in Summer 1982
**Available in Fall 1982
***Available in Winter 1982

+Developed by Microsoft™, Inc. Multiplan™is a trademark of Microsoft, Inc.
++Developed by Milton Bradley–The Attack, Blasto, Hustle, Zerozap, Connect Four, and Zahtzee are trademarks of Milton Bradley.

(1) Course is designed to be used with Circuit Analysis I texbook.
(2) UCSD, UCSD Pascal and UCSD p-System are all trademarks of the Regents the University of California.
(3) Othello is a trademark of Gabriel Industries.

A Glossary of Personal Computing Terms

Array—a collection of numeric or string variables arranged in a list or matrix for processing by the computer. Each element in an array is referenced by a subscript describing its position in the list.
ASCII–the American Standard Code for Information Interchange, the code structure used internally in most personal computers to represent letters, numbers, and special characters.
BASIC (Beginners All-purpose Symbolic Instruction Code)–A very successful and popular computer language developed at Dartmouth College in 1963-64.
Baud–The signaling speed of information in a computer (typically relating to input and output). It is the number of bits of information per second that your computer can process. Baud rates are a factor in selecting a printer for your computer.
Binary–The two-digits (bit) number system based on 0 and 1. Computers recognize the binary bits 0 and 1 by using gates. Gates are electronic circuits which are either off or on represent 0 or 1.
Bit–A Binary digit (0 or 1).
Branch–a departure from the sequential performance of program statements. An unconditional branch causes the computer to jump to a specified program line every time the branching statement is encountered. A conditional branch transfers program control based on the result of some arithmetic or logical operation.
Breakpoint–A point in a program specified by the BREAK command where program execution can be suspended. During a breakpoint, you can perform operations in the Immediate Mode (Command Mode) to help you locate program errors. Program execution can be resumed with a CONTINUE command, unless editing took place while the program was stopped.
Buffer–An area of computer memory for temporary storage of an input or output record.
Bug–An error in the hardware or software of a computer.
Byte–A string of eight binary bits.
CAI (Computer-Assisted Instruction)–The use of computers for instructional purposes in any subject area, including tutorials, drill and practice, education for the handicapped, etc.
Cassette–Computers can use the same type cassettes used to record music for program storage and other information.
Central Processing Unit (CPU)–The nerve center of a computer; the network of electronic circuits that interprets programs and tells a computer how to carry them out.
Character–A letter, number, punctuation symbol, or special graphics symbol, usually equivalent to one byte.
Chip–Tiny silicon slices used to make electronic memories and other circuits. A single chip may have as many as 30,000 electronic parts.
Circuit Board–A rigid fiberglass or phenolic card upon which various electronic parts are mounted. Printer or etched copper tracks connect the various parts to one another.
Command–A word or pair of words that tells the computer to do something in the Immediate Mode.
Examples: NEW, LIST, RUN, CALL CLEAR.
Command Module–Preprogrammed ROM modules which are easily inserted in the TI computer to extend its capabilities. See also: Solid State Cartridge.
Computer–a network of electronic switches and memories that processes data.
Concatenation–Linking two or more strings to make a longer string. The ampersand symbol (&) is the concatenation operator.
Console–Main part of the computer containing the keyboard and the CPU.
Constant–A specific numeric real number (such as 1.2 or-9054) or a string constant (any combination of up to 112 characters enclosed in quotes, such as "HELLO THERE" or "275 FIRST ST."
CPU–See Central Processing Unit.
Cursor–A flashing rectangle showing where a typed character will appear.
Data–Information, often numerical information.
Default–A standard characteristic or value which the computer assumes if certain specification are omitted within a statement or program.
Disk–See Floppy Disk.
Diskette–See Floppy Disk.
Display–The video screen on the monitor.
ENTER key–Key used to enter data.

Exponent–a number indicating the power to which a number or expression is to be raised, usually written at the right and above the number. For example:
$2^8 = 2x2x2x2x2x2x2x2$. In TI BASIC, the exponent is entered following the ^ symbol or following the letter "E" in scientific notation.
For example: $2^8 = 2 \wedge 8$; $1.3 \times 10^{25} = 1.3E25$.
File–A collection of related data records stored on a device; also used interchangeably with **device** for input/output equipment which cannot use multiple files, such as a line printer.
Floppy Disk–A flexible plastic disk coated with the same magnetic material used to make recording tape.
Flow Chart–A diagram of geometric shapes connected by arrows that show the progression of a computer program. Flow charts are handy for developing complicated computer programs and illustrating how programs work.
Gate–a very simple electronic circuit that is always either on or off. Clusters of gates can manipulate binary numbers (0=off, 1=on). They can also count, do arithmetic, make decisions, and store binary numbers. Gates are the basic building blocks of computers.
Graphics–Visual constructions on the screen, such as graphs, patterns, and drawings, both stationary and animated.
Graphics Line–A 32 character line used by the TI BASIC graphics subprograms.
Hard Copy–The permanent printout of a program or its results produced by a printer connected to computer.
Hardware–The circuit boards and electronic parts inside a computer.
Hertz (Hz)–A unit of frequency. One Hertz = one cycle per second.
Hexadecimal–A base-16 number system using 16 symbols, 0-9 and A-F. It is used as a convenient "shorthand" way to express binary code. For example, 1010 in binary = A in hexadecimal; 11111111 = FF. Hexadecimal is used for constructing graphics characters in the CALL CHAR subprogram.
Immediate Mode–A computer mode in which commands are entered directly into the computer without a line number. Such commands are executed immediately.
Input–The means by which data is entered into a computer–often a keyboard.
Input line–The amount of data which can be entered at one time. In TI BASIC, this is 112 characters.
Instruction–A statement or command that tells a computer what to do.
Integer–A whole number, either positive, negative, or zero.
Interpreter–The program stored inside a computer that converts or translates BASIC statements into the computer's machine language.
Iteration–The technique of repeating a group of program statements; one repetition of such a group. See **Loop**.
K–Short for kilo meaning thousand. Used to designate memory capacity–thus a 4K memory has approximately 4,000 storage elements.
Keyboard–A typewriter-like panel of switches and keys used to enter programs and data into a computer.
Line Number–A number identifying a statement in a program. Line numbers determine the order in which a computer executes commands of a program.
Loop–A group of consecutive program lines which are repeatedly performed, usually a specified number of times.
Mantissa–The base number portion of a number expressed in scientific notation. In 3.264E +4, the mantissa is 3.264.
Memory–Any of the many devices (ROMs, RAMs, floppy disks, magnetic tapes, etc.) that store computer programs and data.
Microcomputer–A computer made by combining a microprocessor with some memory. Microcomputers are small in size, not performance.
Microprocessor–The central processing unit of a computer assembled on a single silicon chip.
Monitor–Television-like device to display programs as they run or are being written.
Operator–A symbol used in calculations (numeric operators) or in relationship comparisons (related operations). The numeric operators are +, -, *, /, ^ . The relational operators are >, < , <=, >=, <> .

Output–Information that is being sent from the computer, i.e., graphics on the monitor screen, a report being printed. Also, the means by which data leaves a computer–often a television monitor or printer.
Paper Tape–A narrow ribbon of paper which contains computer data in the form of punched holes. A hole indicates the bit 1; no hole indicates the bit 0. Paper tape is sometimes used to enter programs into a computer.
Peripheral–An accessory which can be added to a computer to increase its capability and usefulness (a floppy disk, paper tape unit, etc.).
Personal Computer (Home Computer)–An economical microcomputer designed for use by small businesses, schools, and computer hobbyists.
Printer–A computer output mechanism that delivers hard copy data.
Print line–a 28-position line used by the PRINT and DISPLAY statements.
Program–The list of instructions or statements that tells a computer what to do to perform a task.
Program line–A line containing a single statement, the maximum length of which is 112 characters.
Programmer–A person who writes programs.
Programming Language–Numeric or alphabetic commands which a computer can assimilate, understand, and execute.
Prompt–A symbol (>) which marks the beginning of each command or program line you enter; a symbol or phrase that requests input from the user.
RAM (Random Access Memory)–A temporary memory, i.e., one in which data is stored so long as electrical power is applied. Data in RAM can be accessed or changed and is lost if electrical power is cut off.
ROM (Read Only Memory)– A permanent memory, i.e., one which retains stored data regardless of whether electrical power is applied. Certain instructions for the computer are permanently stored in ROM and can be accessed but cannot be changed.
Run Mode–A computer mode in which the computer is executing a program. Run Mode is terminated when program execution ends normally or abnormally. You can cause the computer to leave Run Mode by pressing CLEAR during program execution. (See Breakpoint).
Scientific Notation–A method of expressing very large or very small numbers by using a base number (mantissa) times ten raised to some power (exponent).
Scroll–Movement of text on the screen so that additional information can displayed.
Software–Computer programs written on paper or stored on magnetic tape or a floppy disk.
Solid State Cartridges–Preprogrammed ROM which are easily inserted in the TI computer to extend its capabilities. See also: Command Module.
Speech Synthesizer–A peripheral that enables the computer to talk.
Sprite–In TI LOGO, an invisible character to which you can give shape, color, speed, screen position, and direction.
Statement–A single line of a computer program containing a single instruction like PRINT, LET, RUN, etc.
String–A series of letters, numbers, and symbols treated as a unit.
Subprogram–A predefined general-purpose procedure accessible to the user through the CALL statement in TI BASIC. Subprograms extend the capability of BASIC and cannot be easily programmed in BASIC.
Subroutine–A program segment which can be used more than once during the execution of a program, such as a complex set of calculations or a print rountine. In TI BASIC, a subroutine is entered by a GOSUB statement and ends with a RETURN statement.
Subscript–A numeric expression which specifies a particular item in an **array**. In TI BASIC the subscript is written in parentheses immediately following the array name.
Terminal–An input device such as a keyboard or an output device such as a printer or a TV monitor.
Trace–Listing the order in which the computer performs program statements. Tracing the line numbers can help you find errors in a program flow.
Turtle–In TI LOGO, the small triangle with which designs are drawn on the screen.
User's Group–An informal or formal association of persons who own or operate similar or identical computing equipment. User's groups are usually formed to exchange programs and other helpful information.
Variable–A name given to a value which may vary during program execution. A variable is a memory location where values can be replaced by new values during program execution.
Wired Remote Controllers–Small, handheld controls, sometimes called joysticks, used to move items around on the screen.

TEXAS INSTRUMENTS
INCORPORATED

This certifies that

_____

has successfully completed the
course of instruction in the
TI Computer Awareness Program for Adults
sponsored by
the TI Computer Advantage Club.

_____

Program Instructor

_____

Date

NOTES

NOTES

- Thanks to 99er User: Ernest Pergrem, for having scanned this Document and authorized us to place it on our website.

- Revisited by TI99 Italian User Club (info@ti99iuc.it) in February, 2014

TEXAS INSTRUMENTS

INCORPORATED

Dallas, Texas
Printed in the U.S.A.

1049710-1