

# SOLAR EXPLORER

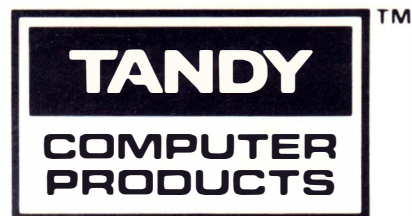
An Electronic Book Program

**Radio Shack®**

Cat. No. 26-2546  
Requires TRS-80® 32K Color Computer  
with Extended Color BASIC  
and TRS-80 Electronic Book™  
(Cat. No. 26-3141)



# Solar Explorer



COMPUTER  
ASSISTED  
INSTRUCTION

Cat. No. 26-2546

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The Solar Explorer program from Radio Shack® allows the student to investigate the solar system. With this courseware, the learner becomes an explorer traveling through the solar system and collecting facts about the planets and Earth's moon. The student's knowledge of the information obtained can then be checked with a "master data file" which quizzes the explorer on what he or she has discovered. This program is ideal for use at school or in the home. Solar Explorer is designed for use with a 32K TRS-80® Color Computer cassette system with Extended Color BASIC or disk system with Disk Extended Color BASIC. A TRS-80 Electronic Book™ (Cat. No. 26-3141) is also required.

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# Solar Explorer

**Radio Shack®**



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FORT WORTH, TEXAS 76102

**First Edition**

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# INTRODUCTION

Solar Explorer is an interactive science learning program for use with the TRS-80® Color Computer and the TRS-80 Electronic Book. The program provides an entertaining way for the student to learn some basic facts about the planets of the solar system and Earth's moon. The facts presented include the planet's distance from the sun, the length of its year, the number of known moons it has, and information on its temperature, diameter, gravity, density, mass, and atmosphere. Solar Explorer also includes a multiple-choice quiz over the program content. This quiz checks what the student has learned from his or her investigations.

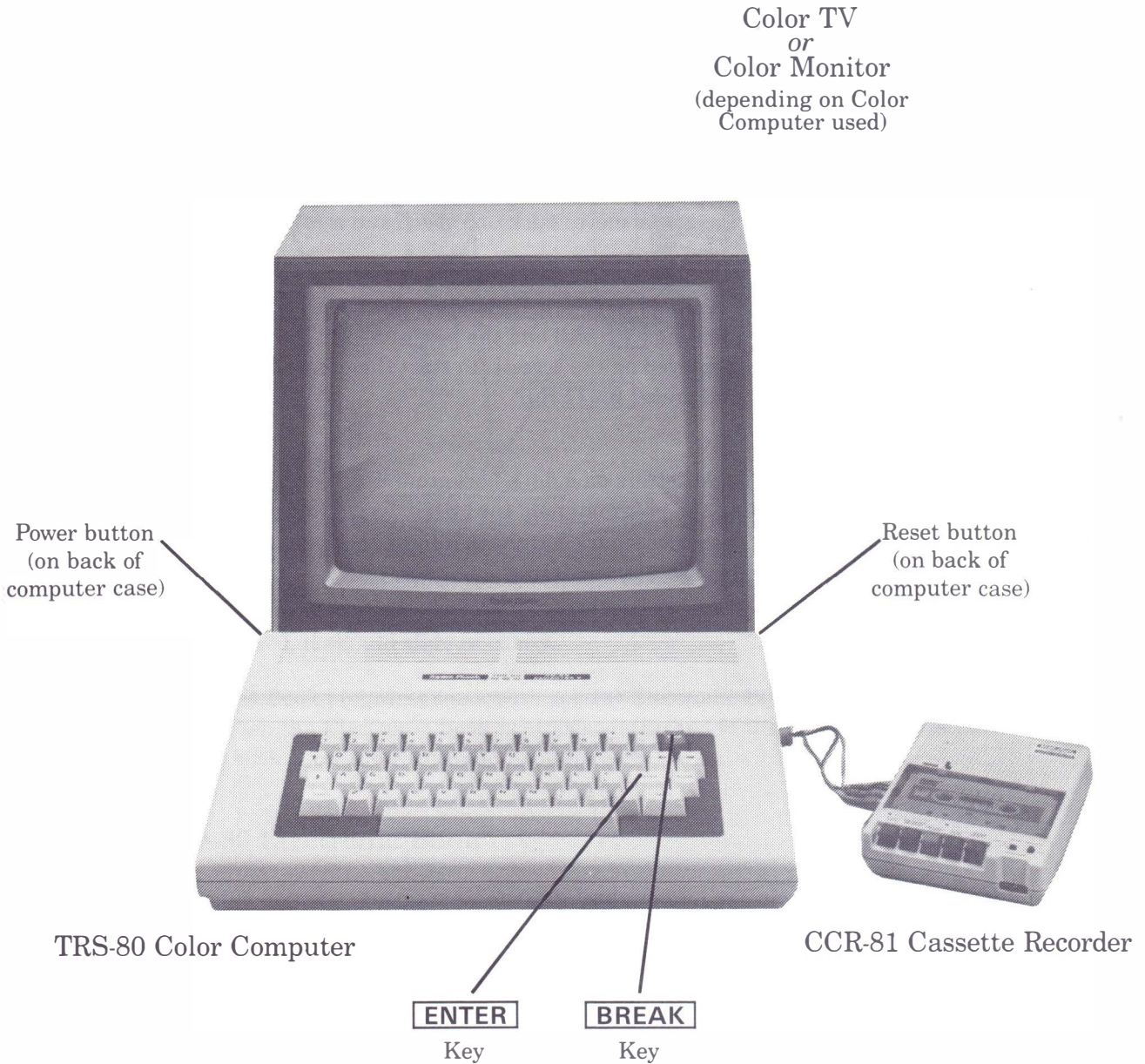
This manual contains a User's Guide which explains how the Electronic Book is used with the Solar Explorer program, and provides a step-by-step demonstration of how the program works. There is also a Solar Explorer Data Sheet which can be duplicated and used to record the data presented in the program. At the end of the manual you'll find appendices with additional information about how to use your TRS-80 Color Computer.

Solar Explorer can be used with a 32K TRS-80 Color Computer tape system (with Extended Color BASIC), or a 32K TRS-80 Color Computer disk system (with Disk Extended Color BASIC). It can also be used with the Radio Shack Network 2 system with a Color Computer host and Color Computer student stations.



# THE TRS-80 COLOR COMPUTER

Before loading the program into the TRS-80 Color Computer, take a moment to familiarize yourself with the computer. Here are the major components you'll need to know:



**Note:** If you are setting up your TRS-80 computer system for the first time, refer to the user's manual packed with each TRS-80 system for instructions. (Disk system users, see the *Color Computer Disk System Owner's Manual* for information on the components of the disk system.)

Now let's take a moment to look at some special keys and features.



## SPECIAL KEYS AND FEATURES

■ This flashing box is called a “cursor.” When it appears, you can enter information into the computer.

OK ■ The “OK” prompt and the cursor appear on the video display whenever the computer is waiting for a command. (An example of a command is: **R** **U** **N** **ENTER**.)

**ENTER** This key is used to enter information into the computer. Remember to press **ENTER** after you have typed a response.

**←** The “left-arrow” key can be used to erase characters when you are typing a command into the computer. Each time you press this key, the cursor moves back one space and erases the character in that space.

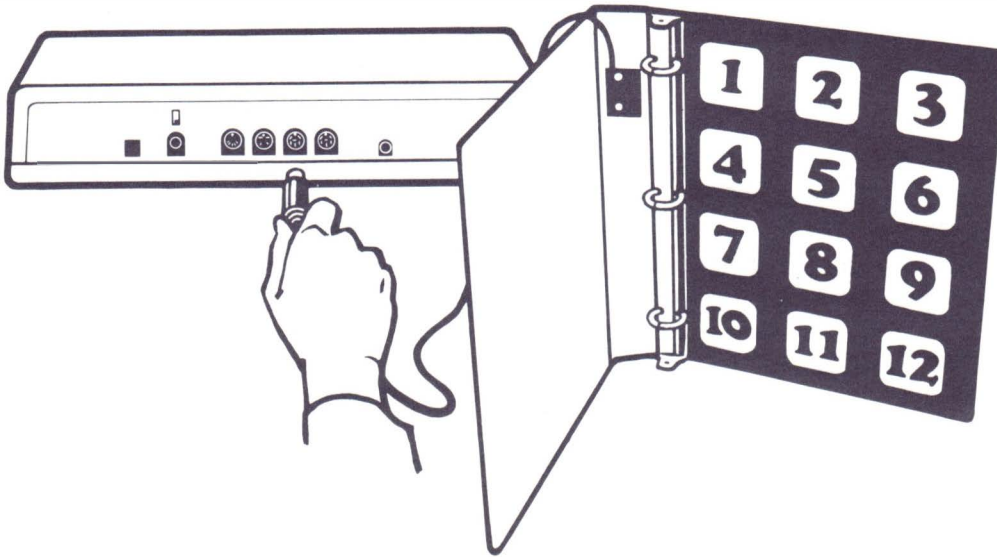
**SHIFT T** Pressing **SHIFT T** (holding down the **SHIFT** key while pressing **T**) will end the program. You’ll then see the “OK” prompt displayed on the screen. To start the program again, type **R U N** and press **ENTER**.\*

\* If reverse-video letters (light letters on a dark background) are displayed when you type at the keyboard after ending the program, hold the **SHIFT** key and press the **0** key to switch back to regular characters (dark letters on a light background). Typing a command in reverse-video letters will cause a syntax error.

# THE TRS-80 ELECTRONIC BOOK

## Setting Up

Let's take a look at the TRS-80 Electronic Book and how it fits into your system.



The TRS-80 Electronic Book is designed for use with special TRS-80 Color Computer Electronic Book programs. It plugs right into your Color Computer system; no special adaptors or connectors are required. Plug the rounded end of the Electronic Book's cable into the "RIGHT JOYSTICK" port on the back of the Color Computer. Do not force the plug; when the pins and holes are properly aligned, it should slide in easily.

Radio Shack Electronic Book programs come with special Electronic Book pages to be used with the program. When the Electronic Book is properly attached to the Color Computer, insert these pages into the book. Now the Electronic Book is ready for use with the program.

## Using the TRS-80 Electronic Book

The Electronic Book is an easy way for children to interact with the Color Computer. A child enters commands into the computer by pressing marked areas on the pages of the Electronic Book instead of pressing keys on the computer. The Electronic Book can be used on most surfaces, but for best results a firm, flat surface is recommended.

# LOADING THE SOLAR EXPLORER PROGRAM

**Note:** It is a good idea to make a backup copy of the Solar Explorer program before you use it for the first time. The original copy can then be stored in a safe place. The directions for making backup copies are in Appendix I.

To load the program into the Color Computer, follow the steps listed below under “Using the TRS-80 Color Computer Tape System” or “Using the TRS-80 Color Computer Disk System.”

## Using the TRS-80 Color Computer Tape System

Set up and connect the Color Computer, color monitor or TV, and cassette recorder according to the instructions in the *TRS-80 Color Computer Operation Manual*. Insert the Solar Explorer Electronic Book pages into the Electronic Book. Attach the Electronic Book to the computer at the “RIGHT JOYSTICK” port located on the back of the computer. Then follow the steps below:

1. Turn on the color monitor or TV, and set the volume at a normal listening level. If you are using a television, select channel 3 or 4 (whichever is weaker or not used in your area). Then select the same channel on the “CHANNEL SELECT” switch at the back of your computer.
2. Turn on the computer by pushing in the power button on the back of the computer. You’ll see this message appear on the video screen:\*

```
EXTENDED COLOR BASIC v.r  
COPYRIGHT (C) 1982 BY TANDY  
UNDER LICENSE FROM MICROSOFT  
OK
```

If you don’t see this message, turn your computer off and on again. Adjust the brightness and contrast on your TV set. Check all connections. If you still don’t see the message, refer to the “Troubleshooting and Maintenance” section of your *TRS-80 Color Computer Operation Manual*.

3. Place your *backup* copy of the Solar Explorer program cassette in the cassette recorder.
4. Set the volume level of the cassette recorder to between 5 and 7.
5. Press “REWIND.” When the cassette tape is completely rewound, press “STOP,” then press “PLAY.”

\* In place of “v.r”, you’ll see two numbers that specify which version and release of Extended Color BASIC you have.

6. Type **C** **L** **O** **A** **D** and press **ENTER**. The computer will search for and load the program. While the computer is searching for the program, the letter “**S**” will be displayed in the upper-left corner of the video screen. When the computer finds the program, the letter “**F**” followed by “**SOLAR**” will appear. When the program has been loaded, the “**OK**” prompt will reappear.

**Note:** If you get an error message while loading the program, the volume on the cassette recorder could be too low or too high. You should:

- press the “STOP” button on the cassette recorder
- turn the volume a little higher or a little lower
- press the RESET button on the back of the computer
- repeat the instructions from Step 5 above.

If consistent loading problems develop, take your computer cassette recorder to your local Radio Shack store or Computer Center for proper balance, azimuth alignment and cleaning.

7. When the “**OK**” prompt has reappeared, type **R** **U** **N** and press **ENTER**. You’ll see a copyright screen, then the title screen, appear on the video display.

To begin working with the Solar Explorer program, turn to page 11 in this manual.

## Using the TRS-80 Color Computer Disk System

Set up and connect the Color Computer and color monitor or TV according to the instructions in the *TRS-80 Color Computer Operation Manual*. Insert the Solar Explorer Electronic Book pages into the Electronic Book. Attach the Electronic Book to the computer at the “RIGHT JOYSTICK” port on the back of the computer. Then follow the steps below:

1. Connect the disk system to the Color Computer. If this is the first time you’ve used the Color Computer disk system, follow the instructions in Chapter 1, Part A, of the *Color Computer Disk System Owner’s Manual*.

**Note:** Always remember to insert the disk controller cartridge *before* you turn *on* the power, and to turn *off* the power *before* you remove the disk controller cartridge. (In other words, *never* insert or remove the disk controller while the power is *on*.)

2. Turn on the color monitor or TV, and set the volume at a normal listening level. If you are using a television, select channel 3 or 4 (whichever is weaker or not used in your area). Then select the same channel on the “CHANNEL SELECT” switch on the back of your computer.
3. Turn on the computer. The power button is on the back of the computer on the left side.



4. Turn on the disk drive(s). The power switch is on the back of the disk drive. You'll see this message appear on the video screen:\*

**DISK EXTENDED COLOR BASIC v.r**  
**COPYRIGHT (C) 1982 BY TANDY**  
**UNDER LICENSE FROM MICROSOFT**  
**OK**

If you don't see this message, turn off the computer, check the connections, and turn the computer on again. You may also need to check the contrast and brightness on your TV set.

5. Insert your *backup* copy of the Solar Explorer program diskette into Drive 0 (the disk drive closest to the computer on the cable) with the square notch up and the label facing right. Close the disk drive door.
6. Type **R U N " S O L A R "** and press **ENTER** . You'll see a copyright screen and then the title screen on the video display.

To begin working with the Solar Explorer program, turn to page 11 in this manual.

\*In place of "v.r", you'll see two numbers that specify which version and release of Disk Extended Color BASIC you have.

## **USER'S GUIDE**

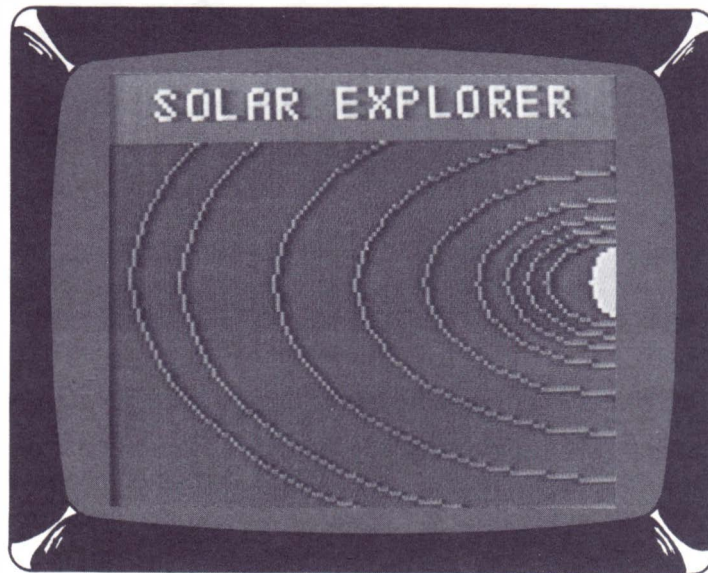


## USING THE SOLAR EXPLORER PROGRAM

**Note to the parent or teacher:** Depending on the age of the learner, you may want to work through this demonstration with him or her. Or, you may want to work through this demonstration by yourself and then explain the program to the learner or group of learners.

Now let's look at how the Solar Explorer program works. With Solar Explorer, the learner gathers information about the planets and the moon. Some general facts about a planet or the moon can be obtained using the "SOLAR SYSTEM" activity page. To get more information, the learner must make an exploratory trip to the planet or to the moon using the "LAUNCH CONTROL" and "PROBE CONTROL" activity pages. The last activity of the program, "MASTER DATA," is a review of the information contained in the program.

When the program is loaded and running, the first screen you'll see is the copyright screen followed immediately by the title screen:



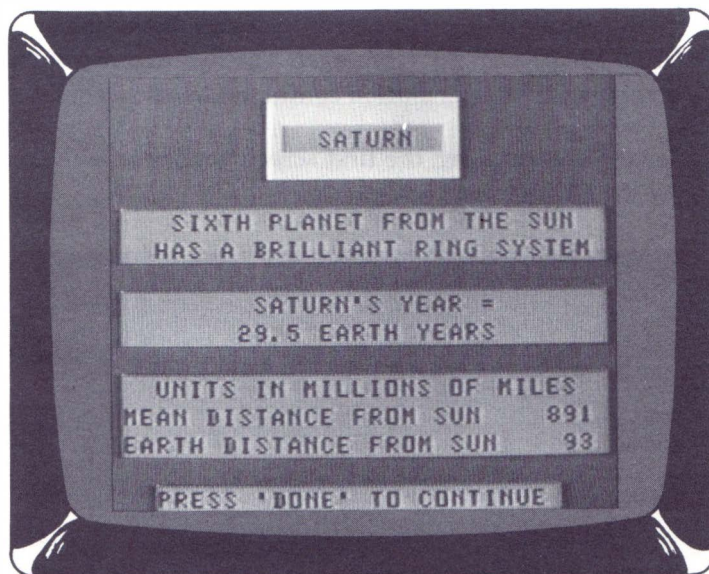
On the title screen you'll see the name of the program and an illustration of the sun with the orbits of the planets. Now you are ready to begin using Solar Explorer.



## SOLAR SYSTEM

First turn, in the Electronic Book, to the page labeled "SOLAR SYSTEM." Press the part of the page marked "ON/OFF." You'll see the message "PAGE 1" appear on the screen. Then the screen will change and you'll see a screen with the flashing word "SELECT."

On the "SOLAR SYSTEM" page in the Electronic Book you'll find illustrations of the moon and the eight planets other than Earth. Choose one of these and press the illustration on the page. The computer will name the planet, will show you which orbit around the sun that the planet (or moon) occupies, and then will provide you with some information about that planet (or moon).

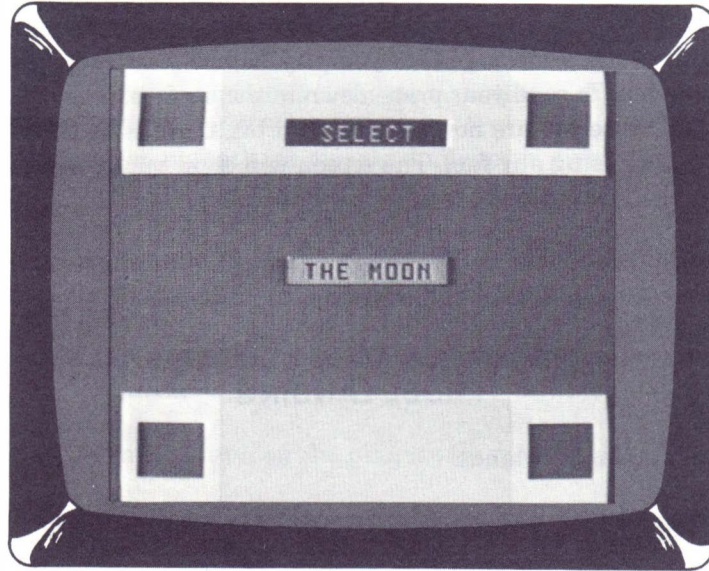


You may wish to write this information down on the Solar Explorer Data Sheet. A master copy of the Solar Explorer Data Sheet from which copies can be made is included in this manual on page 18.

When you are finished with this screen, press the area on the Electronic Book page labeled "DONE." The screen will change and once again you'll see the flashing word "SELECT." If you want some information about a different planet (or the moon), you may now make another choice by pressing another illustration. When you are finished with the "SOLAR SYSTEM" activity and the word "SELECT" is flashing on the screen, press "ON/OFF" and you'll return to the title screen.

## LAUNCH CONTROL AND PROBE CONTROL

Now turn to the “LAUNCH CONTROL” page in the Electronic Book. With “LAUNCH CONTROL” you’ll be sending a space ship on a journey to a planet (or to the moon) in order to gather more information. Press the part of the page labeled “ON.” You’ll see the message “PAGE 2” appear on the title screen. Then the screen will show you in turn each of the nine orbits around the sun, and the name of the planet (or moon) in that orbit along with the flashing word “SELECT.”



To prepare for your journey, press the “PLANET” button when you see the flashing word “SELECT” and the name of the planet (or the moon) you wish to investigate.

Once you have chosen a planet (or the moon), you are at the controls of your space ship. The screen will ask you to confirm the status check on your destination. Press the word “STATUS” in the Electronic Book. The computer will tell you the present distance from the Earth to that planet (or to the moon), and will provide you with 100 units of fuel for your journey.

Next, the computer will ask you to confirm the running time check for your trip. Press the words “RUNNING TIME” in the Electronic Book. The computer will tell you how many time units you’ll need to reach your chosen destination.

Now you’ll see the message “ALL SYSTEMS GO.” In a few seconds the computer will start a countdown for the launch of your space ship. When the count reaches zero, you’ll see the flashing message “LIFT OFF.” At this point you have about three seconds to press “LIFT OFF” in the Electronic Book. If you do not press “LIFT OFF” in time, the mission is aborted and you’ll return to the title screen.

If you have pressed “LIFT OFF” in time after the countdown, the screen will announce “WE HAVE LIFT OFF.” Your space ship will begin its journey to the destination you chose. During the trip, the boxes in the four corners of the screen let you know how far you have traveled, how much fuel you have left, how much time the trip is taking, and your present speed (warp) of travel. (One warp equals the speed of light.)

When you reach your destination, the computer flashes the word “**ORBIT**” to tell you that it is time to establish an orbit around the planet (or the moon). At this point you have about five seconds to press “**ORBIT**” in the Electronic Book. If you do not press “**ORBIT**” in time, your mission has failed, and you’ll receive the following message:

**ORBIT NOT ACHIEVED  
YOU ARE DRIFTING IN SPACE**

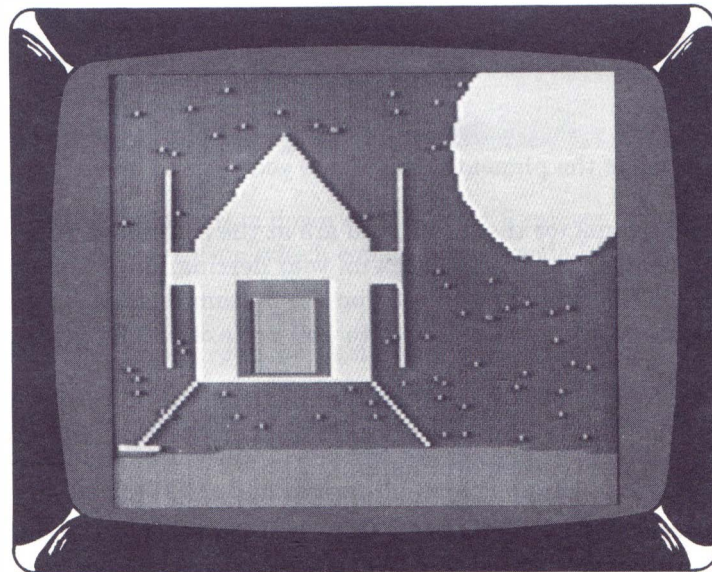
You are then returned to the title screen to begin again.

If you have pressed “**ORBIT**” in time, you then go into orbit around the planet (or moon). After a few seconds you will receive a message that you may launch your exploratory probe to the planet’s (or moon’s) surface. To send your probe down to the surface, press “**LAUNCH PROBE**” in the Electronic Book. Since you are now in a stable orbit, there is no time limit for launching the probe, and you are not using any fuel. The screen will show you in orbit around the planet (or moon) until the probe is launched.

Once you have pressed “**LAUNCH PROBE**,” your space probe begins its descent to the surface of the planet (or the moon). The screen will show you the message

**MOVE TO PROBE CONTROL  
PROBE LANDING**

and then will show the probe as it lands.



Turn to the “**PROBE CONTROL**” page in the Electronic Book. Your space probe is now on the planet’s (or moon’s) surface. You are going to send a robot out onto the planet’s surface to perform some tests and take some measurements. The screen will give you the message “**ACTIVATE ROBOT.**” Press “**ROBOT ACTIVE**” on the “**PROBE CONTROL**” page in the Electronic Book. On the screen you’ll see the robot on the planet’s (or moon’s) surface and then you’ll see the prompt “**AWAITING INSTRUCTIONS.**” Whenever you see this prompt, you can instruct the robot to perform a specific task and give you the result.

To have the robot perform a test or make a measurement, press any of the following buttons found on the “PROBE CONTROL” page in the Electronic Book:

- “DENSITY” — The average density of the planet (or moon) is given in grams per cubic centimeter. For comparison, the density of water is also given.
- “THROW” — In the throw test, the robot tosses an object to see how far it will travel. The path of the object is traced in white. The red path shows how far the object would go if tossed on Earth.
- “TEMP” — The maximum surface temperature of the planet (or moon) is given.
- “MOONS” — The number of known moons orbiting the planet is given.
- “DIAMETER” — The planet’s (or moon’s) diameter is given and is visually compared to the diameter of the Earth.
- “GRAVITY” — The gravity of the planet (or moon) is given in comparison to that of the Earth.
- “MASS” — The mass of the planet (or moon) is given in comparison to that of the Earth.
- “ATMOSPHERE” — Information on the planet’s (or moon’s) atmosphere is given.

You’ll see the result of the test or measurement on the screen. You may want to write this information down on the Solar Explorer Data Sheet. You may ask for another test or measurement when you see the “**AWAITING INSTRUCTIONS**” message appear on the screen again.

While the probe is on the planet’s (or moon’s) surface, your space ship is using fuel. You can see how much fuel you have left by watching the box in the upper-right corner of the screen. You must leave the planet (or moon) with sufficient fuel for the return trip to Earth. When you are getting close to your fuel limit, you’ll see the following message on the screen:

**RETURN  
FUEL LOW**

At this point you may still have time for one or two more tests, but if you stay too long on the surface, you will not have enough fuel for the return trip. If you are running low on fuel and have not completed your investigations, it would be wise to return to Earth and then make another trip to get the rest of the information.

To leave the planet (or moon), press “RETURN” when you see the message “**AWAITING INSTRUCTIONS.**” Your space ship will make the return trip to Earth. When you reach Earth, your mission is completed and you’ll see the Solar Explorer title screen again.



If your probe remains on the surface of the planet (or moon) too long, you will not have sufficient fuel to return to Earth and will be stranded. If this happens, you'll see the following message:

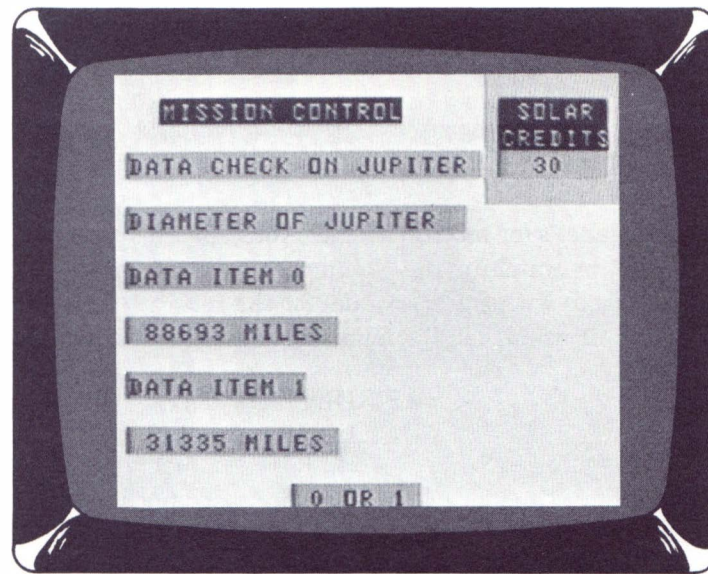
**YOU ARE MAROONED IN SPACE  
YOU RAN OUT OF FUEL  
GOODBYE**

and the activity automatically ends, returning you to the title screen.

## **MASTER DATA**

When you have collected data from one or more planets (or the moon), you can check your knowledge of this data with "MASTER DATA." With the program's title screen showing, turn to the "MASTER DATA" page in the Electronic Book. Press "ON/OFF." The title screen will show the message "**PAGE 4**" and then the screen will change and display the message "**SELECT PLANET FOR DATA CHECK.**" Press the name of any one of the planets (or the moon) shown on the "MASTER DATA" page.

Two data items, labeled "**DATA ITEM 0**" and "**DATA ITEM 1**", will be presented for the planet (or moon) you chose. Only one of the items will be correct.



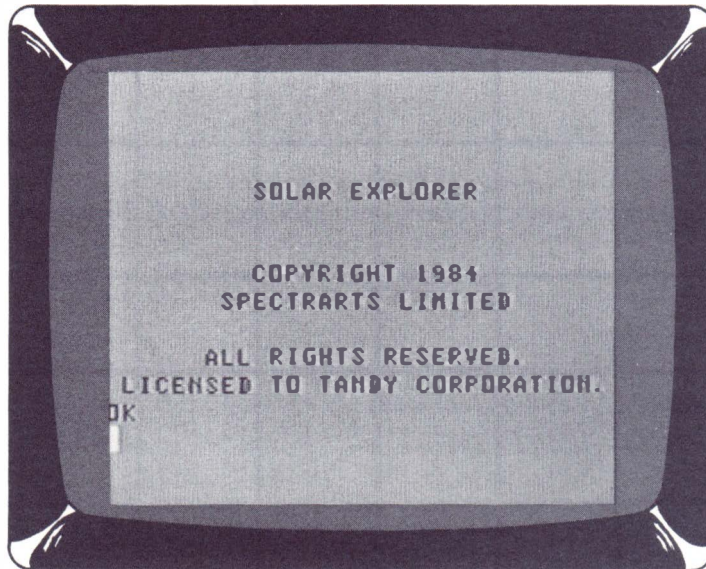
In the Electronic Book, you'll see the numbers "0" and "1" on the "MASTER DATA" page. Press the number of the data item you think is correct ("0" or "1"). If your answer is correct, the computer will confirm your selection and you will be awarded ten points (called "solar credits"). If your reply is incorrect, the computer will inform you that your answer is incompatible, and you'll lose five solar credits from any you have accumulated so far.

Ten sets of data items will be presented for a possible total score of 100 solar credits. After you have completed the ten data checks, you'll see a status report with your score, and then you'll return to the title screen.

If you wish to leave "MASTER DATA" before completing all ten data items, press "ON/OFF." You'll see a status report with your score, and then you'll return to the title screen.

If your score for a particular planet (or the moon) is low, you may be advised to do further investigations of that planet.

If you want to stop for now or try another program, type **SHIFT T** (that is, hold down the **SHIFT** key and type the letter **T**). You'll see a copyright screen with the "OK" prompt.



If you decide you want to start the Solar Explorer program again, type **R U N** and press **ENTER**. To change to a different program or to end the session, rewind the cassette tape completely, remove it from the cassette recorder, and store it in a safe place. If you are using a disk system, open the disk drive door or latch, remove the diskette, return it to its protective jacket, and store it in a safe place.





# Appendix I:

## MAKING A BACKUP COPY OF THE SOLAR EXPLORER PROGRAM

### Using the Color Computer Tape System

It is a good idea to make a backup copy of the program cassette. The original cassette supplied with the program should be stored to protect it from damage. To make a backup copy, follow the steps below:

#### I. GETTING READY

- A. If the computer is off or the cassette tape recorder is not connected:
  - 1. Follow Steps 1 and 2 on page 6 of this manual.
  - 2. Skip to II.
- B. If the computer is on, the cassette tape recorder connected, and the Solar Explorer program is loaded:
  - 1. If the program is running, terminate the program by pressing **SHIFT T**. You should see the “OK” prompt.
  - 2. When the “OK” prompt is showing, skip to III.
- C. If the computer is on, the tape recorder is connected, and a program other than Solar Explorer is loaded:
  - 1. If the program is running, terminate the program by using the **BREAK** key or any special code that may apply to that particular program.
  - 2. When the “OK” prompt appears, turn the computer off. Wait a few seconds, then turn it back on.
  - 3. When the “OK” prompt appears again, you are ready to load the Solar Explorer program.

#### II. LOADING THE SOLAR EXPLORER PROGRAM

Using the original program tape, load the program into the computer following Steps 3 through 6 on pages 6 and 7 of this manual.

### III. MAKING A NEW COPY OF THE PROGRAM TAPE

- A. Place a blank cassette in the recorder. (Use only TRS-80 C-20 or C-10 certified cassettes, or other digital-quality cassettes.)
- B. Make sure the tape is rewound. Use the "FAST FORWARD" button if necessary to advance the tape past the leader.
- C. Press "PLAY" and "RECORD" at the same time until they lock.
- D. Type **C S A V E " S O L A R "** and press **ENTER**. The recorder will start to run.
- E. Wait for the "OK" prompt to reappear. The recorder will stop automatically when the prompt appears.
- F. Rewind the cassette.
- G. Remove and label the cassette, which now contains a new copy of the Solar Explorer program.

## Using the Color Computer Disk System

It is a good idea to make a backup copy of the Solar Explorer program diskette. The original diskette supplied with the program should be stored to protect it from damage. To make a backup copy, follow the "One-Drive" or "Two-Drive" instructions below, depending on whether your computer has one or two disk drives.

### One-Drive TRS-80 Color Computer Disk System

1. Make sure that the Color Computer is properly connected to the color television or color monitor. Before turning on any power, plug the Color Computer Disk Controller into the slot on the right side of the computer.
2. Turn on the color TV (or monitor) and the Color Computer system. (The computer's power switch is on the back left corner of the computer. The disk drive switch is on the back of the drive, in the upper corner.)
3. When you see the "OK" prompt, insert a new, blank diskette into the disk drive (square notch up and label facing to the right). Close the disk drive door.
4. With the blank diskette in the drive, type **D S K I N I Ø** and press **ENTER**.
5. When the "OK" prompt reappears, remove the new diskette from the disk drive.
6. Place an adhesive tab (provided with new diskettes) over the square notch in the Solar Explorer program diskette. (If you do not have any tabs, use a small piece of opaque tape.)

7. Insert the program diskette into the disk drive with the square notch up and the label facing right. Close the disk drive door.
8. Type **B A C K U P**  **0** and press **ENTER** .
9. When you see the message **“INSERT DESTINATION DISKETTE AND PRESS ENTER”**, remove the program diskette (called the **“SOURCE”** diskette) from the disk drive. Insert the new diskette that you used in Step 3 (the **“DESTINATION”** diskette) into the disk drive. Close the disk drive door. Finally, press **ENTER** .
10. When you see the message **“INSERT SOURCE DISKETTE AND PRESS ENTER”**, remove the **DESTINATION** diskette from the disk drive, insert the program diskette, close the disk drive door, and press **ENTER** .
11. Continue to switch between the **SOURCE** diskette and the **DESTINATION** diskette as instructed by the computer. When the backup process is complete, you'll see the **“OK”** prompt reappear.

## Two-Drive TRS-80 Color Computer Disk System

1. Make sure that the Color Computer is properly connected to the color television or color monitor. Before turning on any power, plug the Color Computer Disk Controller into the slot on the right side of the computer.
2. Turn on the color TV (or monitor), the Color Computer, and the disk drives. (The computer's power switch is on the back left corner of the computer. The disk drive switch is on the back of the drive, in the upper corner.)
3. Insert a new, blank diskette into Drive 1 (the disk drive second from the Color Computer on the cable). Close the disk drive door.
4. With the blank diskette in the drive, type **D S K I N I 1** and press **ENTER** .
5. Place an adhesive tab (provided with new diskettes) over the square notch in the Solar Explorer program diskette. (If you do not have an adhesive tab, use a small piece of opaque tape.)
6. Insert the program diskette into Drive 0 (the disk drive closest to the Color Computer on the cable). Close the disk drive door.
7. Type **B A C K U P**  **0**  **T O**  **1** and press **ENTER** .
8. The computer will copy the contents of the diskette in Drive 0 onto the diskette in Drive 1. When the backup process is complete, you'll see the **“OK”** prompt reappear.



## **Appendix II:**

# **PLANNING YOUR APPLICATION**

### **Appropriate Applications**

There seems to be an endless variety of ways to use a computer with students. Some that are appropriate for the Radio Shack Solar Explorer program are:

- A number of computers or “student stations” are placed in a special room or learning lab, where students attend scheduled sessions. A special teacher or teacher aid may be in charge of the lab to help students load and run specified programs, to record scores, and to help with the operation of the system. This scheduled approach provides maximum computer utilization and makes possible the lowest obtainable cost per hour of usage.
- Individual computers are placed in regular classrooms, where they are available to the teacher for use with individual students at the teacher’s discretion.
- Individual computers are loaned or “checked out” to students to take home and use to solve special assignments, or as an incentive for individual studies.
- Computers are provided for general student use in a library — during school and/or after school hours — for periods of time that a student can reserve in advance.
- Computers are provided for use by teachers at a central service center or audio-visual library. A teacher can check out a system for use in class.

There are numerous combinations of these and other uses that are possible. Your own unique circumstances — number of students, or number of computers available — will influence your plans. The following information is designed to help you in planning for the use of microcomputers in your school, and to give you the benefit of others’ experience in developing a realistic and satisfactory installation in your own facility.



## **Saving and Loading Programs: Cassettes vs. Diskettes**

The audio cassette is the least expensive method of saving and loading programs for a microcomputer. Due to its reasonable cost, the cassette recorder merits consideration for use as a program storage device in a classroom; it makes possible a low hardware cost per hour of student operation.

Under proper conditions, the cassette recorder can be a satisfactory storage medium for use with microcomputers. However, there are some special considerations that should be given before deciding on the cassette for program storage over another medium such as the diskette.

First, the quality of cassette tapes used for storage of computer programs (digital information) is more critical than for audio use. In addition, static electricity can damage information recorded on cassettes in a carpeted area, or in a dry climate. And, since a program stored on a cassette takes longer to load into a microcomputer than a similar program stored on a diskette, operational considerations may make the use of the cassette recorder for loading programs unrealistic in the classroom setting.

### **A Radio Shack Network 2 System**

This system is a low-cost alternative to using cassette tapes to load student programs for the classroom. The Radio Shack Network Controller allows from one to sixteen computers to be connected to one TRS-80 disk system using the cassette ports. By using the central disk system, student programs can be saved on disk, and instructional programs can be loaded into the TRS-80 student stations from the central disk system conveniently and reliably. All sixteen student stations can be loaded simultaneously, or any combination of stations can be loaded at a time.

### **A Second Alternative: A Disk Drive for Each Student Station**

Although this increases the cost per student station, there are several advantages over a cassette. First, several programs can be stored on a single diskette and loaded into the computer conveniently by merely typing the program name to be loaded. In addition, no rewinding or tape positioning using an index counter is required with the diskette. And, most importantly, programs can be loaded from a diskette many times faster than from tape, making the diskette much more desirable from an operational standpoint. A program that requires a couple of minutes to load from a cassette can be loaded in a few seconds from a diskette.

## **Choosing a Location: Environmental Considerations**

Large computer systems require temperature- and humidity-controlled environments with air filtration systems to eliminate dust and other contaminants. Fortunately, TRS-80 microcomputers are not so demanding. However, there are some considerations in the location you choose for your microcomputer that could have a direct effect on its operation and reliability. For best results, you should keep these in mind when choosing the location for your computer.

### **Static Electricity**

In dry climates and in certain seasons, you can walk across a carpet and feel the static discharge when you touch a metal object. Under some climatic conditions, even your clothing can build up this kind of charge, normally too small for you to feel. These static charges can damage magnetically-stored computer data, such as that on cassette tapes and diskettes. Larger charges can even wipe out your computer's memory or cause it to "lock up." If you are in a part of the country where the humidity is lower than about 40%, be wary. The ideal humidity level for the operation of a computer is 50% or above. The safest bet is to use a non-carpeted room for your computer. An anti-static floor mat at the computer operator's position can also help.

This is a rather infrequent problem in actual practice, so rest assured we are not trying to imply that you will have this or any of the other problems we have mentioned. We are simply explaining why the choice of your installation location should be given consideration, and what to do in case you do encounter a problem.

### **Power Line Interference**

Any complex electronic equipment is sensitive to power line conditions affecting the voltage and current coming out of your wall socket. Computers are probably more sensitive than other electronics, because the loss of even one bit (one tiny electrical charge) of information can cause a program to fail or a data file to be lost. This is rarely a problem, unless you are operating in an environment which shares its power line with a lot of electrical machinery, particularly electrical motors. Yet you might experience trouble if an appliance or office machine has a defective switch which arcs when turned on or off. If this happens, you will have to (1) repair the appliance, or (2) isolate the power going to the computer by either (a) connecting the computer and peripherals to a separate line or (b) using a line filter. (TRS-80 Models III, 4, II, 12, 16 and 2000 have built-in line filters.) In a severe case, both (a) and (b) may be required. "Brownouts" (periodic drops in line voltage to unusually low levels) or "spikes" (transient surges of a very large voltage lasting only a fraction of a second) may require the addition to your system of a constant voltage transformer.

Power line problems are rare and many times can be avoided by proper choice of installation location for your computer system. The more complex the system, the more consideration you should give to your installation.



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