Radio Shack®

TRS-80™ Microcomputer

Sales Training Manual

RADIO SHACK

TRS-80

M I C R O C O M P U T E R

WHAT IT IS . . .

WHAT IT DOES . . .

HOW TO SELL IT . . .

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MEMORANDUM

TO: EVERY "LEARNER" WHO USES THIS MANUAL

FROM: CARROLL RAY

SUBJECT: ANYBODY CAN LEARN HOW TO USE AND SELL THE TRS-80

In the past few months, I have introduced myself to the world of personal computing. I have had no prior training in the use of computers, except for some exposure to the data processing departments of our company in connection with my work in Accounting.

I have found it a delightful and challenging experience. Our Level I USER'S MANUAL is designed for someone like me...a beginner. The TRS-80 is a superb computer to "learn" on. It has been more than I expected! My hope is that you will approach this session with an open mind...expecting to learn something new, exciting, and challenging. Good luck, and HAPPY COMPUTING!

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SECTION I

WHAT IS THE TRS-80?

Lewis Kornfeld, President of Radio Shack, has stated that "the TRS-80 Microcomputer may be the most important product ever developed by Radio Shack."

Considering the Shack's history, that's a pretty strong statement. In fact, the TRS-80 represents possibly the boldest marketing thrust ever taken by our company. It is literally a breakthrough ... in concept, in technology, and in price.

Many futurists predict that the personal computer will be as common in American homes as color television. Millions of businessmen will have their own personal desk-top computers. If they are right, then the Radio Shack TRS-80 will most likely be the breakthrough product that makes it happen.

In this manual, we want to give you an introduction to the world of the TRS-80.

WHAT IT IS ...

WHAT IT DOES ...

HOW TO SELL IT ...

A COMPUTER WON'T "BYTE" YOU !

There is a mystique that has developed in this computer age. For the average man, there may even be a vague fear or uneasiness about computers. If we aren't seeing super-computers ruling the world in science fiction movies, then we're being harassed by the gas company's computer ... telling us how much we owe "it."

As a matter of fact, many people who work with computers have encouraged this feeling of uneasiness by establishing their own secret society ... complete with their own language and buzz words.

Most of us "outsiders" have experienced at one time or another that feeling of absolute helplessness (indeed, even ignorance) in the presence of a computer "expert." It's a little bit like trying to be cool in ordering from a menu in a foreign language. The waiter is waiting for "the dummy to order," and you just hope that what you do finally order is edible!

Good news! It's not true. A computer does not have a mind of its own, and has no right to intimidate you. Or tell you what to do. In fact, it's just the opposite. A computer is either carrying out your instructions, or it is patiently waiting for you to tell it what to do next!

A COMPUTER IS JUST ANOTHER TOOL

But what a marvelous tool! Ever since man learned to make tools, he has continued to improve them. And every new one is a further extension of himself. Try to imagine driving a nail with your fist. Not very efficient ... and also painful. So, what does man do? He invents a hammer which is just an extension of his arm and hand.

That's all a computer is ... it is an extension of man's brain. We have a certain amount of "computing power" in our brains. This power is a function of two basic skills: intelligence -- i.e., the ability to compute, and mental dexterity, the speed with which we make the computation.

We have other skills resident within our brains which a computer does not have -- for example, the ability to reason, or apply logical analysis to

a problem. There are other "brain abilities" which we have that a computer does not have (for example, the ability to appreciate beauty). It is the thing we have in common that concerns us: computing power.

FASTER THAN 1,000 SPEEDING SCIENTISTS

In sheer computing power (the combination of computing skill and speed), the computer is a fantastic extension of man's own brain because it can do so much more, so much faster than we can with just our brains plus pencil and paper.

Imagine a large ballroom filled with 1,000 scientists, each with pencil and paper (maybe even a hand-held calculator). Imagine that they are working on a problem so complex that it would take all 1,000 men working 24 hours a day for 30 or 40 years to solve. It has been suggested that a computer can work out the same solution in a few minutes. Now that's computing power!

A computer is not only a marvelous tool, and an extension of man's own brain ... it is a servo-mechanism that will do exactly what it is instructed to do (within limits, of course). And no more, and no less ... exactly and precisely!

THE "PERSONAL" COMPUTER AGE IS HERE ... NOW!

Now the exciting part. A hammer is pretty well limited in scope as a tool, and as an extension of man's own arm and hand. But a computer ... that's

a different matter. Since it is an extension of man's own brain (at least, in computing power), it is limited only by man's own imagination!

That's why the introduction of the Microcomputer era is so exciting. This marvelous tool is now literally available to everyone. Your neighbor, your doctor, your auto mechanic, yes even your children can now extend their own brain power to new frontiers ... or just use it to eliminate paper work drudgery.

So ... let's get down to BASICS! Let's learn some basic facts about two terms you will soon find in your daily conversation: "HARDWARE," and "SOFTWARE."

WHAT IS HARDWARE?

The easiest way to define this term is just to say that it refers to anything about computers that you can touch -- i.e., the physical parts ... what are they?

1) CPU — The "central processing unit" which does the actual computing. In the TRS-80, the CPU is contained in the keyboard unit.

2) INPUT/OUTPUT DEVICE — This refers to any device which connects to the CPU, and interacts with it. In fact, a CPU all by itself isn't really usable without some way to tell it what

to do, and then to read the results. A video display is a good example of an input/output device. This also refers to keyboards, printers, punched card readers, etc. With the TRS-80, the keyboard is an I/O device, and contains the CPU.

3) MEMORY

A computer has a certain number of electronic chips which are used for memory. Electronic information (data) can be stored there temporarily ... or permanently in some cases. Memory is usually referred to in "K's" ... or thousands of units. A 4K computer can store 4,000 units of data.

4) RAM

This is a kind of memory: RANDOM ACCESS MEMORY, which simply means that whatever is stored there can be taken out and something else put in its place. It's like a pitcher ... today I "store" milk in it; tomorrow I may want to "store" iced tea, and so on. The amount of RAM memory is a key concern of people who use computers, because it pretty well determines how much you can do with it.

5) ROM

Another kind of memory: READ ONLY MEMORY. It too is an electronic chip (or group of chips) which is used to store data. The difference is that here the data is stored permanently ... like a name "branded" onto a leather belt. In the TRS-80, the ROM contains the Radio Shack BASIC language interpreter. Or, think of it this way: once you are taught to understand English ... that ability is stored in your brain permanently. And you will always be able to "interpret" certain sounds, because your "memory" has the interpreter "burned in." There can be different size ROMs, also. Our Radio Shack Level I BASIC is in 4K of ROM, and Level II BASIC is stored in 12K of ROM.

6) PERIPHERALS

The first time I was asked if we had any peripherals ... I thought the person wanted to know if we had boundaries! I'm learning, however, that this term simply refers to extra devices that can be attached to a computer to do certain jobs ... like printers, disk drives, video displays, cassette tape recorders, etc.

7) BUS STRUCTURE

In electronics, a bus is a power line that provides power to a large number of circuits. In computing, a bus is a group of wires that carries information to a large number of devices. Radio Shack has designed its own TRS-80 bus, and some computer products (other disks, printers, etc.) on the market will not connect to the TRS-80 unless they are specially adapted to do so.

8) FLOPPY DISK

A much faster and more efficient storage vehicle than cassette tape is a disk drive. A floppy disk (or in our case, a mini-floppy disk) is a device which attaches to a computer and can be used to temporarily store and then call back large amounts of data ... at a very fast rate. The disk drive "plays" disks (or diskettes), just as a tape recorder/player "plays" cassettes.

This is by no means an exhaustive list of hardware definitions, but it's enough to get you started. For a longer list of terms ... see APPENDIX III.

WHAT IS SOFTWARE?

No ... it's not something that department stores put on sale every January.

The term software simply refers to "programs" or sets of instructions which tell a computer what to do. These "sets of instructions" are written (and entered electronically) in various "languages." The TRS-80 is designed to understand our versions of BASIC, a simple programming language which uses English words as opposed to codes which only experts understand.

"Software," or "programs" are entered into a computer in various ways. The simplest is to sit down at the keyboard of a TRS-80, and type in the "program." This can take a minute or two, or several hours, depending on the length and complexity of the program.

Another way is to "store" a program on a cassette tape or floppy disk, and "read it into the computer" (instead of typing it in).

TWO KINDS OF SOFTWARE

1) OPERATING SOFTWARE ...

This is a program, or set of programs, which tells the computer how to act when it receives certain kinds of instructions. The Radio Shack TRS-80 MINI-DISK comes with its own operating software, called DOS (Disk Operating System), and this is an important selling feature to the user.

2) APPLICATION SOFTWARE ...

This refers to programs which are written to do a specific job. The Radio Shack Math I program is an example of application software... it is designed to do one specific thing. Application software is really the key to the microcomputer market. As more and more software is developed (by ourselves, and others) ... more and more microcomputers will be sold. It stands to reason.

THE $599 SOFTWARE MAN

Suppose you have no interest in computers, but you do have a particular problem which bugs you almost daily ... let's say, spending two hours at home every night doing job-connected paperwork.

Now suppose Radio Shack announces a new software package which will enable you to do that same work in about 10 minutes once a week. Would such a solution to your time problem be worth $599? You'd better believe it!

As a matter of fact ... you will sell lots of TRS-80's to people who can't wait for application software. They want a solution now ... and are willing to learn to program the TRS-80 themselves. They will personally develop the "application software" that Radio Shack ends up selling. And he just might turn his $599 "expense" into a blue-chip investment!

SOFTWARE BUZZ WORDS

There are also some software terms that you will hear, so we might as well discuss a few of them.

1) PROGRAM — A set of instructions in one of the computer languages (like BASIC) which tells the computer what to do. A "good" program is one which is carefully and logically thought out, and which accomplishes the objective in the most effective manner.

2) PROGRAMMER — A person who writes programs. Usually a professional. However, almost anybody who can read and write English can learn to write some programs on the TRS-80.

3) BAUD — This strange looking word simply refers to the speed of information in a computer. It is used primarily to define the speed with which bits of information move back and forth between the computer and input/output devices. For example, under Level I BASIC, the Baud rate between our cassette recorder and the TRS-80 is 250 Baud. As computers go, that's really not terribly fast. Under Level II BASIC, by the way, that rate is doubled (to 500 Baud).

4) BIT

Not something that goes with a drill press! It refers to a single electronic code (in computer language, either an Ø or a 1).

5) BYTE

Neither do you "byte" into an apple. This word refers to a group or "string" of 8 "bits." To handle 8 "bits" at a time is obviously faster than one at a time. So, when you see the phrase "16K Bytes" ... it means the memory capacity is up to 16,000 Bytes (or groups of 8 "bits" of data).

6) BUG

Believe me ... you can't kill this with insecticide. This is a programmer's word, and it refers to an error in the hardware or software of a computer.

7) DE-BUG

The process by which a person (usually the guy who blew it in the first place) looks for, discovers, and corrects bugs.

8) INSTRUCTION

A statement or command that tells the computer what to do. Like ... "PRINT." The TRS-80 recognizes that word and prints whatever follows that command, and is enclosed in quotation marks.

9) FLOW CHART — A visual diagram of a program. It helps a programmer understand how the program works ... or how he wants it to work.

There you have it: "HARDWARE" and "SOFTWARE." Two terms that you will become more and more familiar with as you become a "superstar computer-salesman!"

NOW, LET'S WRITE A PROGRAM

Turn to APPENDIX I.

SECTION II

HOW TO SELL THE TRS-80

QUALIFY THE CUSTOMER

This is a daily fact of life for retailers. You have to do this every day ... "What does he want?" "Why is he here?" "How much is he prepared to spend?"

Selling the TRS-80 is not new in this respect. The technique may be a little different, but the principles are the same. Here are some basic questions you ought to ask yourself (and him) as you talk with your computer prospect:

DOES HE WANT IT FOR HIS BUSINESS?

/YES/	/NO/
Then is it a small business?	If it is not for business, what does he plan to use it for?
Is this his first computer?	Is it for his job?
Does he have a clear idea of what he wants it to do?	Does he know how to program?
Will he need a printer?	Is he just going to use it at home?
Will he need a mini-disk?	Can I sell him some of our software?
Does he need someone to program it?	Does he want to learn how to program?
Will any of our programs do what he wants?	Is it for the kids?
How much memory does he need?	Does he need a printer?
	Does he need a mini-disk, etc?

After some practice, you will soon discover that your prospects fall into two distinct categories:

A) The customer who has some knowledge of computers and doesn't need to be sold. He will sell himself as soon as you have answered his basic questions.

B) The customer who has a specific need (business or otherwise), and thinks maybe the TRS-80 will solve his problem. BUT ... he doesn't know a thing about computers and is not even sure what it will do (or even what he wants it to do). This kind of customer is a real challenge to you, because he is going to need a lot of help from you . . .

. . . help in defining his problem

. . . help in determining the right system

. . . help in getting it programmed.

This comes with practice, just like selling anything else. In fact, you will find that you will learn as much helping this kind of customer as you will from any other source.

DON'T OVERSELL A CUSTOMER

Knowing the limitations of the TRS-80 (or any computer, for that matter) is just as important as learning its selling points. The basic rule of thumb is that a computer won't do anything until it is properly told (i.e., programmed) what to do!

Some businessman will come in and say "I understand this TRS-80 will help me keep track of inventory" ... and he won't know that it needs to be programmed. If you sell him a TRS-80 without further explanation, and he takes it to his business, turns it on, and expects the TRS-80 to tell him what to do next -- he is going to be one disappointed businessman when it just sits there and stares at him!

You must assume that your customer is not knowledgeable about computers until he indicates otherwise. Make sure he understands that the TRS-80 will not do anything until it is "instructed" -- i.e., programmed to do it ... either by somebody typing in a program, or entering one from a cassette tape.

Now ... don't give up before you've begun just because a customer appears to know nothing about computers. As a matter of fact, that's a very good reason to buy one: to learn about computers, and how to program one. Our Level I USER'S MANUAL is written for beginners. You will be able to make lots of sales simply by appealing to a prospect's innate desire to learn something new ... especially our kind of customer!

And don't overlook the fact that a lot of people will be perfectly happy to own a TRS-80 and just run our own software (personal finance, recipe, games, Math I, etc.) on it, and never try to learn programming.

BUT ... be careful not to make claims about the TRS-80 that aren't technically correct ... or may mislead the customer.

HOW TO DEMO THE TRS-80

This is easy. You demo the TRS-80 just like you demo a stereo system ... you let the customer see it perform, feel it respond to his commands, and appreciate the benefits by seeing it in action!

The TRS-80 is tailor-made for this kind of selling because the customer can get his hands on it ... and interact with it. There is something very satisfying and even exciting about being able to tell a computer what to do!

To see it in action as a tool, an extension of his own brain ... and to imagine the potential ... these are strong motivations to purchase!

You will have special demo tapes which you can run for the customer. Some of these will allow him to ask the TRS-80 certain questions, and it will respond with the answers ... thus actually demonstrating itself. What a product!

The demo that you choose will be determined in part by the qualification process that you are going through in your mind as you talk with him. Would he like to see it play a game? Personal finance? Menu conversion? Maybe he would like to write a short program with some guidance from you. Use your judgment!

It is very important to get rid of fear of computers. You do this by persuading him to get a "hands on" demo. Let him see that <u>he can't hurt it</u>, <u>it won't hurt him</u>, and most of all ... it won't ridicule him if he makes a mistake.

One of the best ways to generate leads and customers is to offer to demo the TRS-80 for various groups at (or after) their meetings:

Computer clubs
Society of C.P.A.'s
Lawyers group
Engineers
Teachers (especially Computer Science)
Pharmacists
Doctors & Medical Societies
Dentists
Lions
Rotary
Kiwanis
Airline Pilots Association
Hobby clubs (especially Ham Radio)
Etc., etc.

Most of these groups have a hassle every month trying to get a speaker that won't bore everybody to death. Personal computing is NEW AND FASCINATING! Offer to bring a speech (and/or demo) on the subject.

SELLING POINTS OF THE TRS-80

By now, you probably know most of these, but it won't hurt to go over a list of some of the key selling points:

... It's not a kit, no wiring or soldering is needed. Take it home, plug it in, and run.

... It is the lowest-priced Micro of its size and capability on the market today.

... It contains the Z-80 microprocessor chip. One of the most technically advanced (and most powerful) on the market.

... It is modular in design. This makes for easy expandability.

... It is backed up by Radio Shack's world-wide reputation for excellence in electronics retailing, and don't forget our network of repair centers.

... We have Two BASICS: Level I and the more powerful Level II. Very popular, and very learnable computer languages.

... We have peripherals: Two printers, expansion interface, and a mini-disk.

... We have software on the shelf and ready to run ... with more on the way.

... Our manuals (Level I and Level II) are the best in the industry.

... The TRS-80 power supply is UL listed for safety.

... The TRS-80 is compact in size. It can be used at the office by day, and in the home by night.

... The TRS-80 is a real product. We aren't just making promises; we have already delivered thousands.

... TRS-80 owners will receive regular newsletters and up-dates on programming techniques, etc.

... For business use, the TRS-80 is tax-deductible.

HOW TO MEET OBJECTIONS

There are some jealous folks out there, and they've been raising some objections about the TRS-80. The most common objections ... with answers, are listed below:

a) Radio Shack is selling a "toy."

ANSWER: This is absurd. Our TRS-80 literally has the memory capacity and computing power of an IBM computer that sold for $600,000 ten years ago.

b) TRS-80 is not compatible with S-100 bus.

ANSWER: One of the early computers in the game was the MITS ALTAIR with a bus structure called S-100. Since it came out, most of the peripheral makers have used this structure so that their device will hook onto an ALTAIR.

First of all, we are going to sell our own peripherals. And second ... we think that after a year or two, there will be so many TRS-80's out there that the TRS-80 bus structure will become the standard, and everybody else will adapt to it!

c) Level I BASIC is rather limited.

ANSWER: Depends on what you want to do with it. For a beginner, it's more than adequate. And for most home and office applications, it's adequate. If it's not adequate for your application, then we have Level II BASIC for only $99.00 ... and it is one of the most powerful BASICS on the market.

d) The cassette is too slow.

ANSWER: Again, it depends on the application. We can sell you a mini-disk for really efficient and speedy data storage. Oh yes -- under Level II BASIC, the cassette transfer rate is twice as fast as Level I.

e) You don't have the software I need.

ANSWER: This would probably be true in 99% of the microcomputer market. Nearly all hardware manufacturers do not provide "custom programming." There is an easy solution. Find yourself some "moonlight" programmers (or software consulting businesses) who do this kind of work, and refer the "custom software" customer to him. You sell him the hardware and the other guy can sell him the software.

f) What if my TRS-80 goes down?

ANSWER: With our repair center network, we are more able than anyone else in the business to have him up and running within a few days. If that's not good enough ... the TRS-80 is so cheap, sell him two so he'll have a backup system!

WHAT KIND OF CUSTOMER BUYS A TRS-80?

Recently we did a survey of some of the early buyers of the TRS-80, and this question can be answered by just listing some of the occupations:

Accounting
Admin. Manager
Aerospace civilian
Air Force
Airline mechanic
Analyst
Attorney
Automotive design
Banker
Building specialist
Businessman
Car dealer
Clergy
Clothing Manufacturer
Composer
Consultant
Contractor
Dairyman
Data processing
Dentist
Designer
Distributor
Doctor
Drilling company
Electrician
Electronic engineer
Electronic technician
Engineering
TV engineer
Entertainer
Film distributor
Film editor
Flying instructor
Hair stylist
Hobbyist
Importer
Insurance
Jailer
Landscaper
Maintenance
Plastic Manufacturer
Graphic design
Metal detection
Mining
Motorcycle dealer
Musician
Nurse
Optometrist
Pharmacist
Photographer
Physicist
Pilot
Plumber
Printer
Motion picture producer
Programmer

Does that answer your question? It's all over the board! You could let your fingers go walking through the yellow pages, and chances are that anywhere you stopped you would find a prospective customer for a TRS-80 system. Now that's not a bad idea for a slow day!

DON'T BE AFRAID TO ASK FOR A BIG ORDER

The TRS-80 is a big ticket. And some of our systems -- like the 32K "Business" System for $3874.00 -- is a really BIG ticket. Don't be frightened! Our 32K system at $3874.00 is the equivalent of many systems which are being advertised at $6,000 - $8,000 - and up to $20,000!

In fact, you will have some businessmen come in for a demo who are already thinking in terms of $10 grand! You think four thousand is a BIG ticket to him? No way! Don't be afraid to ask for it.

Some of your customers will be programmers or scientists/technicians who are using a time-sharing system that costs them up to $300 an hour when they use it. Is $600, or $800, or even $1,200 a big ticket to this customer? NO WAY!

Are we entering into a whole new ball-game with tickets of this size? YES ... and we are entering it confidently and expectantly because we plan to be NUMBER ONE in microcomputers!

Can your store double its annual volume just by getting your share of the microcomputer busines?

YES ... YES ... YES!

Think about it: An average ticket of, say $1,000 x 6 systems per week would do it for the average store.

IS that a big deal? Well, I can tell you it's a GOOD DEAL!

WHAT CAN YOU DO WITH A TRS-80?

The best way to answer this question is with another question: What are our customers already doing with the TRS-80? Appendix II contains excerpts from some of our customer mail ... real, live customers who already own a TRS-80, and have already found some things to do with it.

APPENDIX I

LET'S WRITE A PROGRAM!

YOU CAN LEARN TO PROGRAM

In this section, we want to introduce you to programming! That's right... you can learn to program a computer. This will not be an exhaustive lesson at all, but we will introduce you to some of the capabilities of the TRS-80, and a few of the commands that it understands:

A) VARIOUS CAPABILITIES

1) It can print statements, sentences...even paragraphs
2) It can calculate and compute
3) It can store and recall data

B) SOME COMMANDS THAT THE TRS-80 UNDERSTANDS

NEW	IF THEN
PRINT	INPUT
RUN	FOR-NEXT
LIST	CSAVE
CLS	CLOAD
END	GOTO

C) SOME ARITHMETIC THAT IT CAN DO

+	Add	=	Equals
-	Subtract	< >	Does not equal
*	Multiply	<	Is less than
/	Divide	>	Is more than

Now type into the computer...

10 PRINT "MY NAME IS TRS-80" and hit ENTER

The computer is waiting for your next instruction. So type

RUN

and the computer "RUNS" your program...which is to print out what you put in quotes.

Type LIST

And the computer "LISTS" your program, which is a one-line program:

10 PRINT "MY NAME IS TRS-80"

Now type NEW

And the computer erases your program and gives you a "NEW" slate to write on!

Now type into the computer...

10 CLS (Don't forget to hit ENTER)

20 PRINT "MY NAME IS TRS-80"

Then type RUN

What's happened? The computer has obeyed your instructions...as soon as you told it to RUN your program it proceeded to line 10 and cleared the screen, then it went to line 20 and printed MY NAME IS TRS-80...just like you programmed it!

What we did just now was to "dress up" the program. And notice that we have already used these commands: PRINT, RUN, LIST, NEW, and CLS.

So you know the TRS-80 can print out statements, etc. Let's see it calculate.

Type into the computer...PRINT 8 * 4 and hit ENTER

Not a bad little calculator, right? Well, let's give it a little harder problem.

Type into the computer..... 8 * (54/2) + 2345 - (468 * 3) and ENTER.

What happened? We've got a "bug"...anybody know what it is?

You guessed it (I hope!)...We forgot to tell the computer to PRINT the answer. Try it again. This time type in....PRINT 8 * (54/2) + 2345 - (468 * 3) and ENTER. Now that's pretty fast calculating.

What about the ability of the TRS-80 to store and recall data?

Let's illustrate this with two new commands: INPUT and IF THEN.

Type this program into your computer (type NEW to get a clear screen):

```
10  CLS
20  PRINT "THE TRS-80 TEST OF FAITH"
30  PRINT  (This just skips a line when we run...we're telling it to Print nothing)
40  PRINT  (Same as above)
50  INPUT "HOW MANY TRS-80'S DO YOU PLAN TO SELL THIS YEAR"; N
60  IF N < 1000 THEN 100
70  IF N > 1000 THEN 110
80  IF N =  1000 THEN 120
100 PRINT "THAT'S NOT A GOOD NUMBER"
110 PRINT " THAT'S A GOOD NUMBER...YOU ARE A PLANNER"
120 PRINT "HOW DID YOU KNOW WHAT I WAS THINKING?"
```

Then type RUN

Now the computer is asking you a question...so answer it with 500

Here's what you should see on your screen:

```
HOW MANY TRS-80'S DO YOU PLAN TO SELL THIS YEAR?500
THAT'S NOT A GOOD NUMBER
THAT'S A GOOD NUMBER...YOU ARE A PLANNER
HOW DID YOU KNOW WHAT I WAS THINKING?
```

What has happened?

The computer did exactly what you told it to do. Type LIST, and let's analyze our program.

The TRS-80 carries out instructions in line number sequence. It looks at line 10, then carries out that instruction...then it goes to line 20, carries out the instruction there, then on to line 30, and so on.

In our program, it got to line 50 and asked you a question. When you answered with 500, it then went to line 60 and tested your answer...it turns out that 500 is less than 1000, so the computer went to line 100 (just as it was told by the program) and printed what was there...just like we told it to.

BUT...it then went on to line 110 and printed out what was there, then on to line 120 and printed out what was there also. How can we be a little more precise in telling the computer what we want it to do?

What if we type:

```
105  END
115  END
```

so that the program ENDS after line 100, or line 110...if that's where the computer gets to?

Let's find out...type RUN, then enter 500

type RUN, then enter 1000

type RUN, then enter 1500

See what happens? We have told the TRS-80 more precisely what we want it to do. Now let's "dress up" the program just a little. Type LIST. Then ↑ KEY.

To put some spaces between the question and the answer, let's type some blank spaces in:

```
51  PRINT
52  PRINT
53  PRINT
```

Now type RUN....and answer the question with 500

Again " " " 1000

Again " " " 1500

See what we're doing? We're improving our program by adding some new lines (instructions) to the original program. Notice that we originally numbered our program in steps of 10, just in case we wanted to insert some lines later.

Now...let's do one more trick with this program. Let's build in a FOR-NEXT loop, and a GOTO command.

Type LIST

Look at your program (you will need to "scroll it up" by using the ↑ key).

Now type:

```
101  FOR X = 1 TO 1000
102  NEXT X
105  GOTO 50.  (This changes Line 105 from END to GOTO 50).
```

The FOR-NEXT loop just asks the computer to do some counting. In this case, 1 to 1000 (which takes about 2 seconds). It is literally looking at the instruction on line 101 and counting to one, then it goes to line 102 which tells it to go back and count to two, then line 102, then line 101...and so on until it gets to 1000. Fast little devil, isn't it?

Now...when it gets to 1000, then it goes on to line 105 which tells it to go to line 50. Line 50 asks the question again, and down through the program it goes...following instructions exactly and precisely!

Now type RUN, and answer the question with 500.

See what happened? Now answer the question with 1000, and you will see the computer move on to line 120, just like you told it to!

Let's learn two more commands before we quit: CSAVE and CLOAD.

Put the blank cassette in your recorder, making sure that it is wound past the leader. Then depress the Record and Play buttons on the recorder. Now type CSAVE and Enter.

You are now "reading" your program out onto the cassette tape. When it is finished "reading," it will stop. Wait for a READY message.

Type NEW to erase your program from the computer's memory. Now type CLOAD on the computer and press the Rewind button on the recorder. When it stops rewinding, press STOP and then PLAY on the recorder. Watch for the flashing asterisks on your screen.

The computer is now "reading" your taped program back into its memory. When it has stopped it will signal READY, and then type LIST.

VOILA! Your program is back.

Isn't this fun? Why don't you get yourself a Level I USER'S MANUAL, and get down to some really serious learning?

BE CAREFUL! You just might find yourself right smack in the middle of THE WONDERFUL WORLD OF PERSONAL COMPUTING!

APPENDIX II

TRS-80 APPLICATIONS

CUSTOMER COMMENTS

Radio Shack®
A TANDY CORPORATION COMPANY
NATIONAL HEADQUARTERS
1600 One Tandy Center, Fort Worth, Texas 76102 • 817-390-3011

January 28, 1978

MEMORANDUM

TO: L. KORNFELD

FROM: C. RAY

SUBJECT: TRS-80 APPLICATIONS

Lew, the following are excerpts from some of our customer mail:

"I have a number of ideas for using the microcomputer in higher education...administrative uses, CAI (computer-assisted instruction), and instruction on the use of microcomputers themselves."

- University professor

"I own a business advisory type of business which uses a service bureau approach to business problems."

- Small businessman

"I have convinced my organization that your instrument can fulfill the numerous statistical and data manipulation needs of a clinical hospital laboratory. I have written a quality control program which is usable in any clinical laboratory in the United States."

- Hospital employee

"Although my order was a personal one, it is my intention to use the TRS-80 in a secondary computer science program..."

- Science teacher

"We would like to be able to have a low-cost in-house system that would alleviate our present needs for service bureaus. I congratulate you on a wonderful product and look forward to seeing the new 'stuff'."

- Certified Public Accountant

"You may not know of the considerable attention and effort that has been expended in the last seven years by chemists at various colleges and universities...in implementing various forms of CAI in the field of chemistry. One of the major hurdles...is the diversity of computers and software around the country. I believe that with the economies offered by your systems, many chemistry departments will be attracted to the Radio Shack microcomputer."

- Chemistry professor

"I own a TRS-80 with 16K RAM. I would like to pruchase the Level II Basic. I am well satisfied with the results I have obtained with Level I Basic, but I would like to move on to bigger and better things."

- A lawyer

"One of the biggest problems that many trophy retailers have is keeping track of inventory due to the variety and sizes of figurines and parts. A retailer told me about a new computer that your company makes that can keep track of inventory...selling for $600."

- Trophy industry newsletter

"I purchased your payroll program and your checkbook program, but these two items will work for only about one-half of my clients. I need a General Ledger program..."

- Accountant

"In the course of doing private consulting work, I have recently been asked by several people to look into the possibilities of a small system of hardware and software for their particular needs. Because their companies are quite small, they cannot go into any great expense... They have asked me if I could put together a package of simple but specialized programs that could be handled by your TRS-80 computer."

- Computer Science professor

"Your microcomputer system TRS-80 has been selected to demonstrate our program for diagnoses in Internal Medicine, but we are not sure if this device can be used in Europe..."

- Dutch M. D.

"You already know you have a good system and your manual will be very helpful to a novice to computers."

- Customer

"While the old line engineers might not agree, I believe that your company has done a real service for us ole timers trying to learn a new science, yes I am past three score and ten, but believe me it is wonderful to still be able to learn some new science...now I am hooked on the computer."

- Customer

"I will pass on some neat programming ideas later. However, for us computer buffs...how about a book of schematics, signal flow charts..."

- Customer

"We are using our TRS-80 as part of our office equipment. We have an owner in the business who had programming at Georgia Tech, and he has made us a program for our time payment sales. The program includes our finance charge rate and the insurance premium rate so all the displayed figures are correct and we do not have to use charts or calculate rates. This is a real timesaver..."

- Customer

"You guys are nuts, but great nuts...we are having a ball with these machines in the office. We have four more coming. Keep us informed on new programming and additional equipment."

- Customer

"Just great; super; Now that's the way to teach BASIC. The heck with all the esoteric, cybernetic, useless info. Computers are FUN and that's the name of the game. Thanks for the best thought out, implemented, ROM BASIC computer in the marketplace. I love it!!!!"

- Customer

"At last, a book that assumes the user doesn't know 'boo' about programming."

- Customer

"I like the TRS-80 system, and would like to add to it as new items come out. I can see that I will need Level II Basic as I am a fishery biologist and will need to set up programs dealing with statistical analysis."

- Customer

"I have had my machine since early December, and I have learned and applied all the functions. It's been fun!"

- Customer

"FANTASTIC MACHINE!"

- Customer

"We are considering using the TRS-80 for controlling industrial equipment in the plant...we have an immediate need to control a furnace."

- Customer

"I have been a user of computer systems for quite some time. Your manual and my new 16K TRS-80 opened the door to 'how it all happens'."

- Customer

"Hurrah for Radio Shack, it's about time that someone with financial muscle got into the hobby computer field who can do things properly. Your manual will be great for the average person and will teach a few new tricks to us old timers."

- Customer

"I plan to use the TRS-80 to alphabetize word lists."

- Customer

"Altogether, I am delighted with the TRS-80. I can barely control my impatience to get the expanded memory and the advanced Basic. Please hurry!"

- Customer

"I have written several game programs so far and having a ball learning TRS-80...wife scared of it! Am in a hurry for floppy disk, hope it's out soon."

- Customer

"I would appreciate any information relative to submitting programs to Radio Shack for sale."

- Customer

"Good grief! When we first got the machine we stayed awake till 3 A.M. (fourteen year-olds never sleep!). We finally got to the point of being able to go almost a whole day without turning it on when your manual came...another 3 A.M. deal. Would you folks be interested in a bunch of games we've written for the TRS-80 Basic?"

- Customer

"I use it for both home and work and everybody thinks it's just great. I am in the U. S. Army as the Calibration Chief for this area and I hate paper work, this is where my TRS-80 really comes in handy. It saves me from 2 to 3 hours a day."

- Customer

"By far the best manual I have ever read! That includes IBM, Honeywell, DEC, Westinghouse, Intel, Altair and others."

- Customer

"I had no previous computer or programming experience at all and yet I feel I understand the system pretty well. I have done a number of my own programs including income tax, plotting Dow Jones averages for last year, considerably elaborated on your personal finance package..."

- Customer

"My daughter (9 years old) is in chapter 4 and doing very well. My wife is in chapter 3 (she just began). My 7 year old daughter is not learning programming yet but does practice math skills on some teaching programs I have developed."

- Customer

APPENDIX III

A GLOSSARY OF PERSONAL COMPUTING BUZZ WORDS

Absolute address: An address that is permanently assigned by the machine designer to a storage location.

Absolute coding: Coding that uses machine language instructions with absolute addresses and which the computer can execute without prior translation.

Access time: The time interval between the instant data are called out from the storage unit and the instant they are delivered to the processing unit (read time). The time interval between the instant data are requested to be stored and the instant at which storage is completed (write time).

Acoustic coupler: A computer peripheral need not be located close to the main computer. It can communicate with the main communicator by transferring numbers back and forth over telephone lines, for transmission over telephone lines; numbers are specially coded as a series of tones. An acoustic coupler transforms numbers into a series of tones, or transforms a series of tones into numbers.

Address: A name, label, or number which identifies a location in storage.

Algorithm: A computational procedure for solving a problem. When properly applied, an algorithm always produces a solution to the problem.

Alphanumeric: Fields containing both alphabetic and numerical characters.

Analog computer: A computer that makes analogies between numbers and directly measurable quantities such as voltage, rotations, and so on.

Analog-to-digital converter: An analog-to-digital converter changes the magnitude of voltages into numbers that can be read by a computer.

ANSI: American National Standards Institute. An organization that acts as a national clearinghouse and coordinator for voluntary standards in the United States. Formerly the USA Standards Institute (USASI) and American Standards Association (ASA).

Array: A series of related items, e.g., a table of numbers.

ASCII code: American Standard Code for Information Interchange. A seven-bit code used on many present day computers.

Assemble: To prepare a machine language program from a symbolic language program.

Assembler: A computer program used to translate a program written in a symbolic programming language into a machine language program.

Assembly language: A programming language which allows a computer user to write a program using mnemonics instead of numeric instructions. It is a low-level, symbolic programming language which closely resembles machine code language.

Asynchronous: A term applied to a computer in which the execution of one operation is dependent on a signal indicating that the previous operation has been completed, rather than on a fixed time cycle.

Backspace: The process of returning a magnetic tape to the beginning of the preceding record.

BASIC: Beginners All-purpose Symbolic Instruction Code. An easy-to-learn and easy-to-use programming language developed at Dartmount College. BASIC can be used to solve business problems as well as scientific application.

Baud: A term used to define the signalling speed of information in a computer (typically relating to input and output). It is the number of bits of information per second.

BCD: Binary Coded Decimal code. A decimal notation in which the individual decimal digits are each represented by a group of binary digits.

Binary: The two-digit (bit) number system based on 0 and 1. Gates are electronic circuits that are either on or off; these two states can represent the binary bits 0 and 1.

Binary digit: In binary notation, either of the digits, 0 or 1.

Binary notation: A number system written in base two notation.

Bistable: Refers to a device capable of existing in one or two states – e.g., a switch is ON or OFF.

Bit: An abbreviation of "binary digit".

Bit rate: The rate at which binary digits, or pulse representations, appear on communication lines or channels.

Block: A set of things such as digits, characters, or words, handled as a unit.

Branch: A technique used to transfer control from one sequence of a program to another.

Bug: An error in the hardware or software of a computer.

Bus: A bus is a collection of wires connecting two or more major elements of a computer system, such as peripherals, memory, or a CPU. Numbers are transmitted from one device to another along the bus.

Bus controller: A bus controller is a piece of hardware connected to a bus. It controls the transmission of numbers along the bus from one device to another. It does not allow two or more devices to use the bus at the same time, thus confusing each other's messages.

Byte: A grouping of adjacent binary digits operated on by the computer as a unit. The most common size of byte contains eight binary digits.

CAI: Computer Assisted Instruction. A concept that applies computers and specialized input-output display terminals directly to individualized student instruction.

Call: A branch to a subroutine.

Carriage: A control mechanism for a typewriter or printer that automatically feeds, skips spaces, or ejects paper forms.

Carriage control tape: A tape that is punched with information to control line feeding of a printing device.

Cathode ray tube: The cathode ray tube, or CRT, is a vacuum tube very much like a television picture tube. Pictures can be drawn on the face of the tube under the control of the computer.

Central processing unit: The central processing unit, or CPU, is the part of a computer system that fetches instructions, in numerical form, from the memory of a computer and executes those instructions, thus controlling peripheral devices or modifying memory locations.

Chain printer: A printer with print characters located on a continuous steel chain.

Chaining: A process of linking a series of programs or operations together.

Character: A symbol, mark, or event which a data processing machine can read, write, or store. It is used to represent data to a machine.

Chip: Computer jargon for the tiny silicon slices used to make electronic memories and other circuits. A single chip may have as many as 30,000 electronic parts!

Checkout: See *Debug.*

Circuit Board: A rigid fiberglass or phenolic card upon which various electronic parts are mounted. Printed or etched copper tracks connect the various parts to one another.

COBOL: COmmon Business Oriented Language: A procedure oriented programming language developed for programming business data processing problems.

Code: A representation by which meaning is assigned to groups of characters or symbols.

Command: See *Operation code.*

Compare: To examine the representation of a quantity to determine its relationship to zero or to examine two quantities usually for the purposes of determining identity or relative magnitude.

Compile: To generate a machine language program from a computer program written in a high-level source language.

Computer: A calculating device which processes data represented by a combination of discrete data (in digital computers) or continuous data (in analog computers).

Computer word: A fixed sequence of bits or characters treated as a unit capable of being stored in one storage location.

Data: Information; often numerical information.

Data base: A comprehensive data file containing information in a format applicable to a user's needs and available when needed.

Data collection: The gathering of source data to be entered into a data processing system.

Data conversion: The process of changing the form of data representation — for example, converting punched card to magnetic tape.

Data-phone: The name applied by A. T. & T. to the members of a family of devices used for providing data communication over telephone facilities.

Data processing: A term used in reference to operations performed by data processing equipment.

Data word: See *Word.*

Debug: To detect, locate, and remove all mistakes in a computer program and any malfunctions in the computing system hardware itself.

Decision: The computer operation of determining whether a certain relationship exists between words in storage or registers and then taking alternative courses of action.

Decision table: A table consisting of all decisions that are to be considered in a problem, together with the actions that are to be taken as a result of those decisions. Decision tables are often used instead of flowcharts to describe the operations of a program.

Degausser: A device that is used to erase information from magnetic tape.

Desk checking: The process in which the computer user checks a program prior to executing it on a computer. It involves using sample data and working it manually ("stepping") through the program.

Diagnostic routine: A routine designed to locate a malfunction in a computer.

Digital-to-analog converter: A digital-to-analog converter changes numbers that can be read by a computer into magnitudes of voltages.

Direct access storage: Pertaining to the process of obtaining data from or placing data into storage where the time required for such access is independent of the location of the data most recently obtained or placed in storage. Also called random access storage.

Disk: See *Floppy Disk.*

Diskette: See *Floppy Disk.*

Display unit: A device which provides a visual representation of data. See *CRT.*

Documentation: The general process of logically organizing information, which will be generated in producing a computer program, into a useful file that continually reflects the current state of the program.

Downtime: A time period during which the computer system is malfunctioning.

Dump: Printing all or part of the contents of a storage device.

Duplicate: To reproduce data without altering the original data.

EBCDIC: Extended Binary Coded Decimal Interchange Code. An eight-bit code used for data representation in several computers including the IBM System/360 and System/370 computers.

Edit: To rearrange data or information. Editing may involve the deletion of unwanted data, the selection of pertinent data, the application of format techniques, the insertion of symbols (such as page numbers and typewriter characters), the application of standard processes (such as zero suppression), and the testing of data for reasonableness and proper range.

EDP: Electronic Data Processing.

Emulate: To imitate one system with another, such that the imitating system accepts the same data, executes the same programs, and achieves the same results as the imitated system.

Emulator: A hardware device that causes a computer to behave as if it were another computer.

End of file: Termination or point of completion of a quantity of data. End-of-file marks are used to indicate this point on magnetic tape files.

Execute: To perform the operations specified by a computer instruction (program).

Fetch: To obtain data from a location in storage.

Field: A column or group of columns in a punch card allocated for punching a particular category of data.

File: An organized collection of related data. For example, the entire set of inventory master data records make up the Inventory Master File.

Floppy Disk: A flexible plastic disk coated with the same magnetic material used to make recording tape. The disk stores computer information on fifty or more tracks around its surface.

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.

Flowchart symbol: A symbol used to represent operation, data, equipment, or flow on a flowchart.

Flowchart template: A plastic guide containing cutouts of the flowchart symbols that are used in drawing a flowchart.

Format: The general makeup of items, including arrangement and location of all information.

FORTRAN: FORmula TRANslation. A procedure-oriented programming language designed for programming scientific-type problems.

Garbage: A term often used to describe incorrect answers from a computer program; often a result of an equipment malfunction or a mistake in a computer program.

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.

Hard copy: The permanent printout of a program or its results produced by a printer connected to a computer.

Hardware: The circuit boards and electronic parts inside a computer.

Inquiry: A request for information from storage.

Instruction: A set of characters used to define a basic operation and tell the computer where to find the required data needed to carry out this operation.

Instruction format: The makeup and arrangement of a computer instruction.

Instruction word: A computer word which contains an instruction.

Integer: A whole number which may be positive, negative or zero. It does not have a fractional part. Examples of integers are 26, –417, and 0.

Integrated circuit: A micro-miniature electronic circuit produced on a single crystal of silicon.

Interface: A common boundary between two pieces of hardware or between two systems.

Interrupt: To temporarily disrupt the normal execution of a program by a special signal from the computer.

K: Short for Kilo meaning thousand. Used to designate memory capacity . . . thus a 4K memory has approximately 4,000 storage elements.

Key: One or more characters within a data record used to identify the record or to control its use.

Keyboard: A typewriter-like panel of switches and keys used to enter programs and data into a computer.

Label: An identifier or name which is used in a computer program to identify or describe an instruction, a message, data values, a record, an item or a file.

Language: A set of representations, conventions, and rules used to convey information.

Least significant: The character or bit in the rightmost position of a number.

Left-justified: The aligning of a group of characters according to the leftmost (most significant) characters.

Level 1 BASIC: A set of easy English word instructions used to program a microcomputer.

Level 2 BASIC: An expanded form of BASIC that increases programming capability and adds ability to work with other accessory devices.

Library: A collection of standard, proven routines and subroutines which are accumulated and stored on magnetic tapes, magnetic discs, or magnetic drums for future use.

Library routine: A checked-out routine that is maintained in a program library.

Line printer: An output unit used to record computer output in the form of printed characters.

Logical decision: Generally a decision as to which one of two possible courses of action is to be followed.

Loop: A sequence of program instructions which are repeated until a predetermined terminal condition is achieved.

Low-level language: A computer programming language which is closely related to the internal binary language of a digital computer. Assembly language is an example of this type of language.

Low order: The rightmost (least significant) digit in a number.

LPM: Lines Per Minute.

Master file: A main reference file of data.

Machine independent: A term used to indicate that a program is developed in terms of the problem rather than in terms of the characteristics of the computer system.

Machine instruction: An instruction that a machine can recognize and execute.

Machine language: Basic language of a computer. Programs written in machine language require no further interpretation by a computer.

Macro instruction: An instruction in a source language that is equivalent to a specified sequence of machine instructions.

Memory: Any of the many devices (ROM's, RAMs, floppy disks, magnetic tapes, etc.) that store computer programs and data.

Microprocessor: The central processing unit of a computer assembled on a single silicon chip.

Microcomputer: A computer made by combining a microprocessor with some memory. Microcomputers are small in size, not performance.

Microelectronics: The field which deals with techniques for producing miniature circuits — for example, integrated circuits, thin film techniques and solid logic modules.

Microsecond: One millionth of a second. Abbreviated μs.

Millisecond: One thousandth of a second. Abbreviated *ms.*

Monolithic integrated circuit: A class of integrated circuits wherein the substrate is an active material such as the semiconductor silicon.

Most significant: The leftmost digit in a number.

Nanosecond: One billionth of a second. One thousandth of a millionth of a second. Abbreviated *ns.*

Nonvolatile storage: A storage media which retains its data in the absence of power.

Off-line: Peripheral units which operate independently of the central processing unit; devices not under the control of the central processing unit.

On-line: Peripheral devices operating under the direct control of the central processing unit.

Object program: A computer program in the internal language of a particular computer; the machine language equivalent of a source program. Contrasted with *source program.*

Operation code: The portion of an instruction which designates the operation to be performed by a computer — e. g., add, subtract, or move. Also called a "command".

Output: Data transferred from a computer's internal storage unit to storage or an output device. The means by which data leaves a computer. Often a television monitor or printer.

Output unit: A device capable of recording data coming from a computer's internal storage unit — e. g., card punch, line printer, cathode ray tube display, magnetic disk, or teletypewriter.

Overflow: The result of some number exceeding the capacity of one of the storage registers in the central processing unit.

Parameter: A variable that is given a constant value for a specific purpose or process. Parameters are often used in computer programs to identify data values.

Parity bit: A binary digit added to a group of bits to make the count of all on-bits odd or even in order to conform with the design of the machine.

Parity check: A check which determines whether the number of ones in a character, byte or word is odd or even. Also called "odd-even check".

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.

Precision: The degree of exactness with which a quantity is stated. The result of a calculation may have more precision than it has accuracy; for example, the true value of pi to six significant digits is 3.14159; the value 3.14162 is precise to six digits, given to six digits, but is accurate only to about five .

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: An economical microcomputer designed for use by small businesses, schools and computer hobbyists.

Preventive maintenance: The process used in a computer system which attempts to keep equipment in continuous operating condition by detecting, isolating and correcting failures before occurrence. It involves cleaning and adjusting the equipment as well as testing the equipment under both normal and marginal conditions.

Primary storage: See *Internal storage.*

Printer: A computer output mechanism that delivers hard copy data.

Procedure: A precise step-by-step method for effecting a solution to a problem.

Procedure-oriented language: A programming language designed for the convenient expression of procedures used in the solution of a wide class of problems — e.g., FORTRAN, COBOL, APL and PL/I.

Program: The list of instructions or statements that tells a computer what to do.

Program language: A language which is used by computer users to write computer programs.

Programmer: A person who writes programs. Usually a professional.

Program specifications: A document which identifies the data requirements of a system, files required, input-output specifications and the processing details.

Radix: The quantity of characters or digit symbols required by a number system. Same as base.

System	Radix
Binary	2
Octal	8
Decimal	10
Hexadecimal	16

RAM: (Random Access Memory) A temporary memory, i.e. one in which data can be stored so long as power is applied. RAMs store the data that's typed into the keyboard of a microcomputer.

Real-time system: A system where transactions are processed as they occur.

Record: A group of related items of data treated as a unit; e.g., the Inventory Master Record. A complete set of such records form a file.

Record length: A measure of the size of a record, usually specified in units such as words, bytes or characters.

Recording: The process by which an input unit facilitates the presentation of source data for processing.

Register: A temporary storage device used by the computer to store a specified amount of data, such as one word.

Reliability: A measure of the ability to function without failure.

Relocate: To move a routine from one portion of storage to another and to adjust the necessary address references so that the routine, in its new location, can be executed.

Remote processing: The processing of computer programs through an input-output device that is remotely connected to a computer system.

Remote station: An input-output device that is located at a remote distance from a computer system. It is used to input programs and data to a computer and to accept computed answers from a computer. Also called a "remote terminal".

Remote terminal: See *Remote station.*

Repertoire: The complete set of instructions that belongs to a specific computer or family of computers.

Right justification: The aligning of a group of characters according to the rightmost (least significant) characters.

ROM: (Read-Only Memory). A permanent memory, i.e., one in which data is stored permanently whether or not electrical power is applied.

Routine: A set of functionally related instructions which directs the computer to carry out a desired operation. A subdivision of a program.

Semantics: The meaning of a language.

Sense: (a) To examine, particularly according to some defined criterion. (b) To determine the present arrangement of some element of hardware. (c) To read holes punched on a card or tape.

Sequence: An arrangement of items according to a specified set of rules.

Sequence check: A check used to prove that a set of data is arranged in ascending or descending order.

Sequential: Pertaining to the occurrence of events in time sequence, with little or no overlap of events.

Sequential file: A file on which information is stored in the same order in which it is accessed by the central processing unit.

Statement: A single line of a computer program containing a single instruction like PRINT, LET, RUN, etc.

Storage capacity: The number of items of data which a storage device is capable of containing. Frequently defined in terms of computer words or by a specific number of bytes or characters.

Storage device: A device used for storing data within a computer system — e.g., core storage, magnetic disk unit, magnetic tape unit, magnetic drum unit, etc.

Storage location: A position in storage where a character, byte or word may be stored.

Software: Computer programs written on paper or stored on magnetic tape or a floppy disk.

Subroutine: A subroutine is a program used repetitively by a main program to perform a fixed task.

Subscript: The notation used to refer to a particular element of an array in a programming language — e.g., in the array label TABLE (4), the subscript 4 is used to identify the fourth item in the array named TABLE.

Subscripted variable: A variable which is part of an array and is referred to by using subscript notation — e.g., AREA (4).

Terminal: An input device such as a keyboard; an output device such as a printer or TV monitor; or both.

Table lookup: A method of searching a table to locate items of a certain type or value.

Time-sharing: A method of operation whereby a computer system automatically distributes processing time among many users simultaneously.

Trace: An interpretive diagnostic technique which provides an analysis of each executed instruction and writes it on an output device as each instruction is executed.

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.

Update: To search a file, select an entry, perform an operation on the entry and replace it in the file.

Validity check: A method of detecting unreasonable results produced by a computer.

Variable: A quantity that can assume any of a given set of values.

Volatile storage: A storage medium in which data cannot be retained without continuous power dissipation.

Word: An ordered set of characters which occupies one storage location and is treated by the computer circuits as a unit. Ordinarily, a word is treated by the control unit as a quantity. Word lengths may be fixed or variable depending on the particular computer.

Word length: The number of bits, bytes or characters in a word.