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INSTRUCTION MANUAL FOR  
SmartBall™  
SmartMouse™  
SmartCard™

**WICO**

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COMPUTER  
**Smartline**™

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The most sophisticated computer control systems ever developed.

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**WICO**

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COMPUTER

**Smartline**™

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The most sophisticated computer control systems ever developed.

# Table of Contents

I.	Introduction .....	1
II.	Installation Instructions .....	2
	A. SmartCard for Apple II or II Plus Computers .....	2
	B. SmartCard for Apple IIe Computers .....	7
III.	Controllers .....	9
IV.	What To Do If Something Goes Wrong .....	9
	A. The SmartCard Doesn't Seem to Work Right .....	9
	B. The SmartCard Works OK Until I Try To Program It .....	11
	C. The SmartCard Was Functioning Properly And Now Something Is Wrong .....	12
V.	Copying Your Utility Disk .....	12
VI.	Use Of The Utility Disk .....	12
	A. How To Modify The Existing Set-Up Files To Use A Different Slot Number .....	13
	B. Using The Demonstration Files .....	14
	C. Using The Existing Set-Up Files .....	14
VII.	Control Parameters .....	15
	A. Sensitivity .....	15
	B. Pause .....	16
	C. Mode .....	16
	D. Definition of Modes 1-6 .....	17
VIII.	Modifying Set-Up Files .....	19
IX.	Using The Utility Program .....	19
	A. Some Ground Rules .....	19
	B. SmartCard Command Syntax For Apple II, II Plus, IIe Computers .....	20
	C. Additional SmartCard Command Syntax For Apple IIe Computers Only .....	21
	D. Main Menu .....	22
	E. Option (H) Help - Get Brief Instructions On Using The SmartCard .....	23
	F. Option (P) Program SmartCard Directly .....	23
	G. Programming The SmartCard With The Commands In The Work Space .....	27
	H. Option (C) Create a Disk File For Future SmartCard Set-Up .....	28
	I. Option (E) Edit An Existing Disk Set-Up File .....	29
	J. Option (T) Test SmartCard On Monitor .....	30

<b>X.</b>	<b>How To Program The SmartCard With Your Own Software</b> .....	<b>30</b>
	<b>A. Communicating With The SmartCard</b> .....	<b>31</b>
	<b>B. Programming Syntax</b> .....	<b>32</b>
	<b>C. Applesoft FP BASIC and DOS</b> .....	<b>35</b>
	<b>D. Programs Without DOS</b> .....	<b>37</b>
	<b>E. Apple Integer BASIC With DOS</b> .....	<b>38</b>
	<b>F. Integer Programs Without DOS</b> .....	<b>38</b>
	<b>G. Machine Language SmartCard Programming</b> .....	<b>38</b>
	<b>H. Programming Errors and Recovery</b> .....	<b>41</b>
	<b>I. Initial Parameters</b> .....	<b>42</b>
<b>XI.</b>	<b>Appendix A - SmartCard Quick Reference Table</b> .....	<b>43</b>
<b>XII.</b>	<b>Appendix B - ASCII Codes For Each Keyboard Character</b> .....	<b>44</b>
<b>XIII.</b>	<b>Appendix C - Utility Disk Set-Up Files</b> .....	<b>45</b>
	<b>A. Set-Up File For Apple Monitor Mode</b> .....	<b>45</b>
	<b>B. Set-Up File For Blanking The SmartCard</b> .....	<b>45</b>
	<b>C. Set-Up File For Functional Demo</b> .....	<b>46</b>
	<b>D. Set-Up File For Bank Street Writer</b> .....	<b>46</b>
	<b>E. Set-Up File For Apple Writer 1.0</b> .....	<b>47</b>
	<b>F. Set-Up File For Apple Writer II</b> .....	<b>48</b>
	<b>G. Set-Up File For PIE Writer II</b> .....	<b>49</b>
	<b>H. Set-Up File For Letter Perfect</b> .....	<b>49</b>
	<b>I. Set-Up File For Super-Text</b> .....	<b>50</b>
	<b>J. Set-Up File For CP/M WordStar</b> .....	<b>51</b>
	<b>K. Set-Up File For SuperEdit</b> .....	<b>51</b>
	<b>L. Set-Up File For VisiCalc II+</b> .....	<b>52</b>
	<b>M. Set-Up File For VisiCalc IIE</b> .....	<b>52</b>
	<b>N. Set-Up File For Multiplan</b> .....	<b>53</b>
<b>XIV.</b>	<b>Appendix D - Catalog Of The WICO Supplied Utility Disk</b> .....	<b>54</b>
<b>XV.</b>	<b>Glossary</b> .....	<b>55</b>
<b>XVI.</b>	<b>Warranty</b> .....	<b>60</b>
	<b>A. SmartCard</b> .....	<b>60</b>
	<b>B. SmartMouse and SmartBall</b> .....	<b>60</b>

— NOTES —

# Introduction

Congratulations! You have just purchased one of the most useful Apple II, II Plus and IIe enhancements available — the WICO SmartCard.

This SmartCard and any of the three different WICO controller devices (SmartMouse, SmartBall or DIGITAL JOYSTICK) will provide you with superior program control for most of your existing software, word processors, spreadsheets and games. The SmartCard has its own self-contained micro-processor and memory. This ensures that the SmartCard will not interfere with any Apple applications software. There is no decrease in user available memory. There is no longer a need to purchase new software and then spend time learning how to use it in order to get the improvements of a SmartMouse or SmartBall. These two types of controllers have been scientifically proven to be a better way for a user to communicate with his computer.

Most importantly, the SmartCard will free the user from having to remember the various cursor control commands for different software packages. The SmartCard will take care of the details required to move the cursor in your word processor and after a single DOS command, the SmartCard may be set-up for your spreadsheet. It won't get confused as to which cursor command to use.

In addition, you may now enjoy the advantage of mouse-like control with a SmartMouse, SmartBall or DIGITAL JOYSTICK with any Apple game which uses keyboard control. No software modifications are required. Games using the computer's game connector cannot be used with this product. The SmartCard allows the user to select the controller of his choice to tailor the controller's response to the user's preference.

# Installation Instructions

## SmartCard For Apple II, II Plus Computers

### IMPORTANT

READ THIS ENTIRE SECTION BEFORE YOU ATTEMPT TO INSTALL THE SMARTCARD. TAKE YOUR TIME. INSTALLATION IS NOT DIFFICULT, BUT THE INSTRUCTIONS SHOULD BE FOLLOWED VERY CAREFULLY. ANY SHORT CUTS OR STEPS LEFT OUT MAY DAMAGE YOUR COMPUTER OR THE SMARTCARD ITSELF.

The only tools required are a medium sized Phillips Head Screwdriver and a small straight blade screwdriver.

Disconnect your computer from its electrical power source. Unplug the monitor and any other peripheral units you may be using. Move all this equipment to another area. You will need a clear workspace. Remove the top cover by pulling up slightly at the rear edge of the cover until it pops and then pull it straight back. Put the cover aside.

### IMPORTANT

BE VERY CAREFUL **NOT TO TOUCH ANY OF THE COMPONENTS ON THE CIRCUIT BOARDS.** STATIC ELECTRICITY DISCHARGES MAY DAMAGE SOME OF THE COMPONENTS. WHENEVER POSSIBLE, HANDLE ALL CIRCUIT BOARDS ONLY BY THE EDGES, AND AWAY FROM THE METALLIC FINGERS THAT INSERT INTO THE EDGE CONNECTORS.

Familiarize yourself with the SmartCard and the cables. Compare the SmartCard to Illustration #4 in order to recognize the three cables and their functions.

### SMARTCARD FOR APPLE II/II+

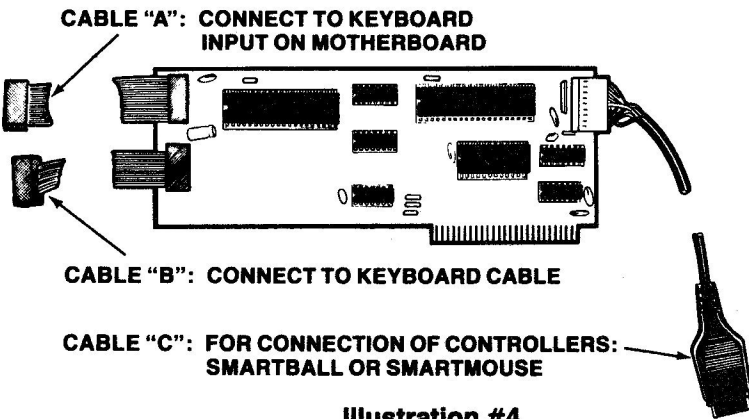


Illustration #4

Remove all peripheral cards that you can. Be careful to note their positions on the main circuit board and any connections required for their installation. Make a list showing locations and connections. Put these cards aside.



Remove the Disk Drive Controller Card. **DO NOT** remove the Disk Drive cable from the computer case. Consult your Apple DOS Manual to properly remove and reinstall the card.

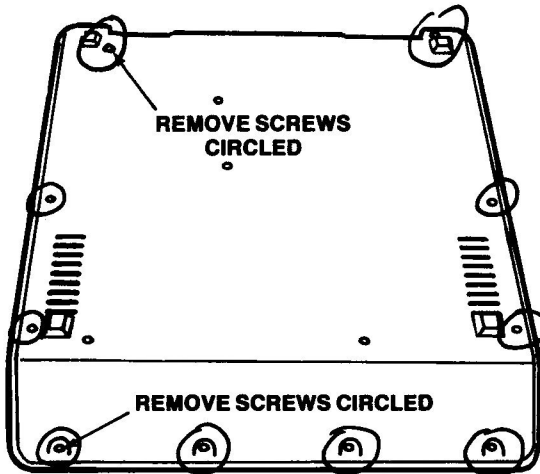
Decide in which slot you wish to install the SmartCard. Apple II and II Plus computers have eight peripheral slots, numbered 0 to 7. The ideal location is slot 5. If slot 5 is used for the SmartCard, the example files on the UTILITY DISK will need **NO** modification. If you can not use slot 5, the SmartCard will function in any other slot **except slot 0**. If the SmartCard is installed in any slot other than 5, the SLOT CHANGER PROGRAM **MUST** be used to modify the sample SET-UP FILES before they may be used.

**IMPORTANT**

**YOU WILL NOW BEGIN TO DISCONNECT THE MAIN CIRCUIT BOARD FROM THE CASE. WHILE DISASSEMBLING AND REASSEMBLING THE CASE, BE EXTRA CAREFUL, PARTICULARLY WHEN MOVING THE PARTIALLY DISASSEMBLED COMPUTER.**

Place your computer so it is bottom side up. Have its front edge closest to you. Be careful of any cables still connected. Remove the Phillips Head Screws indicated in Illustration #1. **SAVE THESE SCREWS.**

**DISASSEMBLY OF APPLE II/II+ CASE**



**REMOVE THESE SCREWS**

**Illustration #1**

Now grasp the computer on both sides and hold the base plate to the sides firmly. Turn the computer over so it rests right side up.

There are several different versions of the Apple II and II Plus computers. Some late model Apple II Plus computers have a separate METAL SHIELD at the rear of the case. This is the RADIO FREQUENCY INTERFERENCE SHIELD. If your computer has this SHIELD, it **MUST BE LOOSENED** from the main circuit board. **LOOSEN, DO NOT REMOVE**, the four screws indicated in Illustration #2 (see next page). If your computer does not have this SHIELD, you do not need to loosen these four screws.

## LOOSENING METAL SHIELD ON APPLE II+

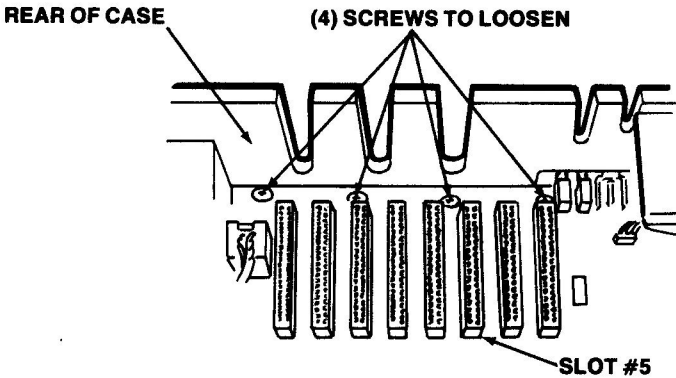


Illustration #2

Now gently slide the case approximately two inches toward the rear. **BE CAREFUL**, the case is still connected to the main circuit board by cables. You **DO NOT** want to damage these cables. **DO NOT TRY TO REMOVE THE CASE COMPLETELY FROM THE BASE.**

Now position the SmartCard over the slot connector you chose previously. Hold the card by the edges and carefully insert the metallic fingers of the card into the connector as shown in Illustration #3. Make sure the card is securely seated. If necessary, rock the card back and forth until it rests snugly against the connector.

## SMARTCARD INSTALLATION FOR APPLE II/II+

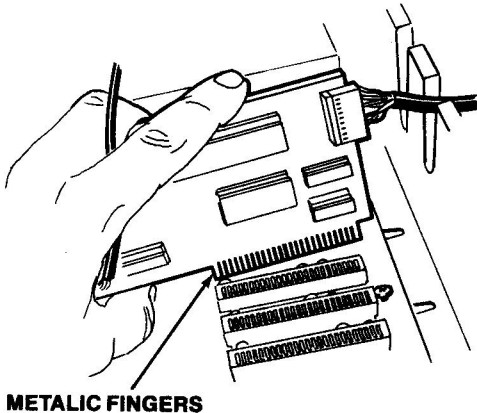
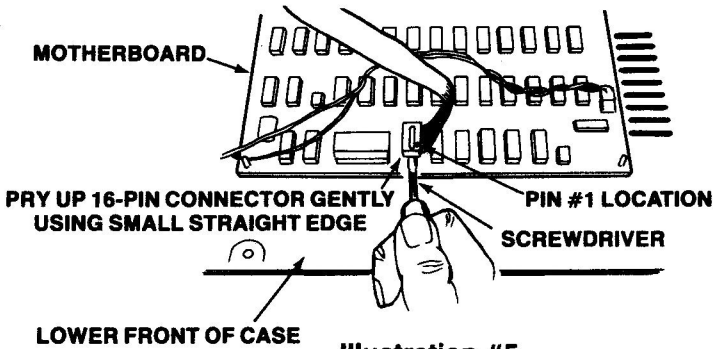


Illustration #3

Raise the front edge of the case a few inches. This will expose the front edge of the main circuit board. You will be able to see the ribbon cable that connects the keyboard to the main circuit board. In order to help you locate pin #1 on the keyboard cable, as shown in Illustration #5, we suggest placing a small piece of tape on the plug indicating pin #1 location. Use a small straight blade screwdriver and gently pry the 16 PIN DIP PLUG out of the main circuit board as shown in Illustration #5. **BE CAREFUL NOT TO BEND ANY PINS.** If you do, carefully straighten them with your fingers or a pair of needle nose pliers.

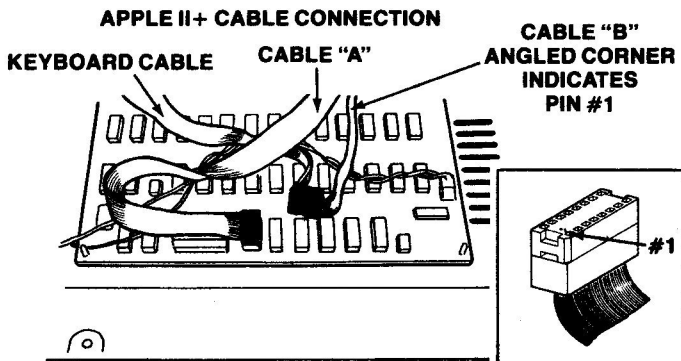
**REMOVING THE KEYBOARD CONNECTION  
ON APPLE II/II+**



**Illustration #5**

Feed cables "A" and "B" from the SmartCard under the computer case towards the front. Insert the 16 PIN DIP PLUG of cable "A" into the 16 PIN DIP SOCKET from which you removed the keyboard cable. Make sure pin #1 of the plug goes into opening #1 of the SOCKET. The pin #1 marker on the main circuit board is a white dot. To easily locate pin #1 on the plug, hold the cable so that the flat side of the cable faces you and the red stripe is on the bottom. Pin #1 is the lower right hand pin.

Next insert the 16 PIN DIP PLUG of the keyboard cable into the 16 PIN DIP SOCKET on cable "B" from the SmartCard. Make sure pin #1 of the plug goes into opening #1 of the SOCKET. Pin #1 opening on the SOCKET is closest to the angled corner of the SOCKET. See Illustration #6.



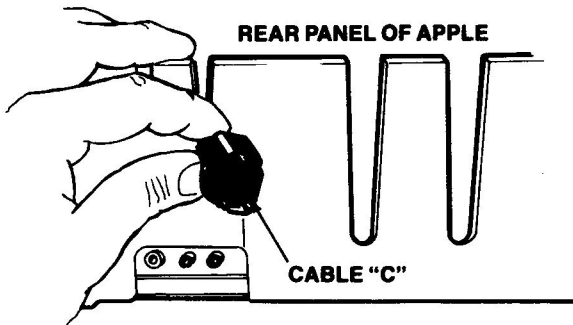
**Illustration #6**

**SOCKET "B" DETAIL**

### **IMPORTANT**

**IT IS VERY IMPORTANT THAT THE CABLES ARE INSTALLED PROPERLY. TAKE YOUR TIME AND BE CERTAIN THAT PIN #1 IS IN THE PROPER OPENING.**

Now slip cable "C" through one of the slots in the rear of the case. This will be used to connect either a SmartMouse, SmartBall or DIGITAL JOYSTICK to your computer. See Illustration #7.



**Illustration #7**

You are now ready to reassemble your computer. Reposition the case to its correct position over the base. If your computer has the RFI SHIELD, you must carefully reinsert the metal tabs located at the bottom of the SHIELD into the slot formed by the insulating spacers supporting the main circuit board and the base plate. When properly done, the tabs will be sandwiched between the main circuit board and the base plate. Tighten the four screws at the rear of the main circuit board.

Make sure the front edge of the computer case is down on the base plate. Slide the computer to the edge of your table just far enough to get at the four screw holes located at the underside of the front edge. Replace the four screws.

Again grasp the computer on both sides. Hold the base plate to the sides firmly. Turn the computer so it rests upside down. Now replace all the screws removed earlier. **DO NOT OVER TIGHTEN THE SCREWS.**

Reinsert all peripheral cards previously removed and make any necessary connections (refer to the list you made). If it is necessary, reconnect the Disk Controller Card to the Disk Drive cable. Consult Chapter 1 of the Apple DOS Manual for proper insertion procedure.

Replace the computer cover and plug in your monitor and any other peripheral equipment.

# Installation Instructions SmartCard For Apple Iie Computers

## **IMPORTANT**

**READ THIS ENTIRE SECTION BEFORE YOU ATTEMPT TO INSTALL THE SMARTCARD. TAKE YOUR TIME. INSTALLATION IS NOT DIFFICULT, BUT THE INSTRUCTIONS SHOULD BE FOLLOWED VERY CAREFULLY. ANY SHORT CUTS OR STEPS LEFT OUT MAY DAMAGE YOUR COMPUTER OR THE SMARTCARD.**

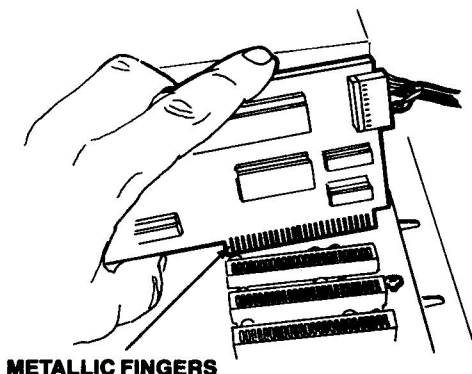
## **IMPORTANT**

**BE SURE ALL POWER TO THE COMPUTER IS TURNED OFF. BE VERY CAREFUL NOT TO TOUCH ANY OF THE COMPONENTS ON THE CIRCUIT BOARDS. STATIC ELECTRICITY CHARGES MAY DAMAGE SOME OF THE COMPONENTS. WHENEVER POSSIBLE, HANDLE ALL CIRCUIT BOARDS BY THE EDGES ONLY AND DO NOT TOUCH THE METALLIC FINGERS THAT INSERT INTO THE EDGE CONNECTORS.**

Decide in which slot you wish to install the SmartCard. Apple Iie computers have seven peripheral slots, numbered 1 to 7, located at the back of the computer. The ideal location is slot 5. If slot 5 is used for the SmartCard, the example files on the UTILITY DISK will need **NO** modifications. If you cannot use slot 5, the SmartCard will function in any other slot **except slot 3**. If the SmartCard is installed in any slot other than 5, the **SLOT CHANGER PROGRAM** must be used to modify the sample SET-UP FILES before they may be used.

Now position the SmartCard over the slot connector you chose. Hold the card by the edges and carefully insert the metallic fingers of the card into the connector as shown in Illustration #8. Make sure the card is securely seated. If necessary, rock the card back and forth until it rests snugly against the connector.

## **SMARTCARD INSTALLATION FOR APPLE Iie**



**Illustration #8**

Each connection cable on the SmartCard is labeled as to its designation and termination as shown in Illustration #9.

### SMARTCARD FOR APPLE IIe

CONNECT TO MOTHERBOARD

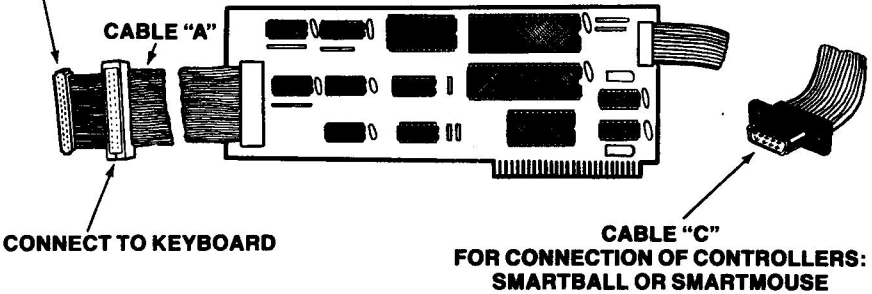


Illustration #9

### IMPORTANT

*IT IS VERY IMPORTANT THAT THE CABLES ARE INSTALLED PROPERLY. TAKE YOUR TIME AND BE CERTAIN THAT PIN #1 OF ALL CABLES IS IN THE PROPER OPENING.*

Locate the keyboard cable inside the computer. Gently pull the 26 pin plug from the motherboard. Connect this keyboard cable to the socket on cable "A" of the SmartCard and then connect the plug of cable "A" to the motherboard location where the keyboard cable was removed as shown in Illustration #10.

### SMARTCARD INSTALLATION FOR APPLE IIe

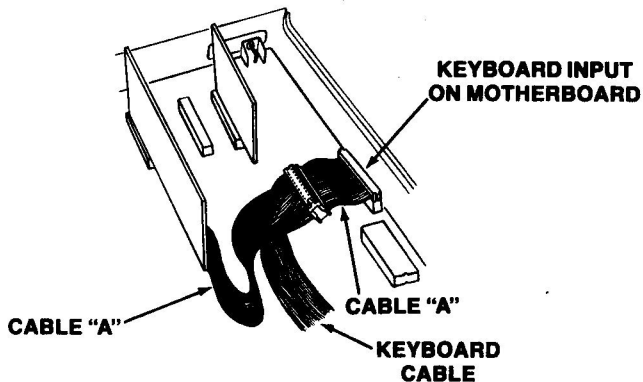


Illustration #10

**NOTE:** The above drawing is for the later models of Apple IIe computers. If you own an earlier version, the keyboard cables will plug in from the opposite direction. The cables are designed so they cannot be plugged in incorrectly. If you have difficulty plugging in the cables, simply try it the other way.

Remove one of the plastic oval inserts on the back of the computer, at locations 5, 6, 8 or 9. Insert the plug of cable "C" into this new opening and attach it with the included nuts and bolts.

# Controllers

You may now plug your computer into its power source and connect your controller. To do this, simply plug the cable of your SmartBall, SmartMouse or DIGITAL JOYSTICK into cable "C" which earlier you slipped through one of the slots at the back of the computer. To insure proper positioning of the controller, always hold the unit so the cable is coming off the front of the controller away from you. When holding the controller in this manner, the button on the left is the T-button and the one on right is the B-button as shown below.

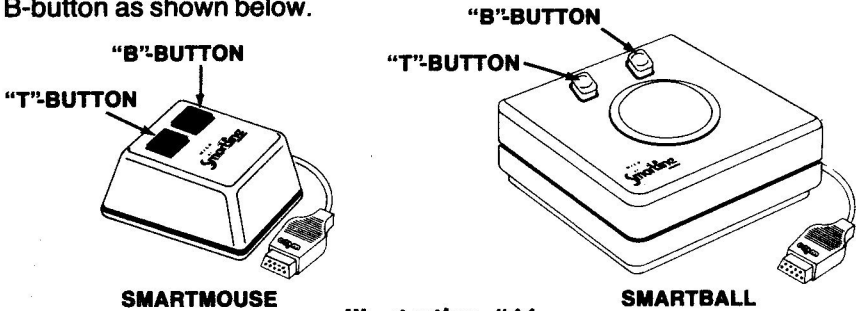


Illustration #11

Turn the computer ON and you should be able to see the cursor move on the screen when you roll either the SmartMouse or SmartBall. The normal "COLD START" instruction built into the SmartCard cause it to function as the escape cursor codes (A,B,C,D). This is called the MONITOR MODE of the SmartCard.

If you are using a WICO DIGITAL JOYSTICK and a **Disk Drive** and the SmartCard is in slot 5, you must type the following command in order for the SmartCard to function in the MONITOR MODE.

```
PRINT CHR$(4); "PR#5": PRINT "M=1": PRINT CHR$(4); "PR#0"
```

**RETURN**

If you are operating with **NO Disk Drive** in your system and your SmartCard is in slot 5, type the following command to make the DIGITAL JOYSTICK function in the MONITOR MODE.

```
PR#5: PRINT "M=1": PR#0 RETURN
```

Use these commands **ONLY** if the SmartCard is in slot 5. If the SmartCard is in a different slot, replace the 5 in the command with the number of the appropriate slot.

## What To Do If Something Goes Wrong

### The SmartCard Doesn't Seem To Work Right

If after installing the SmartCard, your computer no longer operates, do the following:

- a.) Turn the power switch off. Always turn the power off before removing or installing any accessory, including any controllers or ribbon cables.

- b.) Remove the SmartCard from the peripheral connector slot. Reinstall the card. Be certain it "seats" properly and that the front and rear metallized fingers on the edge of the SmartCard fit snugly and evenly in the peripheral connector slot. You might try inserting the SmartCard in a different slot.
- c.) Be sure all of the connectors are "mated" properly. Check to see if there is an excessive gap between the two parts of any of the connectors on the SmartCard or on the main circuit board. If a gap appears to be larger than 1/16," try to squeeze the two parts together with SLIGHT force. Remember these parts may easily be damaged when too much force is applied. Now disconnect and reconnect the controller to the SmartCard. Check the space between the connector parts and make sure the controller is attached to the SmartCard properly. After all of these connector checks, make sure the SmartCard is still seated properly.
- d.) Now turn the computer power supply on. If you have a SmartBall or SmartMouse connected, you should be able to see the cursor on the screen move when the controller is moved. The normal COLD START instructions built into the SmartCard cause it to function in the MONITOR MODE. A COLD START is when the computer has just been powered-up after sitting in the powered-down "OFF" MODE for at least 20 seconds. The MONITOR PROGRAM controls the computer with programs in firmware before any programs or disks are read in the computer at the start of a use session.

If after doing the previous steps, your computer will still not respond to the keyboard or operate in any other normal manner, disconnect the SmartCard by doing the installation procedure in reverse. Consult your dealer or call the SmartLine Help Desk (312-647-7500) for help.

**Please, DO NOT ATTEMPT TO FIX THE SMARTCARD YOURSELF. There are no user serviceable parts — many of the integrated circuits on the SmartCard are custom circuits and can only be replaced at the factory. TAMPERING WITH THE SMARTCARD WILL VOID YOUR WARRANTY.**

- If the computer functions properly, but you cannot get the cursor to respond to any of the controller directional commands or if some cursor motion is observed but not in all directions, recheck the connection of the controller to the SmartCard. If all of the connections appear to be fine, the controller may not be working properly. If possible, try another controller, making sure it is programmed properly.
- If all of the features of the SmartCard seem to operate properly except for one button or one controller direction, then the controller is probably in need of adjustment. If possible, try another controller, making sure it is programmed properly.
- If all of the directions and buttons still do not operate properly after a COLD START and you are certain the SmartCard is installed and programmed properly, consult your dealer or call the SmartLine Help Desk (312-647-7500) for additional assistance.



## The SmartCard Works OK Until I Try To Program It

If the SmartCard functions properly until you try to program it, there is probably a programming error. First, make sure the SmartCard is in the slot you think it is. Visually check the slot number. Compare that number to the number used in programming the SmartCard. Now try some simple programming commands. Note that if you encounter some programming difficulty during your programming attempts, a Control-Reset and a ten second pause will usually allow both the SmartCard and the computer to recover. You may then try programming the SmartCard again. Alternatively, you may turn the power off and start again from a COLD START.

If you are using a SmartBall or SmartMouse and the SmartCard is in slot 5, enter the following sequence from the keyboard (if you have the SmartCard in a different slot, then replace the 5 in the following expression with the appropriate slot number):

**For systems in FP (Floating Point BASIC) with DOS booted, enter:**

```
PRINT CHR$(4); "PR#5": PRINT "M=4": PRINT "T=T": PRINT "R=R":  
PRINT CHR$(4); "PR#0" RETURN
```

**For systems in FP (Floating Point BASIC) without DOS, enter:**

```
PR#5: PRINT "M=4": PRINT "T=T": PRINT "R=R": PR#0 RETURN
```

**For systems in INT (Integer BASIC) with DOS, enter:**

```
PRINT "CTRL-D PR#5": PRINT "M=4": PRINT "T=T": PRINT "R=R":  
PRINT "CTRL-D PR#0" RETURN
```

**For systems in INT (Integer BASIC) without DOS, enter:**

```
PR#5: PRINT "M=4": PRINT "T=T": PRINT "R=R": PR#0 RETURN
```

After typing any of the above sequences exactly as shown, strike the return key.

**If you are using a DIGITAL JOYSTICK** with either Floating Point or Integer BASIC, with or without DOS, replace the M=4 expression with M=1. NOTE: If the SmartCard is programmed for a joystick MODE (M=1,2,3) and you connect a SmartBall or SmartMouse without first reprogramming the SmartCard, you will see some very confusing cursor activity on the screen.

Now after entering the appropriate sequence of keystrokes for your computer, you should see the commands on the screen as follows:

M=1

T=T

R=R

Indicates commands  
appearing on screen



If the message

**\*\*CNTRLR-INTERFACE ERROR\*\***

appears, repeat the sequence of keystrokes. To see if your hardware is functional, you might try programming the SmartCard with one of the EXEC FILE examples included on the UTILITY DISK with your UTILITY PROGRAM. If the error message still appears after a COLD START and repeating the command sequence EXACTLY as shown above, consult your dealer or contact the SmartLine Help Desk (312-647-7500).

If the message appeared on your screen properly, try the following test: Press the T-button; you should see a T appear on the screen. Now move the controller to the right; the letter R should appear. If these tests work properly, the Smartcard is functioning properly.

If these tests do not result in the actions described above, try a COLD START and repeat the tests. If the results are still not as described, consult your dealer or contact the SmartLine Help Desk (312-647-7500).

**The SmartCard Was Functioning Properly  
And Now Something Is Wrong**

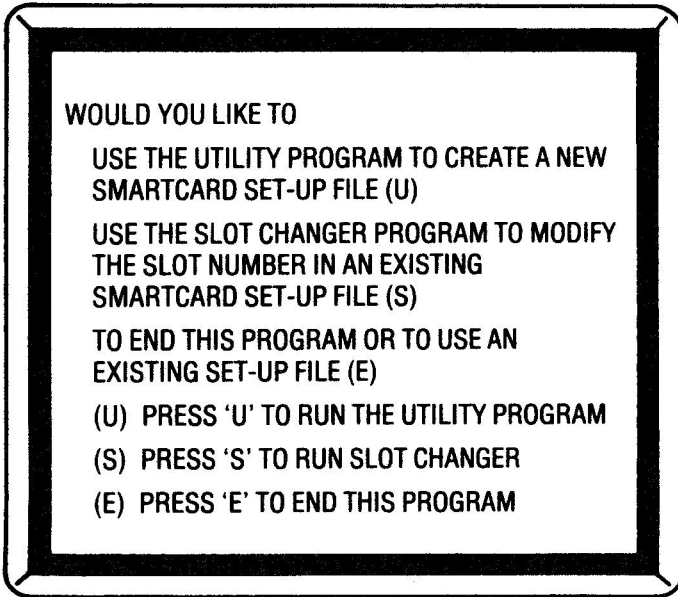
If you currently have six or more cards installed and the SmartCard was functioning properly but it has suddenly done something unexpected and unexplainable, there may be insufficient power to supply the multiple cards. This is especially true when several larger cards such as 80 column cards and processor cards are installed at one time. There are two possible solutions. 1: remove any unnecessary cards when they are not in use. 2: obtain a heavy duty power supply to replace your existing power supply.

## **Copying Your Utility Disk**

Before attempting to use the SmartCard UTILITY DISK, copy its entire contents on to one of your own disks. To do this, use the Apple program "COPYA". Refer to your Apple User's Manual for further details. When you have finished copying the disk, keep the original in a safe place and use your copy for everyday use.

## **Use Of The Utility Disk**

Insert your new copy of the UTILITY DISK into the Disk Drive and turn the computer power ON. The disk will graphically identify itself. Pressing the space bar at any time will allow you to continue. A three option menu will now appear as follows:



### **How To Modify The Existing Set-Up Files To Use A Different Slot Number**

Boot the UTILITY DISK and press the space bar. After a short delay, when prompted, select the "S" option to run Slot Changer.

You will be given the option to see the DISK CATALOG. Respond by pressing Y for YES or N for NO. (A copy of the DISK CATALOG appears in Appendix D.).

Type in the FILENAME as it appears on the DISK CATALOG and press the return key. You will see the prompt:

ENTER THE  
NEW SLOT  
NUMBER



Respond by typing in a single number which identifies the actual slot where the SmartCard is installed and press the return key. The program will verify that the FILENAME entered is a valid SET-UP FILE and will proceed to modify the SET-UP FILE.

If the message

ERROR DETECTED BY  
APPLE SYSTEM



appears, there is probably a typographical error. Try again.



Indicates commands appearing on screen.

Once the program has been successfully modified, the program will end. If at this time, you wish to modify another existing SET-UP FILE, type RUN followed by the return key. You are now ready to modify another SET-UP FILE.

### **Using The Demonstration Files**

The UTILITY DISK supplied with your SmartCard contains a few DEMONSTRATION FILES as well as sample SET-UP FILES for popular software packages. The two FUNCTIONAL DEMO FILES allow the user to "see" what the controller is doing by the letters displayed on the screen. If you have a SmartBall or SmartMouse connected to the SmartCard, try "EXEC"ing the file "FUNCTIONAL DEMO MOUSE/SBALL". As you move the SmartBall or SmartMouse in the up direction, the word "UP" will appear on the screen. Similar symbols will appear on the screen for all of the other directions and for each button. The T-button is used to "TOGGLE" to the ALTERNATE CHARACTER SET. If you move the controller while in the ALTERNATE CHARACTER SET, a "/" will precede the displayed characters. If you have a DIGITAL JOYSTICK connected to the SmartCard, try "EXEC"ing the file "FUNCTIONAL DEMO JSTICK". You should see a similar response.

The "WORD PROCESSOR DEMO" program written in BASIC is designed to show some of the advantages of using a SmartBall or SmartMouse to control Word Processor Programs. With a SmartBall or SmartMouse connected, try "RUN"ing this program. If you are using a joystick, you will need to modify this simple BASIC program. If you are not familiar with BASIC, you may wish to skip this DEMONSTRATION PROGRAM.

### **Using The Existing Set-Up Files**

A UTILITY DISK with over twenty SET-UP FILES is supplied with your SmartCard. These SET-UP FILES allow you to preconfigure the SmartCard for use with many of the popular software packages such as:

- Apple Writer
- Microsoft® Multiplan® Electronic Worksheet
- Bank Street Writer™
- PIE Writer™
- Super-Text™
- Wordstar®
- Letter Perfect®
- SuperEdit
- VisiCalc®

A detailed description of many of the SET-UP FILES is found in Appendix C.

If the program you wish to use appears on this list, it is necessary only to type the following command in order to use it:

#### **EXEC FILENAME**

Where we have listed FILENAME, specify the name of the SET-UP FILE you wish to use. For example, if you wish to use the program Bank Street Writer on the Apple IIe with a SmartBall:

EXEC BANK STREET WRITER IIE SBALL RETURN

If you plan to use this SET-UP FILE often, it is possible to rename the file with a shorter name to make it more convenient. For example, a shorter name for the above command may be:

EXEC BW

If you wish to modify the response or actions of your controller to better suit your needs, you may refer to the chapters entitled "CONTROL PARAMETERS" and "MODIFYING SET-UP FILES". If the program you wish to use is not on the list at the beginning of this section, refer to the chapters entitled "CONTROL PARAMETERS" and "USING THE UTILITY PROGRAM" (section: "Option C - Create A Disk File For Future SmartCard Set-Up").

## Control Parameters

The SmartCard is designed to translate electrical signals generated by a mechanical controller device (SmartMouse, SmartBall or DIGITAL JOYSTICK) into Apple compatible, computer signals. It has six MODES of operation. In these six MODES, controller signals from a DIGITAL JOYSTICK, SmartBall or SmartMouse are interpreted by the SmartCard and converted to keyboard type signals.

A description for each of the six MODES OF OPERATION are listed below:

MODE #	DESCRIPTION
1	JOYSTICK, NORMAL
2	JOYSTICK, SPEED-UP
3	JOYSTICK, TOGGLE
4	SMARTBALL/SMARTMOUSE, NORMAL
5	SMARTBALL/SMARTMOUSE, HORIZONTAL/VERTICAL
6	SMARTBALL/SMARTMOUSE, TOGGLE

The user **MUST SPECIFY** the three CONTROL PARAMETERS — SENSITIVITY, PAUSE and MODE. If not, the default values will be used.

### SENSITIVITY

This CONTROL PARAMETER tells the SmartCard how responsive (or sensitive) it should be to mechanical controller actions. That is, how much motion of the SmartBall or SmartMouse is required before the SmartCard sends a signal to the computer. With a JOYSTICK, the SENSITIVITY PARAMETER determines how long the JOYSTICK must be held in one position (usually fractions of a second) before a command is generated by the SmartCard and sent to the computer. This CONTROL PARAMETER may range in value from 1 to 9. When the SmartCard is programmed with a value of 1, (S=1), the SmartCard is the least sensitive to controller actions. When the SmartCard is programmed with a value of 9, (S=9), the SmartCard is the most sensitive to controller actions.

## **PAUSE**

This CONTROL PARAMETER sets the delay between successive SmartCard commands. It is required to allow the SmartCard to work properly with most of the available programs. In many programs, a minimum delay is required between commands from the keyboard — this delay may vary from less than a millisecond (.001 seconds) to greater than a second. During this delay, the computer is usually busy “digesting” the previous command and will ignore any other commands. To prevent instructions from being lost, the SmartCard must wait, or pause, before sending out any subsequent commands. Since each program has different characteristics, the SmartCard allows the user to customize the controller commands to meet the specific requirements of the user’s software. This CONTROL PARAMETER may range in value from 1 to 9. When the Smartcard is programmed with a value of 1, (P=1), you will have the shortest delay between consecutive commands. When the SmartCard is programmed with a value of 9, (P=9), you will have the longest delay between consecutive commands.

The user will be able to customize the controller actions to meet individual preferences with a simple “trial and error” method. A value of 8 for the sensitivity, (S=8), and 2 for the pause, (P=2), are good starting values when setting up the SmartCard for the first time with a new program.

## **MODE**

The SmartCard simulates the action of the keyboard and issues a sequence of up to seven simulated keystrokes for each possible controller action. Before using the SmartCard, the user must specify which keyboard codes should be generated in response to each controller action. These SmartCard OUTPUT CHARACTER STRINGS (OCS) may be programmed into the SmartCard by any one of four techniques:

- 1.) By “EXEC”ing one of the existing SET-UP FILES.
- 2.) By using the UTILITY PROGRAM included with your SmartCard.
- 3.) By typing Smartcard commands directly from the keyboard.
- 4.) By running a user generated program that contains SmartCard commands.

The UTILITY PROGRAM allows you to create and store your own SET-UP FILES in order to use the SmartCard with a minimum of effort.

As an example, when using your favorite word processor, you must type a certain sequence of keystrokes in order to move the cursor up one line while editing text. With the SmartCard and a WICO SmartBall, Smart-Mouse or DIGITAL JOYSTICK, you may move the cursor up one line by pushing your controller in the up direction. The SmartCard may control many aspects of your favorite software — from cursor movements in a word processor to ICON selection used in many new INTEGRATED software packages. The SmartCard must be reprogrammed before each use of any software package.

For each of the four major directions a controller moves, a sequence of 0 to 7 keystrokes may be assigned to set-up the SmartCard OUTPUT CHARACTER STRINGS. In addition, each separate button on the controller may also be programmed to issue a sequence of 0 to 7 simulated keystrokes to

the computer. In the PRIMARY MODE, there are as many as six Smart-Card OUTPUT CHARACTER STRINGS corresponding to up (U), right (R), down (D), left (L), TOGGLE — T-button and B-button. Virtually any combination of the 128 possible ASCII CHARACTER CODES may be programmed for each possible controller action. When a direction or button is programmed with no more than three keystrokes, a set of ALTERNATE OUTPUT CHARACTER STRINGS is also available. There are up to six ALTERNATE OUTPUT CHARACTER STRINGS for a total of up to twelve possible OUTPUT CHARACTER STRINGS (six Primary and six Alternate). The ALTERNATE CHARACTER SET may be accessed by programming any of the controller buttons or directions with a special code (/+) to TOGGLE between the PRIMARY and ALTERNATE CHARACTER SETS.

As an example, when using your favorite word processor, you might program the PRIMARY CHARACTER SET with instructions to move the cursor one position up, down, left and right. The ALTERNATE OUTPUT CHARACTER STRINGS might be programmed with codes to move the cursor up one page, down one page, left one word, and right one word. The code to switch (TOGGLE) between the PRIMARY and ALTERNATE CHARACTER SETS (/+) should be assigned to the same pushbutton in both CHARACTER SETS to avoid confusion.

## **DEFINITION OF MODES 1-6**

### **Mode #1: Joystick, Normal Mode**

The SmartCard should be programmed in this MODE when a WICO DIGITAL JOYSTICK is used with a program requiring keyboard type signals to control the program.

### **Mode #2: Joystick, Speed-Up Mode**

This MODE is the same as MODE #1 except after the same controller position is held for 16 consecutive CHARACTER OUTPUT STRINGS, the OUTPUTS are sped-up by a factor of four. The PAUSE PARAMETER is internally changed and the character commands are issued by the Smart-Card at a significantly faster rate. This MODE has applications to word processor or spreadsheet programs and is particularly useful when you wish to move the cursor relatively large distances across the screen.

After the position of the joystick controller has been changed or the joystick has been released, the SmartCard automatically returns to the originally programmed PAUSE PARAMETER.

### **Mode #3: Joystick, Toggle Mode**

This MODE is designed to optimize the operation of VisiCalc type programs. It may control any program requiring a special TOGGLE OUTPUT CHARACTER SET when changing from horizontal to vertical controller motion and the same code when changing from vertical to horizontal controller motion. Any sequence of characters programmed into the T-button is sent to the computer each time the direction of controller action is changed in a perpendicular manner. The normal sequence of characters is then output by the SmartCard to the computer as in MODE #1. It may be used with some VisiCalc programs which only use the left and right arrow keys for movement in all four directions. The right arrow key, CHR\$(149), is used for both right and down motion of the cursor in VisiCalc. The left arrow

key, CHR\$(136), is used for both left and up cursor motion. In the standard VisiCalc program for the Apple II, II Plus, typing a space causes the left arrow key to TOGGLE between the up cursor function and the left cursor function. Programming the SmartCard in MODE #3 with the following direction assignments: "T=";CHR\$(160), "U=";CHR\$(136), "R=";CHR\$(149), "D=";CHR\$(149), "L=";CHR\$(136), "P=3", "M=3", "S=7", will automatically "press the space bar" every time the joystick is moved from one type of motion to another. In this MODE, you may use VisiCalc or a similar program and move the cursor in the desired direction by simply pushing the joystick in the selected direction. You no longer need to type a space key every time you wish to change directions.

#### **Mode #4: SmartBall/SmartMouse, Normal**

This is the normal MODE for a SmartBall or SmartMouse. As the controller is moved in a given direction, for example to the right, the SmartCard issues keyboard type signals to the computer that correspond to whatever character code was preselected for the right direction by the "R=" SmartCard programming statement. The length of the roll required before a single CHARACTER STRING is sent to the computer is determined by the SENSITIVITY PARAMETER. A large value, S=9, will give an OUTPUT CHARACTER STRING with a very short motion. The number of times the desired character sequence is sent to the computer for long rolling motions is determined by the value of the PAUSE PARAMETER, the speed with which the controller is moved, and the value of the SENSITIVITY PARAMETER.

#### **Mode #5: SmartBall/SmartMouse, Horizontal/Vertical**

This MODE is similar to MODE #4 except now the SmartCard analyzes the controller motion and decides whether the user wanted to go horizontally or vertically. If you rolled the controller mostly in the horizontal direction but also rolled it a little in the vertical direction, the SmartCard will ignore the vertical motion and only issue the programmed OUTPUT CHARACTER STRINGS corresponding to the appropriate horizontal direction. This MODE is particularly useful for controlling software requiring mostly horizontal and vertical cursor motions. MODE #4 should be used with programs requiring diagonal motions.

#### **Mode #6: SmartBall/SmartMouse, Toggle**

This MODE is similar to MODE #3 except it uses a SmartBall or SmartMouse. It is useful with VisiCalc type programs for the Apple II, II Plus computers on which no up or down arrows are present on the keyboard. It issues a T-button OUTPUT CHARACTER STRING whenever the controller's rolling motion changes from mostly horizontal to mostly vertical or vice-versa. A special note should be made regarding the use of MODE #6 with some programs such as VisiCalc. It is possible to roll the SmartBall or SmartMouse so rapidly that the program gets confused as to whether you are in the horizontal or vertical MODE. The program may not recognize a space character from the SmartCard if the PAUSE PARAMETER is too low or if the controller is rolling too fast. The VisiCalc program will be confused as to whether you want the CHR\$(149) to be a right or a down cursor motion. To coordinate the program again with the controller, strike the T-button. You may wish to reprogram the SmartCard with a larger value for the PAUSE PARAMETER or with a lower value for the SENSITIVITY. This problem may be avoided by rolling the controller slower.



# Modifying Set-Up Files

In order to modify existing SET-UP FILES, the WICO SmartCard UTILITY DISK includes an APPLESOFT Program called UTILITY PROGRAM. This program allows the user to modify the response or actions of the controller to suit personal preferences.

Often, a software manufacturer will modify an applications package several times during the life of the software. These modifications allow manufacturers an opportunity to improve their product. This may be another reason to modify existing SET-UP FILES. Consult the instruction manual that came with your version of the software. Usually the section labeled "Cursor Movement" will be most helpful for programming the SmartCard. After you have determined the proper key codes to move the cursor, modify the SmartCard SET-UP FILE.

For specific instructions, refer to the chapter entitled "Using The Utility Program" and the section entitled "Option (E) — Editing An Existing Set-Up File."

## Using The Utility Program

The UTILITY PROGRAM has been designed to be "User Friendly" so you may program your SmartCard in a straightforward and efficient manner.

### Some Ground Rules

First, we should note that this UTILITY PROGRAM is written in Applesoft Floating Point BASIC with DOS 3.3 and is designed for use on an Apple II, II Plus, or IIe computer with at least 48K memory and at least one disk drive. If your system is not configured with this equipment, refer to the section entitled "Option (P) — Programming The SmartCard Directly."

Two different types of responses will be required. Usually, the user is asked to respond with a single character, that is, a single letter or number. When typing in such a response, you should simply press the appropriate key on the keyboard. Do NOT follow this keystroke with a return, as this is not expected by the program. If you should forget and press the return key, the program will either ask if you wanted to press the return key or the program will ignore the extra return keystroke. However, it is good practice to respond as described above. Sometimes the user is required to respond with more than a single character; for example, the name of a file. In this case, a return must follow the response.

As a rule, the UTILITY PROGRAM will produce a "beep" when it receives an inappropriate response to a prompted question. For example, if the question requires a "Y" for yes or an "N" for no and something other than a "Y" or "N" is entered, the beep will sound and the program will wait for the user to make another response.

Before you can create your own or modify existing SET-UP FILES, you should be familiar with the SmartCard Command SYNTAX. The following is the SYNTAX, or set of rules, for creating legal SmartCard commands.

# SmartCard Command Syntax For Apple II, II Plus, IIe Computers

The SmartCard can store OUTPUT CHARACTER STRINGS for each of the four positions on the controller (up, down, left, and right) and also for each of the two buttons: T-button and B-button. In addition, it needs to be programmed with the three CONTROL PARAMETERS that define its operating characteristics. These are: MODE, SENSITIVITY, and PAUSE (See the chapter entitled "CONTROL PARAMETERS"). The format for the SmartCard commands that will allow you to define these CONTROL PARAMETERS and OUTPUT CHARACTER STRINGS is:

KEYWORD=USER SUPPLIED DATA

The KEYWORD may either be the first letter of the position/parameter or the entire word. The SmartCard interprets the single letter "M" and the word "MODE" in the same manner. The list of allowable KEYWORDS for the SmartCard is as follows:

MODE	UP	T-BUTTON
SENSITIVITY	RIGHT	B-BUTTON
PAUSE	DOWN	
	LEFT	

The only valid first letters for SmartCard KEYWORDS are M, S, P, U, R, D, L, T, and B or /M, /S, /P, /U, /R, /D, /L, /T, and /B. The characters preceded by a "/" indicate ALTERNATE CHARACTER SET programming which was discussed in the chapter entitled "CONTROL PARAMETERS". Use of any other first letter would constitute an illegal command. To set the MODE to 5, the command is as follows:

MODE=5  
or  
M=5

To store the OUTPUT CHARACTER STRING "ABC" in the down position, the command is:

DOWN=ABC  
or  
D=ABC

It is important **NOT** to add any extraneous spaces when you type in the user supplied data for these commands. Any spaces to the right of the equal sign will be interpreted by the SmartCard as a required part of the message. That is if you typed the command:

D=A BC

The OUTPUT CHARACTER STRING "A BC" (with space included) would be set-up for the down controller action. You may put extra spaces to the left of the "=" sign and they will not affect the message to the program. For example, if you typed:

DO W N =ABC

The result would be the same as

DOWN=ABC

The rule to remember is simple: extraneous spaces to the left of the "=" sign are ignored, but extra spaces to the right of the "=" sign are part of the message.

Many programs for which you will want to configure the SmartCard require the use of "CTRL" CHARACTERS. A "CTRL CHARACTER" may be entered by pressing and holding the "CTRL" KEY as you press the key of your choice. The SmartCard will accept "CTRL" CHARACTERS and the UTILITY PROGRAM will show them on the screen enclosed in <>. So, a "CTRL B" will appear on the screen as <B>. Certain other characters will also be shown in a special way. The "ESC" key is shown as <ESC>. The left arrow key is shown as <H>, and the right arrow key as <U>, since these CTRL CHARACTERS have the same codes as the arrow keys.

There is a provision on the SmartCard for a set of ALTERNATE CHARACTER STRINGS. The way to denote these in a command is to precede the KEYWORD with a "/". To use the ALTERNATE CHARACTER SET, be certain to program only a maximum of three characters for a PRIMARY CHARACTER SET.

If you wish to use the return key as a character in one of the OUTPUT CHARACTER STRINGS, you must type the special code "/" instead of the return key when you program the SmartCard. Finally, the code used to designate switching between the PRIMARY and ALTERNATE CHARACTER SETS is "/+". Don't forget to place this special code somewhere in both the PRIMARY and ALTERNATE SETS, so switching in both directions may occur.

### **Additional SmartCard Command Syntax For Apple IIe Computers Only**

In addition to the 128 ASCII characters that may be programmed in the keyboard modes, there are special programming codes that may be used with the SmartCard. As indicated above, the /+ sequence indicates that you want the SmartCard to change from the PRIMARY CHARACTER SET to the ALTERNATE CHARACTER SET or vice-versa, depending in which character set the SmartCard is currently operating. The /\* is another special programming code for the SmartCard. The /\* code is used to create a return character in the OUTPUT CHARACTER STRING.

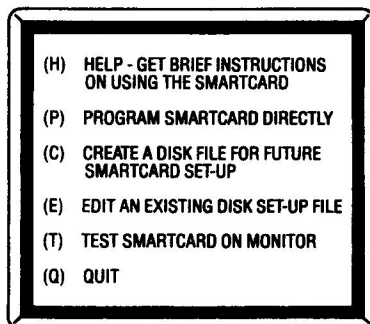
Apple IIe users have three other special programming codes /#, /\$, /% for Open Apple, Closed Apple and Enable Operations. To instruct the SmartCard to simulate the Open Apple key, the /# code should be programmed into the desired OUTPUT CHARACTER STRING. Similarly,

the Closed Apple key should be programmed with the /\$ sequence. These two special Apple IIe keys do not generate any of the 128 ASCII characters. Instead, these keys cause Switch 0 and Switch 1 of the game connector to go high when the Open Apple and Closed Apple keys are depressed. Some Apple IIe applications programs use the Open and Closed Apple keys to control certain program activities. These programs must periodically read the game input/output connector to determine if either the Open or Closed Apple key has been depressed. The frequency in which the application software interrogates the Open and Closed Apple switches varies from program to program. Therefore, the length of time that the SmartCard keeps Game Switch 0 or 1 high must also be adjusted to the specific application software. When a /# or /\$ code is programmed into an OUTPUT CHARACTER STRING and the controller motions cause that OUTPUT STRING to be issued to the computer, the SmartCard sets the appropriate switch high until the last character of the OUTPUT CHARACTER STRING is sent to the computer. To lengthen the time in which that SmartCard holds the Open or Closed Apple switch high, the user may increase the PAUSE PARAMETER or increase the number of special codes in the string. That is, multiple /#/#/#/ or /\$/\$/ codes may be programmed in one OUTPUT CHARACTER STRING or PAUSE may be set to 5, 6, or 7. Since the SmartCard holds the appropriate switch high until the entire OUTPUT CHARACTER STRING for that motion is sent to the computer, the special key code should be the first character of the OUTPUT CHARACTER STRING.

The /% special code puts the SmartCard in the enable mode. If the /% special code sequence is programmed into the T-Button or the B-button, then the controller is disabled unless the preprogrammed key is depressed. No controller motion will cause any OUTPUT CHARACTER STRINGS to be sent to the computer unless the button, programmed with the enable code, /%, is depressed. If multiple buttons are programmed with the enable code, only one button need be depressed to "enable" the controller. The PRIMARY and ALTERNATE CHARACTER SETS may be independently programmed into the enable mode.

## Main Menu

The UTILITY PROGRAM is a MENU-DRIVEN PROGRAM. At various points in the program, you are given a list of options from which to choose. Indicate your choice by typing the single letter which precedes the description of the desired item in the menu. The Main Menu of the UTILITY PROGRAM contains six basic items. You will see a list of the options when you start the program. This is how it will look:



## Option (H) Help - Get Brief Instructions On Using The SmartCard

This is essentially a brief set of reference notes on the use of the SmartCard. By having these notes on the screen, you may quickly refresh your memory on some aspects of the SmartCard without having to refer back to this manual. The help notes are broken down into eight pages or screens. When you select the help mode from the Main Menu, you will see Page 1 appear on the screen. To move to the next page, press the "N" key, which stands for "next." Now Page 2 will appear. You may continue paging through the notes by pressing "N" until you come to the last page. Pressing the "N" key at this time will result in a beep, as it is an inappropriate response. You may page backwards by pressing the "P" key, for "previous." The "P" key may not be used when page 1 is on the screen. Attempting to do so will cause a beep. To return to the Main Menu, press the "M" key. Any other response will cause a beep. At the bottom of each page is a Mini-Menu containing these three appropriate responses.

## Option (P) Program SmartCard Directly

This MODE of the program will allow you to configure, or program, the SmartCard for use with any software you have chosen. Do this by typing in the appropriate SmartCard commands as input to the UTILITY PROGRAM.

The selection (P) from the Main Menu of the UTILITY PROGRAM makes use of a "WORK SPACE" or "SCRATCHPAD" area of the computer memory. This applies also to the (C) and (E) MODES. You may type commands for the SmartCard into this WORK SPACE area. Then, you may examine the commands you have generated and decide if there are any modifications or additions to the command that should be made. You may make these changes before you attempt to have the UTILITY PROGRAM write the commands to the SmartCard. The WORK SPACE area will remain intact until you instruct the program to clear it and start with a "clean slate" or until you stop PROGRAM EXECUTION. Whenever you stop execution of the UTILITY PROGRAM and then restart the program, the commands in the WORK SPACE will be lost.

The first question you will be asked upon selecting the (P) option from the Main Menu is:

DO YOU WANT TO CLEAR  
THE WORK SPACE  
OF THE CURRENT COMMANDS?



This requires a simple "Y" for "Yes" or "N" for "No" response. If you respond with "N", the program will allow you to modify or add commands to the current list. If your response is "Y", the WORK SPACE will be cleared and the program will allow you to begin entering commands. You will be reminded that the WORK SPACE is clear by the message:

CURRENT NUMBER  
OF COMMANDS = 0



There are two COMMAND ENTRY MODES: an AUTOMATIC and MANUAL MODE. The following message will appear on the screen:

WANT COMMANDS AUTO PROMPTED? (Y/N)



If you type "Y", you will be in the AUTOMATIC MODE. In this MODE, you are prompted with the SmartCard KEYWORDS in the form:

MODE=5  
ACCEPT THIS ENTRY? (Y/N)



If you type "Y", the program will enter the command: MODE=5 in the WORK SPACE. This program will set the default values for MODE, SENSITIVITY, and PAUSE in this manner. If you do not wish to use the default values, you may respond with "N" to the question. The program will now prompt you with:

MODE=



Now enter the desired MODE value. NOTE: there will be no flashing cursor to prompt you.

In the AUTOMATIC MODE, the program will prompt you with all 18 possible KEYWORDS. You must enter a response to each prompt or simply press the return key. When you press only the return key, you will define that KEYWORD as having no value, i.e., a null character string.

If you type "N" in response to the question:

WANT COMMANDS AUTO PROMPTED? (Y/N)



The screen will display:

ENTER NEXT COMMAND



NOTE: There will be no flashing CURSOR to indicate that the program is waiting for user input.

You may then type in the complete command in the form:

KEYWORD=DATA



followed with a return key. If you should make a mistake when typing the command, **YOU CANNOT BACKSPACE OVER THE ERROR BY USING THE LEFT ARROW KEY.** This is because the left arrow is a valid ASCII CHARACTER that you may want to type as part of a command to the SmartCard, and so the program must recognize it as such. The way to correct typing errors in commands is to press the return key and respond "N" to the following question:

ACCEPT THIS ENTRY? (Y/N)



If you respond with "Y" for "Yes", the command will be accepted into the **COMMAND WORK SPACE** just as you typed it. But if you respond with "N" for "No", then the line will be cancelled and the program will prompt you with:

**RE-ENTER COMMAND**



At this point, you may retype the command correctly. After each command is accepted into the **WORK SPACE**, the prompt:

**ENTER NEXT COMMAND**



will always reappear. When you have typed in all of the commands for your application, type a return key only in response to this prompt. After a return only response, the program will ask:

**WANT TO STOP COMMAND ENTRY? (Y/N)**



This is to verify that you intended to exit the **COMMAND ENTRY MODE** of the program. If you respond "N" for "No", you will be prompted again with:

**ENTER NEXT COMMAND**



and you may resume with command entry as before. If you respond "Y" for "Yes", the program will take you out of the **COMMAND ENTRY MODE** and take you into the **DISPLAY/EDIT COMMANDS** section. This part of the **UTILITY PROGRAM** allows you to modify and/or add to the current commands in the **WORK SPACE**. Recall the first question asked by the program when you chose the (P) **MODE** was:

**DO YOU WANT TO CLEAR  
THE WORK SPACE  
OF THE CURRENT COMMANDS? (Y/N)**



If the response to this prompt was "N", instead of entering the **COMMAND ENTRY MODE**, as described above, the program would have taken you directly into the **DISPLAY/EDIT COMMANDS** section.

### **Display/Edit Commands Module**

Whenever the **DISPLAY/EDIT** section is entered, the program will inform you as to the number of commands currently in the **WORK SPACE**. Then, the commands themselves are displayed in a two-column arrangement on the monitor. Each command is also given an identification number, the first command being numbered 1, and so on. You will recall that the **CTRL CHARACTERS** are displayed by placing the character inside the <>'s. Also, the left arrow, right arrow, and **ESC** keys are displayed as <H>, <U>, and <ESC>, respectively. In some unusual circumstances, the display of a command may **WRAPAROUND** to the next line of the screen. This happens when you have a command which requires the display of a large number of special characters. This **WRAPAROUND** will not interfere with the entry of the command.

Following the display of commands currently stored in the WORK SPACE, the program will prompt you with another Mini-Menu:

**PRESS M TO MODIFY COMMANDS,  
A TO ADD COMMANDS,  
OR P TO PROCEED**



Pressing "M" for "modify" when in the DISPLAY/EDIT MODE will allow you to change any of the commands currently residing in the WORK SPACE. When you press "M", you will be asked for the number of the command you wish to modify. Simply refer to the display of the commands on the upper part of the screen and type in your choice. Here, since there could be either one or two digits in your response for the command number, you must press the return key following the entry. The UTILITY PROGRAM will then issue the prompt:

**ENTER MODIFIED COMMAND**



At this point, you are essentially back in the COMMAND ENTRY section of the UTILITY PROGRAM. The entry of your modified command, therefore, is subject to the same rules as described before. You may completely cancel the command you have selected to modify by pressing the return key when prompted with the message "enter modified command." When the program has accepted your modified entry, it will display the current contents of the WORK SPACE. If you have chosen to cancel the command as described above, you will find one less entry in this new list of commands. The UTILITY PROGRAM will also have taken care of renumbering the commands to account for the deleted command.

Should you want to add commands to the current list in the WORK SPACE, press the "A" key in response to the prompt at the bottom of the DISPLAY/EDIT COMMANDS screen. This will again put the program back into the COMMAND ENTRY MODE and you may proceed to enter as many new commands as you wish. As before, when you want to stop entering new commands, press the return key only.

Respond with a "Y" to the verification question:

**WANT TO STOP COMMAND ENTRY? (Y/N)**



You will see the list of commands just entered and the Mini-Menu requesting that you either modify commands, add more commands, or proceed to the next section of the program.

Pressing "P" for "proceed" will simply take you out of the DISPLAY/EDIT COMMANDS MODE and proceed with the UTILITY program's next task. In this particular mode, the screen will clear and you will be prompted with the question:

**DO YOU WANT TO PROGRAM THE SMARTCARD  
WITH THE COMMANDS CURRENTLY IN THE  
WORK SPACE? (Y/N)**

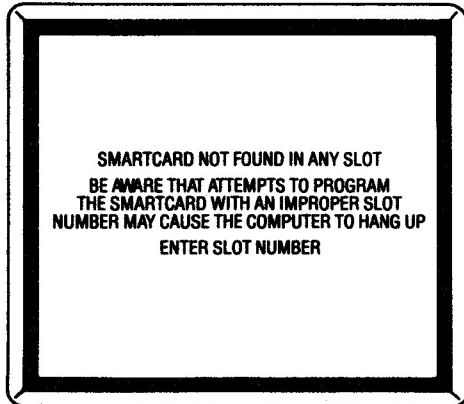




If you respond with "N" for "No", the program will return you to the Main Menu, with the commands still stored in the WORK SPACE. A response of "Y" for "Yes" will cause the UTILITY PROGRAM to prepare to send these commands to the SmartCard.

### **Programming The SmartCard With The Commands In The Work Space**

Before the UTILITY PROGRAM can send the commands in the WORK SPACE to the SmartCard, it must first determine in which peripheral slot the SmartCard is located. To do this, it executes a special section of code that automatically determines the correct slot number. If that routine cannot "find" the SmartCard in any slot, it will issue the message:



This message is telling you that if you attempt to have the UTILITY PROGRAM write commands to a slot in which the SmartCard does not reside, the execution of the UTILITY PROGRAM may cease and leave the computer in a suspended state. The only way to recover from this condition is to press CTRL RESET on the keyboard and restart execution of the UTILITY PROGRAM. Assuming you have the SmartCard installed properly in one of the appropriate slots, the UTILITY PROGRAM will issue the message:

SMARTCARD WAS LOCATED IN APPLE SLOT NO. 5  
OK TO USE THIS SLOT #? (Y/N)



Of course, you may have used a slot number other than 5. For direct programming of the SmartCard, you will almost always answer "Y" to this prompt. Occasionally, you may want to use slot 0 for diagnostics. Using slot 0 would cause the commands to simply be issued to the screen and not to the SmartCard. To do this, you would answer "N" to the prompt. The UTILITY PROGRAM will then ask you to:

ENTER SLOT NUMBER



You would then type "0" followed by a return key. Whether you use the slot found by the UTILITY PROGRAM or enter one of your own choice, such as 0, the program will attempt to write the commands that currently exist in the WORK SPACE to that slot. As long as the SmartCard resides in the slot you have selected, each command will be "echoed" by the SmartCard to

the screen. NOTE: CTRL and ESC characters are not printed on the screen at this time. If you enter an illegal command, the SmartCard will recognize it as such, beep and issue this message on the screen:

**\*\*CNTRLR-INTERFACE ERROR\*\***



When the UTILITY PROGRAM successfully transfers all the commands in the WORK SPACE to the SmartCard, the Main Menu will again appear. You may now wish to test these transferred commands by selecting the (T) menu option. The test option allows you to visually see the commands previously transferred. By moving the controller slowly in each direction or by pressing each button, the characters you entered will be displayed one at a time on the screen. CTRL characters will be bracketed as shown: <>. (For additional information, refer to "Option (T) - Test SmartCard On Monitor"). Whether you took advantage of the test option or not, you may now stop the program by pressing "Q" to quit.

### **Option (C) - Create A Disk File For Future SmartCard Set-Up**

The flexible disks you place in your Disk Drive are used to store programs or data that you may want to use many times. The UTILITY PROGRAM can store on a disk the list of SmartCard commands typed into the WORK SPACE. Each time you want to reprogram the SmartCard with that list of commands, you need only type one simple instruction to the computer. The computer will fetch the stored command list from the disk and program the SmartCard with that list of commands.

When you press "C" to select the Create MODE from the Main Menu of the UTILITY PROGRAM, the first question to appear will be:

**DO YOU WANT TO SEE A CATALOG OF THE  
DISKETTE NOW IN THE DRIVE? (Y/N)**



Responding with "Y" will cause the computer to perform a normal CATALOG. If your system has multiple Disk Drives, this CATALOG action will list the files on the last-accessed Disk Drive. With the CATALOG option you will see the names of all files on the diskette, including any SmartCard SET-UP FILES you may have stored in the past. Responding with "N" will simply bypass the CATALOG.

The program will perform the same way it did for the (P) MODE of the Main Menu. You may enter, modify, or add commands, as before. When you are done with the Edit MODE and press "P" to proceed, the slot finder routine of the UTILITY PROGRAM will again try to determine which slot you have chosen for your SmartCard. Once you have either accepted the slot number it found or typed in another of your own choice, the program will ask:

**DO YOU WANT TO SAVE THE COMMANDS  
CURRENTLY IN THE WORK SPACE ON  
A DISK FILE? (Y/N)**



Responding “N” will simply return you to the Main Menu. A “Y” response will cause the prompt:

### ENTER THE FILENAME



Now type in any legal Disk FILENAME that you choose. If you have a multi-disk drive system, you may want to attach a Disk Drive IDENTIFIER SUFFIX (,D1 or ,D2) to the FILENAME, such as FILENAME,D2. You must follow this response with a return key. It is a good idea to choose a FILENAME that will:

- a) remind you that the file is a SmartCard SET-UP FILE
- b) remind you with what program the SET-UP FILE is to be used
- c) remind you for which controller the SET-UP FILE is designed
- d) contain no more than 30 characters

For example, you might want to name a file to be used with a program called “Word Processor” and a SmartBall — “Set-Up Word Processor SBall”.

After entering the FILENAME, the UTILITY PROGRAM will store the data on the disk and will display the Main Menu on the screen.

### Option (E) - Edit An Existing Disk Set-Up File

The (E) selection from the Main Menu is used to edit one or more of the commands stored on an existing SmartCard SET-UP FILE. The first question issued by the UTILITY PROGRAM for the (E) selection will ask if you want to see a DISK CATALOG. Following that, you will be asked to enter the name of the file to be edited. When the program goes to the disk to read this file, it will respond with:

### READING FILENAME



As long as the FILENAME you typed corresponds to a valid SmartCard SET-UP FILE on the disk, the program will show a message as it decodes each line of the file:

DECODED LINE 1

DECODED LINE 2



and so on.

If the file cannot be found on the disk or if it is not a valid SmartCard SET-UP FILE, the UTILITY PROGRAM will issue the error message:

FILE CANNOT BE DECODED. PLEASE  
CHECK THAT FILENAME IS CORRECT.



At this point, pressing any key will return you to the Main Menu in order to determine what caused the problem. Most often, this error will result from either mis-typing the FILENAME or having an incorrect disk in the Disk

Drive. NOTE: If you select a FILENAME that does not exist, the UTILITY PROGRAM will create a 1-sector Text File with that name. You will probably want to delete this empty file when convenient. To do this, simply type:

DELETE FILENAME



If the file can be decoded, the DISPLAY/EDIT MODE will be invoked and you will see the commands stored on that DISK FILE. The rest of the workings of the (E) Option are identical to those of the (P) and (C) Options. When you have completed making your changes to the commands in the WORK SPACE, you may either store them back on the disk with the same FILENAME or choose a new name. Be aware that if you choose to use the old name, the original contents of that file will be replaced with the new commands. That is, the old commands will be lost.

### **Option (T) - Test SmartCard On Monitor**

This MODE will allow you to test the behavior of the SmartCard via a display on the monitor. This can be a useful diagnostic tool if the SmartCard does not seem to be working with your software in the manner that you had programmed it.

To choose the Test Option, press the letter "T". The prompt from the program will ask you to type "P" when you are ready to proceed with the test. After you type "P", slowly start to move the controller through its various positions and also press the buttons on the controller. On the screen you will see the characters programmed into the SmartCard for each position/button that is activated. In this way, you may verify whether or not the SmartCard has been set-up properly.

Do **NOT** try to move the controller too rapidly through its positions in this test. If you do, you may not see all of the characters on the screen. This condition may also occur when the OUTPUT CHARACTER STRING has multiple characters. This may be corrected if you move the controller at a reasonably slow rate during the test. Although multiple CHARACTER STRINGS are detectable by the appropriate software (when the PAUSE is set correctly), the test section of this UTILITY PROGRAM does not always "hear" all of the characters of the string. To exit from this MODE, press the return key. This will return you to the Main Menu of the UTILITY PROGRAM.

## **How To Program The SmartCard With Your Own Software**

This information is intended for the user interested in programming the SmartCard directly from user generated software. It presents the information required to set-up the SmartCard without use of the UTILITY PROGRAM. Some advanced programming concepts are used and may be difficult for users not familiar with the BASIC Programming Language.

It is recommended that novice programmers read this over with the aid of the Apple BASIC Programming Manual. Users not interested in learning the details of programming the SmartCard may skip this information.

## Communicating With The SmartCard

The SmartCard contains a special firmware program to direct the computer's 6502 microprocessor in transferring commands from the computer to the SmartCard. This 256 BYTE, MACHINE LANGUAGE Program resides in a special location of the computer's memory space that is normally reserved for these types of operations, i.e., peripheral card input/output. This firmware program allows the user to program the SmartCard with instructions on how it should respond to different types of controllers. To do this, the computer must send its output to the slot containing the SmartCard.

NOTE: The lower case "n" in the text will refer to the peripheral connector slot which contains the SmartCard. This number is required in all programs which communicate with the SmartCard. Be sure to use the correct value for "n".

Once you have determined the slot number containing the SmartCard, you may begin programming. It is easiest to program with the BASIC Programming Language and with the help of the "PR#n" statement. This BASIC statement tells the computer to send all subsequent output information to slot #n. For example, if the SmartCard is installed in slot 5, a valid SmartCard command might appear in your program as follows:

```
10 PRINT CHR$(4);"PR#5"  
20 PRINT "R=";CHR$(149)  
30 PRINT CHR$(4);"PR#0"
```

These statements, written in APPLESOFT FLOATING POINT BASIC with DOS, tell the SmartCard to send a right arrow keystroke to the computer whenever a "right" controller motion occurs. In APPLESOFT BASIC and INTEGER BASIC, the PR#5 command automatically sends all subsequent OUTPUT CHARACTERS to the peripheral card located in slot 5. After this statement has been executed by APPLE BASIC and a PRINT command is encountered, the computer is directed to go to the special MACHINE LANGUAGE Program residing at HEXADECIMAL APPLE ADDRESS \$C500 and follow the instructions given there for communicating with the SmartCard. The BASIC user need not get involved with any of the details of the MACHINE LANGUAGE Program or where the program is located. The computer's Operating System internally takes care of all of the details.

When you are finished sending commands to the SmartCard, you must redirect the computer's output back to the standard output device by sending another PR# command. In the example, the PR#0 tells the computer to send the program output back to the screen. The prefix CHR\$(4), the control-D code, is used in all DOS commands to indicate that the contents of the PRINT statement are a command to the computer and not text to be printed on the screen or printer. In general, you will program the SmartCard at the beginning of your program and probably not send additional instructions to the SmartCard until you change programs or turn the power off and on again.

If you are not programming in BASIC but using MACHINE LANGUAGE, different principles of input/output apply. To send valid commands to the SmartCard, the MACHINE LANGUAGE program must send the entire

command as a string of ASCII CHARACTERS. The desired SmartCard command must be represented as a list of HEXADECIMAL NUMBERS representing all of the ASCII CHARACTERS in the command. The first HEXADECIMAL CHARACTER must be loaded into the computer's 6502 accumulator and a MACHINE LANGUAGE Jump to Subroutine (JSR \$Cn00) must be executed. The MACHINE LANGUAGE program would load the next character of the SmartCard command into this process until the complete command has been issued. The subroutine's HEXADECIMAL ADDRESS is determined from the SmartCard slot #n as follows: \$Cn00.

For the example above, the subrouting would be located at \$C500.

Before leaving the topic of MACHINE LANGUAGE programs, we should note that Hexadecimal Random Access Memory (RAM) locations \$0036, \$0037, \$0038, \$0039, \$0045, \$0046, \$0047, \$0048, \$0049, and \$07F8 are used by firmware installed on the SmartCard. These locations are used according to the rules set by Apple Computer. If you use these locations in a nonstandard manner, your program may give you unexpected results. It is difficult to establish if any interference would occur without examining the details of the user's program. Usually there will be no conflict. The programmer may guarantee that no conflict will occur by programming the SmartCard at the beginning of the application and then the above locations may be used for any other purpose. The memory locations listed above are only used while the SmartCard is being programmed. After the appropriate commands have been sent to the SmartCard, no computer memory locations are used.

The user will notice that with all programming techniques, the commands issued to the SmartCard will appear on the screen. This allows the user to see which characters are actually being sent to the SmartCard and is helpful in case of programming or SYNTAX errors. If the SmartCard detects an erroneous command, it will inform the user by beeping and sending a

**\*\*CNTRLR-INTERFACE ERROR\*\***



message on the screen.

### **Programming Syntax**

All possible aspects of the SmartCard may be programmed with a total of 18 commands. Each command assigns a value to one of the CONTROL PARAMETERS or OUTPUT CHARACTER STRINGS. Of course, the user does not have to send all 18 commands to the SmartCard each time the controller is to be set-up. If no commands are sent to the SmartCard by the computer, certain power-up default values will be assigned to the CONTROL PARAMETERS and OUTPUT CHARACTER STRINGS. Once the SmartCard is programmed, each command or OUTPUT CHARACTER STRING is remembered by the SmartCard until it is reprogrammed or the main power to the computer is turned off.

Each command sent to the SmartCard must have four elements: a KEYWORD, an equal sign, user supplied data, and a return character. The

**KEYWORD**, which may be only a single letter, tells the SmartCard which **PARAMETER** is being defined. The **KEYWORDS** may be any of the following: **MODE**, **SENSITIVITY**, **PAUSE**, **UP**, **RIGHT**, **DOWN**, **LEFT**, **T-BUTTON**, **B-BUTTON**, **/MODE**, **/SENSITIVITY**, **/PAUSE**, **/UP**, **/RIGHT**, **/DOWN**, **/LEFT**, **/T-BUTTON**, or **/B-BUTTON**. All **MODES** of the SmartCard require the user to define the three **CONTROL PARAMETERS**: **MODE**, **SENSITIVITY** and **PAUSE**. In addition to these **CONTROL PARAMETERS**, you have the option to define **UP**, **DOWN**, **LEFT**, **RIGHT**, **T-BUTTON** and **B-BUTTON** in any combination. If an **ALTERNATE CHARACTER SET** is being used, **ALTERNATE CONTROL PARAMETERS** and **ALTERNATE OUTPUT CHARACTER STRINGS** must also be used. The **ALTERNATE KEYWORDS** are indicated with a slash (/) in front of the same **KEYWORDS** used for the **PRIMARY CHARACTER SET**: **/MODE**, **/SENSITIVITY**, **/PAUSE**, **/UP**, **/RIGHT**, **/DOWN**, **/LEFT**, **/T-BUTTON**, and **/B-BUTTON**.

For simplicity, the SmartCard will allow the user to abbreviate a **KEYWORD** with just the first letter of the **KEYWORD**. Example: **M**, **S**, **P**, **U**, **R**, **D**, **L**, **T**, **B**. For the **ALTERNATE KEYWORD SET**, the abbreviations are: **/M**, **/S**, **/P**, **/U**, **/R**, **/D**, **/L**, **/T**, **/B**. The SmartCard will allow spaces or other characters after a valid first letter but before the equal sign. In this way, the user may type the entire **KEYWORD** for ease of remembering what **PARAMETER** is being programmed or the user may abbreviate the **KEYWORD** to reduce the length of the program. The user may even modify the spelling of the **KEYWORDS** as long as the first letter is correct.

After the **KEYWORD** has been entered in a command line, an equal sign (=) must appear. This tells the SmartCard that the **KEYWORD** is finished and everything to the right of the equal sign is the user's data.

This data is the information used to assign values to the **CONTROL PARAMETERS** and **OUTPUT CHARACTER STRINGS**. No spaces are permitted to the right of the equal sign unless a space is specifically to be included in the **OUTPUT CHARACTER STRING**. The allowed values for the **CONTROL PARAMETERS** — **MODE**, **SENSITIVITY**, and **PAUSE** — were specified earlier. If the user attempts to assign a value to a **CONTROL PARAMETER** outside of the allowed range, the:

**\*\*CNTRLR-INTERFACE ERROR\*\***



message will occur in most cases. After an error message, the SmartCard command causing the error must be reprogrammed properly or unpredictable SmartCard operation may occur.

Any combination of seven or less **ASCII CHARACTERS** may be programmed for **PRIMARY OUTPUT CHARACTER STRINGS**. An **ALTERNATE OUTPUT CHARACTER STRING** is only available if the **PRIMARY CHARACTER STRING** has been programmed with three or less characters. For example, if the user wishes to implement an **ALTERNATE OUTPUT CHARACTER STRING** for the up controller action, the **PRIMARY OUTPUT CHARACTER STRING** must be programmed with no more than three **ASCII CHARACTER CODES**. To make use of the **ALTERNATE CHARACTER STRINGS**, one of the controller actions must be programmed with the “/+” code. This generates no keyboard type signal and sends no message to the computer; it is an internal message code for the SmartCard microprocessor. When it is programmed for one of the controller

actions, that action causes the SmartCard to TOGGLE between CHARACTER SETS. For example, let's set-up the B-button to TOGGLE between CHARACTER SETS:

```
PRINT CHR$(4);"PR#5": PRINT "B= /+": PRINT "/B= /+":  
PRINT CHR$(4);"PR#0"
```

In this example, we assume the SmartCard is in slot 5. We have assigned the "/" code to both B and /B. In this way, whenever we press the B-button on the controller, we will TOGGLE from one CHARACTER SET to the other. Therefore we do not have to know which CHARACTER SET we are using, because the B-button can take us to the other quickly. If we had programmed the T-button (/T= /+) to take us out of the ALTERNATE CHARACTER SET and put us back in the PRIMARY CHARACTER SET, this would have been more confusing since we would have had to remember which character set was currently invoked.

As long as one of the controller actions is programmed to TOGGLE between the ALTERNATE and PRIMARY CHARACTER SETS, the ALTERNATE CHARACTER SET must be programmed to be functional.

Controller actions that are assigned PRIMARY OUTPUT CHARACTER STRINGS longer than three characters in length, may have no ALTERNATE OUTPUT CHARACTER STRING. If you move the controller in a direction that has no OUTPUT CHARACTER STRING (or if, in the ALTERNATE MODE, no OUTPUT CHARACTER STRING is available), no information will be sent to the computer.

ALTERNATE CHARACTER SETS may be used for a variety of special applications. For example, in many Word Processor Programs, the PRIMARY CHARACTER SET may be made to scroll single lines vertically and single characters horizontally for small movements through the text. While the ALTERNATE CHARACTER SET may be made to scroll pages vertically and whole words horizontally for large movements through the text. In other types of software the ALTERNATE OUTPUT CHARACTER STRINGS may be defined to be blank. That is, all of the ALTERNATE controller actions (except for toggling to the PRIMARY SET), may be set to contain no OUTPUT characters. In this way, the controller action which switches to the ALTERNATE CHARACTER SET essentially turns the controller off. The next time the button is pressed, the SmartCard will again output the PRIMARY CHARACTER SET in response to controller actions. Of course, any of the allowed controller actions could be programmed to switch between CHARACTER SETS, including U, R, D, L, T, or B.

The concluding character of the SmartCard command is the return character CHR\$(13) or CHR\$(141). The return character tells the SmartCard that the command has ended. When programming the SmartCard with a BASIC language program, the return character is automatically issued at the end of the BASIC PRINT statement, unless a semicolon is added to the end of the PRINT statement. If the return character is suppressed with a semicolon, the SmartCard will not know where the programming command ends and an error will probably occur. After such an error, the SmartCard must be reprogrammed or it will respond to controller actions in an unpredictable manner.

If your application requires a return character in the OUTPUT CHARACTER STRING, a special CODE, "/\*", should be entered. Using this



code for the return character is required to let the SmartCard differentiate when you are trying to enter a return as part of the OUTPUT CHARACTER STRING and when you are trying to end the command. The ASCII CHARACTER combination “/\*” is automatically replaced by the SmartCard with an ASCII return character 5 CHR\$(13). This conversion from a two character “/\*” sequence to a single return character only occurs if the “/\*” sequence occurs without any other intervening characters or spaces. In counting characters, the “/\*” counts as only one character. The number of characters in an OUTPUT CHARACTER STRING is important if the user is trying to use an ALTERNATE CHARACTER SET. The “/+” CHARACTER STRING which TOGGLEs the SmartCard from the PRIMARY to the ALTERNATE CHARACTER STRING counts as two characters. As stated earlier, for an ALTERNATE CHARACTER SET the total number of characters in an OUTPUT CHARACTER STRING must not exceed three.

### Applesoft FP BASIC And DOS

This is the easiest way to write a program for the SmartCard without the use of the SmartCard UTILITY PROGRAM. A sample FP BASIC program with DOS commands is as follows:

```

10 PRINT CHR$(4);"PR#5":REM DIRECT OUTPUT TO SLOT #5
14 REM SET-UP TOGGLE FEATURE BETWEEN
16 REM ALTERNATE AND PRIMARY CHARACTER SETS
18 REM USE T-BUTTON ON CONTROLLER TO SWITCH
20 PRINT "T=/"
30 PRINT "/T=/"
40 PRINT "U=UP"
50 PRINT "/U=/UP"
60 PRINT "D=Dear,/*"
70 PRINT "R=";CHR$(149): PRINT "L=L"
80 PRINT "/R=R/+": PRINT "/L=/*/*/*"
90 PRINT "B=": PRINT "/B="
100 REM SET-UP CONTROL PARAMETERS
110 PRINT "M=4": PRINT "S=7": PRINT "P=3"
115 PRINT "/M=5": PRINT "/S=9": PRINT "/P=3"
120 PRINT CHR$(4);"PR#0": REM RETURN OUTPUT TO MONITOR SCREEN
130 END

```

This short FP BASIC program is only intended to illustrate some of the features of programming the SmartCard. A controller set-up in this manner may not necessarily function well with any software, but a line-by-line description of the program will illustrate many important programming issues.

### Line 10

```
10 PRINT CHR$(4);"PR#5": REM DIRECT OUTPUT TO SLOT #5
```

This directs the computer's output to slot 5. For this example, it is assumed that the SmartCard is installed in slot 5. The Control - D or CHR\$(4) prefix

printed at the beginning of the line alerts the DOS program controlling the computer, that the statement is printing a command for the computer and not text to be printed to the current output device.

#### **Line 20 and 30**

```
20 PRINT "T=/"
30 PRINT "/T=/"
```

These lines assign the TOGGLE function to the T-button. This allows the user to switch to the other CHARACTER SET (either PRIMARY or ALTERNATE) by pressing the T-button.

#### **Line 40**

```
40 PRINT "U=UP"
```

This line assigns the CHARACTER STRING "UP" to the PRIMARY OUTPUT CHARACTER STRING for the controller action corresponding to rolling the SmartBall or the SmartMouse in the up direction.

#### **Line 50**

```
50 PRINT "/U=/UP"
```

This line assigns the CHARACTER STRING "/UP" to the ALTERNATE OUTPUT CHARACTER STRING for the up action. In this example, rolling the controller in the up direction will tell the user if he is in the PRIMARY or ALTERNATE CHARACTER SET by observing a slash or no slash preceding the word "UP."

#### **Line 60**

```
60 PRINT "D = Dear,/*"
```

This line sets the PRIMARY OUTPUT CHARACTER STRING for the down controller action to send the word "Dear," preceded by a space and followed by a return character. In certain applications, the same word must be typed in the same manner many times. As shown in this line, the SmartCard may be programmed to "type" a short phrase each time a specified controller action occurs. NOTE: although it appears we have programmed an eight character string for D in this line, D is actually only seven characters long since /\* is considered one character — return. Since the PRIMARY OUTPUT CHARACTER STRING length is longer than three characters, no ALTERNATE CHARACTER STRING is allowed. In fact, seven characters is the maximum length for a PRIMARY OUTPUT CHARACTER STRING in the SmartCard.

#### **Line 70**

```
70 PRINT "R=";CHR$(149):PRINT "L=L"
```

This line assigns the right arrow key character to the PRIMARY right controller action and the letter "L" to the left controller action. The FP BASIC Language has a CHR\$ command which allows any ASCII CHARACTER to be expressed in a simple statement. When using the CHR\$ function to define all or part of an OUTPUT CHARACTER STRING, care must be taken to use the proper SYNTAX as shown in this example and specified in the Apple Basic Programming Reference Manual.

### Line 80

```
80 PRINT "/R=R/+": PRINT "/L=/*/*/*"
```

This line defines the ALTERNATE OUTPUT CHARACTER STRINGS for the right and left controller actions. In the ALTERNATE CHARACTER SET, a right controller action will send an "R" to the computer and then send the SmartCard back into the PRIMARY CHARACTER SET. The left controller action will send three return keystrokes when the SmartCard is in the ALTERNATE CHARACTER SET MODE.

### Line 90

```
90 PRINT "B=": PRINT "/B="
```

This line assigns the NULL SET to the PRIMARY and ALTERNATE OUTPUT CHARACTER STRINGS for the B-button. This will make the B-button completely nonfunctional in both the PRIMARY and ALTERNATE CHARACTER SETS.

### Line 110

```
110 PRINT "M=4": PRINT "S=7": PRINT "P=3"
```

This line defines the CONTROL PARAMETERS for the PRIMARY CHARACTER SETS. SmartBall/SmartMouse MODE #4 is selected for the PRIMARY CHARACTER SET, the PRIMARY SENSITIVITY is set to 7, and the PRIMARY PAUSE is set to 3.

### Line 115

```
115 PRINT "/M=5": PRINT "/S=9": PRINT "/P=3"
```

This line assigns the ALTERNATE CHARACTER SET CONTROL PARAMETERS. The ALTERNATE MODE is set to 5, the ALTERNATE SENSITIVITY is set to 9, and the ALTERNATE PAUSE is set to 3.

### Line 120

```
120 PRINT CHR$(4);"PR#0": REM RETURN OUTPUT TO MONITOR SCREEN
```

This line resets the computer's output to the screen.

The SmartCard will operate properly only if the computer is directed to receive inputs from the keyboard. An IN#0 command must be executed in BASIC if any other IN# commands have been executed previously. Remember, an IN#0 command is only required if another IN# command precedes the use of the SmartCard in your program. In MACHINE LANGUAGE programs, this is equivalent to setting the computer page 0 locations HEXADECIMAL \$38 and \$39 to HEXADECIMAL \$1B and \$FD respectively.

### Programs Without DOS

Programs written for use without DOS (DISK OPERATING SYSTEM) require a few modifications to standard FP BASIC. Some minor changes must be made in the PR# statements shown in lines 10 and 120 in the previous example. These statements should be as follows:

```
10PR#5  
120PR#0
```

## Apple Integer BASIC With DOS

Apple's INTEGER BASIC Programming Language is similar to APPLESOFT FLOATING POINT BASIC in many respects. There are a few differences relevant to programming the SmartCard. The PR# command is similar for both INTEGER BASIC and APPLESOFT FP BASIC. From the programmer's point of view, one of the important differences is the lack of the CHR\$ function in INTEGER BASIC. Instead of defining OUTPUT CHARACTER STRINGS with the CHR\$ function, the appropriate special character must be typed directly as some combination of keyboard keys, the control key and the shift key. In the previous example, line 70 would have to be changed and a few additional lines added as follows:

```
1 DIM RA$(5), D$(5)
2 D$="": REM D$=CONTROL-D
3 RA$="": REM RA$=CONTROL-U
10 PRINT D$;"PR#5"
70 PRINT "R="; RA$: PRINT "L=L"
120 PRINT D$;"PR#0"
```



Since the CHR\$ function is not available in INTEGER BASIC, the right arrow is defined in a separate statement — line 3. These minor modifications for INTEGER BASIC are required to compensate for the lack of the CHR\$ function.

## Integer Programs Without DOS

The changes in our sample program for INTEGER BASIC WITHOUT DOS are identical to those program changes listed in the above section, "Apple Integer BASIC With DOS." In that example, line 2 is not necessary and lines 10 and 120 should be as follows:

```
10 PR#5
120 PR#0
```



## Machine Language SmartCard Programming

For the advanced programmer, we provide a sample 6502 Assembly Language Program for setting-up the SmartCard. For this sample program, we will assign the same values to the OUTPUT CHARACTER STRINGS and CONTROL PARAMETERS as we defined in our earlier example. We will again assume the SmartCard is installed in slot 5. The Assembly Language Program listed below uses standard MNEMONICS for the 6502 microprocessor.

```
*
* SMARTCARD SET-UP ASSEMBLY LANGUAGE PROGRAM
*
*          ORG $300
*
SMARTCRD EQU $C500 *SMARTCARD SUBROUTINE ADDRESS
```

TABLE BYTE \$D4 \$BD \$AF \$AB \$8D

\*  
\* T=/+ RETURN  
\*

BYTE \$AF \$D4 \$BD \$AF \$AB \$8D

\*  
\* /T=/+ RETURN  
\*

BYTE \$D5 \$8D \$D5 \$D0 \$8D

\*  
\* U=UP RETURN  
\*

BYTE \$AF \$D5 \$BD \$AF \$D5 \$D0 \$8D

\*  
\* /U=/UP RETURN  
\*

BYTE \$C4 \$BD \$A0 \$C4 \$E5 \$E1

BYTE \$F2 \$AC \$AF \$AA \$8D

\*  
\* D= Dear,/\* RETURN  
\*

BYTE \$D2 \$8D \$95 \$8D

\*  
\* R=CHR\$(149) RETURN  
\*

BYTE \$CC \$BD \$CC \$8D

\*  
\* L=L RETURN  
\*

BYTE \$AF \$D2 \$BD \$D2

BYTE \$AF \$AB \$8D

\*  
\* /R=R/+ RETURN  
\*

BYTE \$AF \$CC \$BD \$AF \$AA

BYTE \$AF \$AA \$AF \$AA \$8D

\*  
\* /L=/\*/\*/\* RETURN  
\*

BYTE \$C2 \$BD \$8D

\*  
\* B= RETURN  
\*

BYTE \$AF \$C2 \$BD \$8D

\*  
\* /B= RETURN  
\*

BYTE \$CD \$BD \$B4 \$8D

\*  
\* M=4 RETURN  
\*

BYTE \$D3 \$BD \$B7 \$8D

```

*
* S=7 RETURN
*
*       BYTE $D0 $BD $B3 $8D
*
*
* P=3 RETURN
*
*       BYTE $AF $CD $BD $B5 $8D
*
* /M=5 RETURN
*
*       BYTE $AF $D3 $BD $B7 $8D
*
* /S=7 RETURN
*
*       BYTE $AF $D0 $BD $B3 $8D
*
*
* /P=3 RETURN
*
*
*
LOOP   LDX   #$00      * INITIALIZE X COUNTER
        LDA   TABLE, X * LOAD ASCII CHARACTER
        INX   * INCREMENT TABLE POINTER
        JSR   SMTCRD   * GOTO SMARTCARD SUBROUTINE
        CPX   #$5D     * CHECK FOR END OF TABLE
        BNE   LOOP     * GO FOR MORE CHARACTERS
*
*
*       END
*

```

This Assembly Language Program sends seventeen instruction commands to the SmartCard. These commands, which consist of 93 characters, are sent to the SmartCard firmware program one character at a time. The SmartCard program starts at location \$C500 and accepts ASCII type data stored in the 6502 accumulator. This SmartCard set-up Assembly Language Program stores the ASCII CHARACTER data in a look-up table (labeled TABLE). The X-REGISTER is used as an INDEX REGISTER to point to the appropriate ASCII value in the table. The ASCII CHARACTER is loaded into the 6502 accumulator and the program transfers control to the subroutine located at \$C500. After returning from the subroutine on the SmartCard, our program checks the X-REGISTER table pointer to see if it is pointing to the last entry. If the X-REGISTER contains a value less than decimal 93, the program jumps to the instruction labeled "LOOP", reloads the accumulator with the next value from the table and again jumps to the Subroutine located at \$C500. This looping continues until all of the ASCII CHARACTERS are transmitted to the SmartCard. The user's main program would then appear below the BNE LOOP statement.

In the Assembly Language Program above, BYTE, EQU, and END are ASSEMBLER DIRECTIVES. These DIRECTIVES tell the ASSEMBLER PROGRAM to perform special functions. The BYTE statement sets memory locations to the specified hexadecimal values listed in the OPERAND section. In some ASSEMBLERS, the DATA MNEMONIC is often used instead of BYTE for this type of ASSEMBLER command. The EQU MNEMONIC is used to define a symbol. In the example, EQU is used to define the address of the SMTCRD (SmartCard Subroutine) - \$C500. The dollar sign "\$" indicates that the listed value is expressed in the hexadecimal number system. An "\*" indicates that the balance of the line has only comments and should not be interpreted by the ASSEMBLER as MACHINE LANGUAGE instructions. The END ASSEMBLER DIRECTIVE simply indicates that the list of Assembly Language instructions have been concluded.

### **Programming Errors And Recovery**

Certain types of SYNTAX errors are detected by the SmartCard and indicated by an error message. The computer will beep and print the message:

**\*\*CNTRLR-INTERFACE ERROR\*\***



on the screen. The following list of programming errors will be detected by the SmartCard:

- a) A command is initiated with an invalid character.
- b) A PRIMARY OUTPUT CHARACTER STRING is defined with more than seven characters.
- c) An ALTERNATE CHARACTER STRING is programmed with more than three characters.
- d) A CONTROL PARAMETER is defined with a value outside the allowable range.
- e) A command is sent to the SmartCard without a return character at the end of the message.
- f) A command is sent to the SmartCard without an equal sign.

The error message is intended to announce to the user that an error has occurred during an attempt to program the SmartCard. After an error message has been displayed, the SmartCard must be reprogrammed with a corrected form of the command causing the error. If the SmartCard is not reprogrammed, operation may be unpredictable. In certain circumstances, the SmartCard will have to reset itself after an improper programming attempt. If the computer appears to "hang", wait ten seconds and press the control button and the reset button simultaneously. Under certain extreme situations, the user may find it helpful to turn the computer power switch off and on again after a twenty-second delay to reset the SmartCard to its COLD START MODE.

## Initial Parameters

The SmartCard contains a special feature allowing it to function in a factory-set MODE when the computer is first powered up. These initial PARAMETERS provide cursor motion with a SmartBall or SmartMouse while the computer is being controlled by the Apple System Monitor. As noted in the Apple Reference Manual, the Apple System Monitor interprets the ESC-A, ESC-B, ESC-C, and ESC-D keystroke sequences as cursor move commands for right, left, down, and up motions respectively. The initial PARAMETERS are as follows:

M=5	/M=5
S=5	/S=5
P=3	/P=3
U=<ESC> D	/U=
R=<ESC> A	/R=
D=<ESC> C	/D=
L=<ESC> B	/L=
T=/+	/T=/+
B=/+	/B=/+

From the above set of commands, the user will notice that pressing either the B or T buttons will effectively turn off the controller. No matter how much the controller is moved, no cursor action will occur while the SmartCard is in the ALTERNATE CHARACTER SET MODE. The ALTERNATE controller actions were specifically defined not to send any CHARACTER OUTPUT STRING to the computer. When the T or B button is pressed a second time the SmartCard is returned to the PRIMARY CHARACTER SET, controller actions will once again move the cursor across the screen

Before the user runs applications software requiring other cursor movement command codes, the SmartCard must be appropriately reprogrammed. If the user does not reprogram the SmartCard or does not wish to use it in the near future, it may be turned off by activating the T or B button.



# Appendix A

## SMARTCARD QUICK REFERENCE TABLE

### Modes

1. Digital Joystick, Normal
2. Digital Joystick, Speed-Up
3. Digital Joystick, Toggle
4. SmartBall/SmartMouse, Normal
5. SmartBall/SmartMouse, Horizontal/Vertical
6. SmartBall/SmartMouse, Toggle

### Sensitivity

1 (least) — 9 (most)  
Typically 7

### Pause

1 (shortest) — 9 (longest)  
Typically 3

### Keywords

UP	/UP
DOWN	DOWN
LEFT	/LEFT
RIGHT	/RIGHT
T	/T
B	/B

### Programming Codes

/+ Toggle Between Primary and Alternate OCS  
/\* = CHR\$(13) Return

For Apple IIe Owners Only:

/# Open Apple  
/\$ Closed Apple  
/% Enable Mode

# Appendix B

## ASCII CODES FOR EACH KEYBOARD CHARACTER

### Keyboard Codes For Programming The SmartCard Without The Utility Program

(As an option for Apple II or II Plus Computers, you may add 128 to each CHR\$ number. Example: Ctrl A = CHR\$(01) or CHR\$(129). However, these computers will recognize either CHR\$(01) or CHR\$(129).)

ASCII CODE	DEC CHR\$	HEX CODE	ASCII CHR\$	DEC CHR\$	HEX CODE	ASCII CHR\$	DEC CHR\$	HEX CODE	ASCII CHR\$	DEC CHR\$	HEX CODE
NUL	0	00	SP	32	20	@	64	40	'	96	60
CTRL A	1	01	!	33	21	A	65	41	a	97	61
CTRL B	2	02	"	34	22	B	66	42	b	98	62
CTRL C	3	03	#	35	23	C	67	43	c	99	63
CTRL D	4	04	\$	36	24	D	68	44	d	100	64
CTRL E	5	05	%	37	25	E	69	45	e	101	65
CTRL F	6	06	&	38	26	F	70	46	f	102	66
CTRL G	7	07	'	39	27	G	71	47	g	103	67
CTRL H	8	08	(	40	28	H	72	48	h	104	68
CTRL I	9	09	)	41	29	I	73	49	i	105	69
CTRL J	10	0A	*	42	2A	J	74	4A	j	106	6A
CTRL K	11	0B	-	43	2B	K	75	4B	k	107	6B
CTRL L	12	0C	,	44	2C	L	76	4C	l	108	6C
CTRL M	13	0D	-	45	2D	M	77	4D	m	109	6D
CTRL N	14	0E	.	46	2E	N	78	4E	n	110	6E
CTRL O	15	0F	/	47	2F	O	79	4F	o	111	6F
CTRL P	16	10	0	48	30	p	80	50	p	112	70
CTRL Q	17	11	1	49	31	Q	81	51	q	113	71
CTRL R	18	12	2	50	32	R	82	52	r	114	72
CTRL S	19	13	3	51	33	S	83	53	s	115	73
CTRL T	20	14	4	52	34	T	84	54	t	116	74
CTRL U	21	15	5	53	35	U	85	55	u	117	75
CTRL V	22	16	6	54	36	V	86	56	v	118	76
CTRL W	23	17	7	55	37	W	87	57	w	119	77
CTRL X	24	18	8	56	38	X	88	58	x	120	78
CTRL Y	25	19	9	57	39	Y	89	59	y	121	79
CTRL Z	26	1A	:	58	3A	Z	90	5A	z	122	7A
ESC	27	1B	;	59	3B	[	91	5B	(	123	7B
FS	28	1C	<	60	3C	\	92	5C	i	124	7C
GS	29	1D	=	61	3D	]	93	5D	)	125	7D
RS	30	1E	◇	62	3E	^	94	5E	~	126	7E
US	31	1F	?	63	3F	-	95	5F	DEL	127	7F

Apple IIe Keyboard Codes for Programming SmartCard without Utility Program (for example: "RIGHT=CHR\$(21)" for right arrow when moving controller right)

NOTE: Ctrl H = CHR\$(08) is the same as the left arrow key  
 Ctrl J = CHR\$(10) is the same as the down arrow key  
 Ctrl K = CHR\$(11) is the same as the up arrow key  
 Ctrl U = CHR\$(21) is the same as the right arrow key  
 Ctrl M = CHR\$(13) is the same as the RETURN key

Shift = Hold shift key down when striking designated key(s).  
 Ctrl = Hold control key down when striking designated key(s).  
 Norm = Only strike designated key(s), hold no other keys down.

# Appendix C

## UTILITY DISK SET-UP FILES

### Set-Up File For Apple Monitor Mode

This SET-UP FILE called MONITOR MOUSE/SBALL may be used to return the SmartCard to its "start-up" state. That is, the state it is initialized to when the computer is first turned on. The cursor may be moved one position up, down, left and right with the controller. These cursor motion codes are only valid while the computer is controlled by the system monitor program. The T or B-buttons will "turn off" the controller when pressed once and will turn the controller back "on" when pressed a second time. The assignments are as follows:

M=4	S=7	P=3
U=QESCWD	R=QESCWA	D=QESCWC
L=QESCWB	T=/+	B=/+
/M=4	/S=7	/P=3
/U=	/R=	/D=
/L=	/T=/+	/B=/+

### Set-Up File For Blanking The SmartCard

The SET-UP FILE called BLANK ALL may be used to set all the CHARACTER OUTPUT STRINGS to the NULL SET. This is useful whenever you change the SmartCard programming from one set of commands to another. If the BLANK ALL file is "EXEC'ed" before "EXEC'ing" the next SmartCard SET-UP FILE, the user need only define the CHARACTER OUTPUT STRINGS needed for the next program in the new EXEC file. All other codes will be sent to the NULL SET. This prevents codes from a previous SmartCard SET-UP FILE from being generated inadvertently for a controller action not defined in the new EXEC file. If the BLANK ALL program is not "EXEC'ed" between different applications, the user must take care to redefine all the possible positions and CONTROL PARAMETERS.

### Set-Up File For Functional Demo

The CONTROL PARAMETER values and the OUTPUT CHARACTER STRINGS for the SET-UP FILES called FUNCTIONAL DEMO MOUSE/SBALL and FUNCTIONAL DEMO JSTICK are as follows:

#### FUNCTIONAL DEMO MOUSE/SBALL

M=5	S=8	P=2
U=UP	R=RT	D=DN
L=LF	T=/+	B=B-B
/M=5	/S=8	/P=2
/U=/UP	/R=/RT	/D=/DN
/L=/LF	/T=/+	/B=/BB

#### FUNCTIONAL DEMO JSTICK

M=2	S=6	P=3
U=UP	R=RT	D=DN
L=LF	T=/+	B=B-B
/M=2	/S=6	/P=3
/U=/UP	/R=/RT	/D=/DN
/L=/LF	/T=/+	/B=/BB

In the PRIMARY CHARACTER SET, an up controller motion will make the word "UP" appear on the screen. When you move the controller down, you will see "DN", a right motion will produce "RT" and a left motion will produce "LF". Similarly, in the ALTERNATE CHARACTER SET, you will see the same symbols on the screen, preceded by a "/", for each controller motion. The T-button will TOGGLE between the PRIMARY and ALTERNATE CHARACTER SETS. The B-button will display "B-B" on the screen in the PRIMARY SET and will display "/BB" in the ALTERNATE SET.

### Set-Up File For Bank Street Writer

The CONTROL PARAMETER values and the OUTPUT CHARACTER STRINGS for the BANK STREET WRITER II+ MOUSE file and the BANK STREET WRITER IIE MOUSE file are as follows:

#### BANK STREET WRITER II+

M=4	S=8	P=2
U=I	R=K	D=M
L=J	T=<ESC>/+	B=/+
/M=5	/S=7	/P=3
/U=	/R=<U>	/D=
/L=<H>	/T=<ESC>	/B=/+

## **BANK STREET WRITER IIE**

M=5	S=8	P=2
U=<K>	R=<U>	D=<J>
L=<H>	T=<ESC>	B=/+
/M=5	/S=8	/P=5
/U=	/R=/\$/\$/\$	/D=
/L=#/#/#	/T=<ESC>	/B=/+

This file is used to control the Bank Street Writer Word Processor. In the PRIMARY CHARACTER SET, the cursor is moved one position at a time with the SmartMouse or SmartBall. In the ALTERNATE CHARACTER SET, only the left and right motion of the controller causes the menu select pointer to move left or right. The T-button tells the Bank Street Writer to go into the menu select mode and it also puts the SmartCard into the ALTERNATE CHARACTER SET mode. The B-button always tells the SmartCard to TOGGLE between the PRIMARY and the ALTERNATE CHARACTER SET.

## **Set-Up File For Apple Writer 1.0**

The CONTROL PARAMETER values and OUTPUT CHARACTER STRINGS for the SET-UP FILES called APPLE WRITER 1.0 MOUSE/SBALL and APPLE WRITER 1.0 JSTICK are as follows:

### **APPLE WRITER 1.0 MOUSE/SBALL**

M=5	S=7	P=2
U=I	R=K	D=M
L=J	T=<ESC><ESC>	B=/+
/M=5	/S=7	/P=3
/U=<T>	/R=	/D=<V>
/L=	/T=<ESC><ESC>	/B=/+

### **APPLE WRITER 1.0 JSTICK**

M=1	S=6	P=2
U=I	R=K	D=M
L=J	T=<ESC><ESC>	B=/+
/M=1	/S=6	/P=3
/U=<T>	/R=	/D=<V>
/L=	/T=<ESC><ESC>	/B=/+

In the PRIMARY CHARACTER SET, A U controller motion will move the cursor up one line, D will move the cursor down one line, R will move the cursor right one character, and L will move the cursor left one character. In the ALTERNATE CHARACTER SET, U will move the cursor up twelve lines, while D will move the cursor down twelve lines. Both R and L are not functional in the ALTERNATE SET. The T-button in both the PRIMARY

and ALTERNATE CHARACTER SETS will generate the double <ESC> sequence required to put Apple Writer 1.0 into the cursor movement mode. The B-button will TOGGLE between the PRIMARY and ALTERNATE SETS. To get out of the cursor movement mode and into the text entry mode in Apple Writer 1.0, press any key other than <ESC>.

**NOTE:** Most DIGITAL JOYSTICKS have only the T-button, therefore the ALTERNATE CHARACTER SET will not be used.

### Set-Up File For Apple Writer II

The CONTROL PARAMETER values and OUTPUT CHARACTER STRINGS for the files called APPLE WRITER II MOUSE/SBALL and APPLE WRITER IIE MOUSE/SBALL are as follows:

#### APPLE WRITER II MOUSE/SBALL

M=5	S=7	P=3
U=I	R=K	D=M
L=J	T=<ESC><ESC>	B=/+
/M=5	/S=7	/P=3
/U=E	/R=D	/D=X
/L=S	/T=<ESC><ESC>	/B=/+

#### APPLE WRITER IIE MOUSE/SBALL

M=5	S=8	P=2
U=<K>	R=<U>	D=<J>
L=<H>	T=/+	B=<B>
/M=5	/S=7	/P=3
/U=/\$<K>	/R=/\$<U>	/D=/\$<J>
/L=/\$<H>	/T=/+	/B=<B>

When in the cursor movement mode, the PRIMARY CHARACTER SET will perform as follows: U moves the cursor up one line, D moves the cursor down one line, R moves the cursor right one character, and L moves the cursor left one character. In the ALTERNATE CHARACTER SET in the cursor movement mode, U moves the cursor up twelve lines, D moves the cursor down twelve lines, R and L move the cursor right and left one word at a time.

When used on an Apple II or II Plus, this SET-UP FILE, as in the SET-UP for Apple Writer 1.0, the T-button (both PRIMARY and ALTERNATE) will generate the double <ESC> sequence for going from the text entry mode to the cursor movement mode. The B-button is used to TOGGLE between the PRIMARY and ALTERNATE SETS.

When used on an Apple IIE computer, the T-button TOGGLES between the PRIMARY and ALTERNATE CHARACTER SETS, while the B-button will move the cursor to the top of the file.

### Set-Up File For Pie Writer

The CONTROL PARAMETER values and the OUTPUT CHARACTER STRINGS for the PIE WRITER II+ MOUSE/SBALL file and the PIE WRITER IIE MOUSE/SBALL file are as follows:

#### PIE WRITER II+ MOUSE/SBALL

M=5	S=8	P=2
U=<E>	R=<F>	D=<C>
L=<S>	T=/+	B=<T>
/M=5	/S=8	/P=2
/U=<R>	/R=<G>	/D=<V>
/L=<A>	/T=/+	/B=<T>

#### PIE WRITER IIE MOUSE/SBALL

M=5	S=8	P=2
U=<K>	R=<U>	D=<J>
L=<H>	T=/+	B=<T>
/M=5	/S=7	/P=3
/U=<ESC><N>	/R=<I>	/D=<ESC><Y>
/L=<A>	/T=/+	/B=<T>

The SmartCard SET-UP FILES for PIE WRITER may be used with a SmartMouse or a SmartBall to control the cursor position in the Word Processor's edit mode. In the PRIMARY CHARACTER SET, moving the controller moves the cursor one position at a time. In the ALTERNATE CHARACTER SET, the moving action of the controller now moves the cursor up or down one page at a time and right or left one tab stop at a time. The T-button TOGGLES the cursor between the PRIMARY and the ALTERNATE CHARACTER SETS. The B-button moves the cursor to the beginning of the file.

### Set-Up File For Letter Perfect

The CONTROL PARAMETER values and OUTPUT CHARACTER STRINGS programmed for the Letter Perfect SET-UP FILES are listed below. You will find these files on the UTILITY DISK under the names LETTER PERFECT MOUSE/SBALL and LETTER PERFECT JSTICK.

#### LETTER PERFECT MOUSE/SBALL

M=5	S=8	P=2
U=<Y>	R=<U>	D=<V>
L=<H>	T=/+	B=<D>
/M=5	/S=6	/P=3
/U=<X>	/R=<U>	/D=<P>
/L=<H>	/T=/+	/B=<D>

## LETTER PERFECT JSTICK

M=1	S=6	P=3
U=<Y>	R=<U>	D=<V>
L=<H>	T=/+	B=<D>
/M=1	/S=6	/P=3
/U=<X>	/R=<U>	/D=<P>
/L=<H>	/T=/+	/B=<D>

In the PRIMARY SET, the up controller motion will scroll the cursor up one line, while the down motion will scroll the cursor down one line. Left and right will move the cursor one character in each direction. With the Smart-Card in the ALTERNATE OUTPUT CHARACTER SET, left and right are the same as in the PRIMARY SET, but up will now move the cursor immediately to the beginning of the text, while down will scroll down one page. Both T and /T are equal to "/+", which is the designator for toggling between the PRIMARY and ALTERNATE CHARACTER SETS. In both sets, the B-button will delete one character.

## Set-Up File For Super-Text

The CONTROL PARAMETER values and OUTPUT CHARACTER STRING assignments for the software package Super-Text are listed below. You will find this SET-UP FILE on the UTILITY DISK under the name SUPER-TEXT II+ MOUSE/SBALL.

M=5	S=8	P=2
U=/*	R=<U>	D=/
L=<H>	T=<ESC><ESC>	B=/+
/M=5	/S=8	/P=2
/U=<ESC>/*	/R=<ESC><U>	/D=<ESC>/
/L=<ESC><H>	/T=<ESC><ESC>	/B=/+

In the cursor movement mode, the up, down, left, and right motions for the PRIMARY CHARACTER SET will move the cursor up one line, down one line, right one character, and left one character respectively. In the ALTERNATE CHARACTER SET for the cursor movement mode, up takes the cursor to the top of the page while down moves the cursor to the bottom of the page. Right moves the cursor to the end of the line and left moves the cursor to the beginning of the line. The T-button is programmed in both the PRIMARY and ALTERNATE CHARACTER SETS to put the program into the cursor movement mode. The B-button is used to TOGGLE between CHARACTER SETS.



## Set-Up File For CP/M WORDSTAR

The CONTROL PARAMETER values and OUTPUT CHARACTER STRING ASSIGNMENTS FOR THE SET-UP FILE CP/M WORDSTAR MOUSE/SBALL are as follows:

M=5	S=7	P=3
U=<E>	R=<D>	D=<X>
L=<S>	T=/+	B=<Q>R
/M=5	/S=7	/P=3
/U=<R>	/R=<F>	/D=<C>
/L=<A>	/T=/+	/B=<Q>R

For the PRIMARY CHARACTER SET, U moves the cursor up one line, D moves the cursor down one line, R moves the cursor right one character, and L moves the cursor left one character. In the ALTERNATE CHARACTER SET, U moves the cursor up one page, D moves the cursor down one page, R moves the cursor right one character, and L moves the cursor left one character. The T-button is used to TOGGLE between CHARACTER SETS. The B-button will move the cursor to the top of the file.

## Set-Up File For SuperEdit

The CONTROL PARAMETERS and OUTPUT CHARACTER STRINGS selected for the software editor, SuperEdit, are listed below. You will find the EXEC FILE on the UTILITY DISK under the name SUPEREDIT MOUSE/SBALL.

M=5	S=8	P=2
U=<K>	R=<U>	D=<J>
L=<H>	T=/+	B=<T>
/M=5	/S=8	/P=2
/U=<I>	/R=<U><U><U>	/D=<O>
/L=<H><H><H>	/T=/+	/B=<T>

In this example, the SuperEdit cursor is controlled by a SmartBall or SmartMouse. In the PRIMARY CHARACTER SET, the cursor is moved one position at a time across the screen. In the ALTERNATE CHARACTER SET, the controller scrolls up or down one page at a time or left or right three spaces at a time. The T-button TOGGLES between the PRIMARY and ALTERNATE CHARACTER SETS. The B-button will always move the cursor to the beginning of the file.

## Set-Up File For VisiCalc II+

The CONTROL PARAMETER values and OUTPUT CHARACTER STRING assignments for the SET-UP FILES called VISICALC II+ MOUSE/SBALL and VISICALC II+ JSTICK are as follows:

### VISICALC II+ MOUSE/SBALL

M=6	S=6	P=3
U=<H>	R=<U>	D=<U>
L=<H>	T=(space)	B=/+
/M=5	/S=8	/P=2
/U=	/R=	/D=
/L=	/T=	/B=/+

### VISICALC II+ JSTICK

M=3	S=5	P=4
U=<H>	R=<U>	D=<U>
L=<H>	T=(space)	B=/+
/M=2	/S=5	/P=4
/U=	/R=	/D=
/L=	/T=	/B=/+

Recall that for M=6 or M=3, the SmartCard will automatically switch between the horizontal and vertical directions when you move the controller. Note that if you move the controller extremely quickly, it is possible for the SmartCard to "lose track" so that a vertical motion of the controller moves the cursor horizontally and vice-versa. If this should happen, press the T-button once (in the PRIMARY SET) and the problem will be corrected. We have set-up the T-button to produce a "space," which is the signal to VisiCalc to change cursor directions between horizontal and vertical. The B-button here is used to TOGGLE between CHARACTER SETS. In the ALTERNATE CHARACTER SET, the controller will be "turned off."

## Set-Up File For VisiCalc IIE

The CONTROL PARAMETER values and OUTPUT CHARACTER STRING assignments for the SET-UP FILE called VISICALC IIE MOUSE/SBALL are as follows:

M=5	S=8	P=2
U=<K>	R=<U>	D=<J>
L=<H>	T=/+	B=/+
/M=5	/S=8	/P=2
/U=<K><K><K>	/R=<U><U><U>	/D=<J><J><J>
/L=<H><H><H>	/T=/+	/B=/+

In the PRIMARY CHARACTER SET, the up controller motion will move the cursor up one row, while the down controller motion will move the cursor down one row. Left and right will move the cursor one column in each direction. In the ALTERNATE CHARACTER SET, moving the controller up or down will move the cursor three rows at a time. A left or right controller motion will move the cursor three columns at a time. Both the T-button and the B-button will TOGGLE between the PRIMARY and ALTERNATE CHARACTER SETS.

### Set-Up File For Multiplan

The CONTROL PARAMETER values and OUTPUT CHARACTER STRINGS for the MULTIPLAN MOUSE/SBALL SET-UP FILE are as follows:

M=5	S=8	P=2
U=<E>	R=<D>	D=<X>
L=<S>	T=/+	B=<Q>
/M=5	/S=8	/P=2
/U=<R><E>	/R=<R><D>	/D=<R><X>
/L=<R><S>	/T=/+	/B=<Q>

This SET-UP FILE controls the Microsoft Multiplan electronic spreadsheet with a SmartMouse or SmartBall to move the cursor around the spreadsheet matrix. The PRIMARY CHARACTER SET moves the cursor one position at a time. In the ALTERNATE CHARACTER SET, the motion of the controller now moves the cursor across the spreadsheet matrix one page at a time. The T-button TOGGLES the SmartCard between the PRIMARY and ALTERNATE CHARACTER SETS. The B-button always moves the cursor to the upper left corner of the field.

# Appendix D

## CATALOG OF THE WICO SUPPLIED UTILITY DISK

### DISK VOLUME 254

\*A 002 HELLO  
\*A 010 INTRO  
\*A 092 UTILITY PROGRAM  
\*A 015 SLOT CHANGER  
\*B 018 NEWSHAPE  
\*A 011 WORD PROCESSOR DEMO  
T 004 MONITOR MOUSE/SBALL  
T 004 BLANK ALL  
T 004 FUNCTIONAL DEMO MOUSE/SBALL  
T 004 FUNCTIONAL DEMO JSTICK  
T 004 BANK STREET WRITER IIE MOUSE  
T 004 BANK STREET WRITER II+ MOUSE  
T 004 APPLE WRITER 1.0 MOUSE/SBALL  
T 004 APPLE WRITER 1.0 JSTICK  
T 004 APPLE WRITER II MOUSE/SBALL  
T 005 APPLE WRITER IIE MOUSE/SBALL  
T 005 PIE WRITER II+ MOUSE/SBALL  
T 005 PIE WRITER IIE MOUSE/SBALL  
T 004 LETTER PERFECT MOUSE/SBALL  
T 005 LETTER PERFECT JSTICK  
T 005 SUPER-TEXT II+ MOUSE/SBALL  
T 005 CPM WORDSTAR MOUSE/SBALL  
T 005 SUPEREDIT MOUSE/SBALL  
T 004 VISICALC II+ MOUSE/SBALL  
T 004 VISICALC II+ JSTICK  
T 005 VISICALC IIE MOUSE/SBALL  
T 005 MULTIPLAN MOUSE/SBALL

**NOTE:** The Applesoft BASIC programs are indicated above by an “\*A” at the beginning of each line.

A Binary Data Table Program is indicated above by a “\*B” at the beginning of the line.

All of the Text Files (indicated above by a “T” at the beginning of each line) are WICO SmartLine supplied Set-Up Files.

# GLOSSARY

**ALTERNATE CHARACTER SET** - A group of Alternate output character strings.

**ALTERNATE OUTPUT CHARACTER STRING** - With the Alternate Output Character Strings, an additional set of controller actions is accessible. When a direction or button is programmed with no more than three keystrokes in the Primary Mode, an Alternate OCS of no more than three keystrokes is available.

**APPLE FLOATING POINT BASIC** - An extended BASIC (Beginner's All-purpose Symbolic Instruction Code). The SmartCard Utility Program is written in this language.

**ASCII CHARACTER CODE** - American Standard Code for Information Interchange — a method of coding characters (letters, numbers, symbols) to numbers. There are a total of 128 possible ASCII characters.

**ASSEMBLER DIRECTIVE** - A command to the assembler which instructs the assembler to perform special tasks which are not part of the program.

**ASSEMBLER PROGRAM** - The program that changes mnemonic source code into loadable binary object code.

**AUTOMATIC MODE** - A command entry mode. In this mode, you will be prompted with the 18 possible SmartCard keywords. You must enter a response to each prompt or press the return key.

**BASIC** - Beginner's All-purpose Symbolic Instruction Code. A procedure level computer language that is probably one of the easiest computer programming languages to learn and master.

**BYTE** - A generic term which usually represents a group of eight bits. Generally, data is stored in bytes.

**CATALOG** - A list of the files currently stored on a disk.

**COLD START** - When the computer has just been powered-up after sitting in the powered-down "off" mode for at least twenty seconds.

**COMMAND ENTRY MODES** - The mode in which you enter the commands. The SmartCard has two such modes — Automatic and Manual.

**CONTROL PARAMETERS** - Mode, Sensitivity and Pause. These control parameters allow the user to customize the controller actions to meet individual preference and needs for a particular program.

**"CTRL" CHARACTERS** - control characters are characters typed while holding the CTRL key down. During the test mode, a CTRL character is displayed inside <>, such as <H>.

**DATA MNEMONIC** - An easily remembered, user-defined name that the assembler associates with a constant numeric value.

**DEMONSTRATION FILES** - There is one Demonstration Program (WORD PROCESSOR DEMO) and two Demonstration Set-Up Files (FUNCTIONAL DEMO MOUSE/SBALL and FUNCTIONAL DEMO JSTICK) included on the Utility Disk. The Functional Demos allow the user to "see" what the controller is doing by the letters displayed on the screen. For example, when you move the controller in the up direction, the word UP will appear on the screen.

**DIGITAL JOYSTICK** - A joystick made with switches that open and close as the joystick is moved to direct the action on the screen. It is capable of movements in only eight directions.

**DIP PLUG** - Dual In-line Package Plug has two rows of pins on the end of the plug.

**DIP SOCKET** - Receptacle which will accept Dual In-line Package Products (such as a DIP Plug).

**DISK CATALOG** - A list of the files which have been stored on a diskette for future use. This includes any SmartCard Set-Up Files.

**DISK FILES** - A method of storing programs or data on a disk for future use.

**DISK SET-UP FILE** - A series of commands which specifically instructs the SmartCard for a given application. All Set-Up Files will be text files.

**DISPLAY/EDIT COMMANDS** - Part of the SmartCard's Utility Program which allows the user to modify and/or add to the current commands in the work space.

**DOS** - Disk Operating System.

**EQU** - Equate. An assembler directive which assigns an address to a label.

**EQU MNEMONIC** - An easily remembered, user-defined name that the assembler associates with a constant number.

**EXEC FILENAME** - The manner in which you use or "execute" the desired Set-Up File.

**HEXADECIMAL ADDRESS** - A number represented to the base 16 which corresponds to a unique location inside the computer.

**HEXADECIMAL CHARACTER** - A representative of a number to the base 16. A single digit may be any of the following: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F.

**ICON** - A graphic symbol which corresponds to a function which you may select to perform.

**IDENTIFIER SUFFIX** - For the user who has a Multi-Disk Drive system. You may want to attach a Disk Drive Identifier Suffix such as D1 or D2 after a filename in order to identify which Disk Drive is to be used. Example: FILENAME,D1.

**INDEX REGISTER** - An internal register to the 6502 CPU. There are two (X and Y) Index Registers in the 6502 CPU.

**INTEGER BASIC** - A simplified BASIC (Beginner's All-purpose Symbolic Instruction Code).

**INTEGRATED SOFTWARE** - When two or more applications are capable of working together, often sharing mutual data.

**KEYWORD** - The word that defines the operation to be performed in the form: KEYWORD=DATA. Example: UP=<ESCWD, in this case, "UP" is the keyword.

**MACHINE LANGUAGE** - A list of ones and zeros that the microprocessor directly executes.

**MANUAL MODE** - A command entry mode. In this mode, you will not be prompted with the SmartCard keywords. The computer will accept the instructions as entered by the user from the keyboard.

**MENU DRIVEN PROGRAM** - A program in which you are periodically given a list of options from which to choose. You indicate your choice by typing the command which identifies the menu description.

**METAL SHIELD** - Located at the rear of some late model Apple II Plus computers. It is the Radio Frequency Interference Shield.

**MNEMONICS** - A sequence of letters that represents an instruction to the computer.

**MODES** - The SmartCard has six modes or methods of operation, in which controller signals from a mechanical controller device (Smart-Mouse, SmartBall, or Digital Joystick) are interpreted by the SmartCard and converted to keyboard type signals.

**MONITOR MODE** - The normal Cold Start instructions built into the SmartCard cause it to function as the escape cursor codes (A,B,C,D). These escapecodes move the cursor around the screen.

**MONITOR PROGRAM** - Controls the computer with programs in firmware before any programs or disks are read in the computer at the start of a use session.

**NULL SET** - No information is assigned to the Primary and/or Alternate Output Character String

**OPERAND** - The information that immediately follows certain mnemonics. For example: LDX \$00, the \$00 is the operand, the address of what will be loaded into X.

**OUTPUT CHARACTER STRINGS (OCS)** - A group or sequence of up to seven simulated keystrokes or characters for each possible controller action. The user must program the OCS for UP, DOWN, LEFT, RIGHT, B-button and T-button. There are up to twelve possible OCS - six primary and six alternate.

**PARAMETER** - The data to be transferred to the computer as guidelines for the SmartCard's operation.

**PAUSE** - A control parameter which sets the delay between successive SmartCard commands. This will allow the computer to process previous commands and to prevent instructions from being lost. The SmartCard will wait, or pause, before sending out any subsequent commands. Values range from 1-9 with 1 having the shortest delay and 9 having the longest delay between consecutive commands.

**PRIMARY CHARACTER SET** - The sequence of up to seven simulated keystrokes for each possible controller action — UP, DOWN, LEFT, RIGHT, B-button and T-button. When a maximum of only three keystrokes are assigned to a direction or button, then an Alternate Output Character String is also available.

**PRIMARY MODE** - Same as Primary Character Set.

**PROGRAM EXECUTION** - The running of a program.

**RADIO FREQUENCY INTERFERENCE SHIELD** - A metal shield which prevents radio interference to the monitor or television from the computer.

**SCRATCH PAD** - Same as Work Space.

**SENSITIVITY** - A control parameter which tells the Smartcard how responsive (sensitive) it should be to mechanical controller (Joystick, SmartBall or SmartMouse) actions. Values range from 1-9 with 1 being the least sensitive and 9 being the most sensitive to controller actions.

**SET-UP FILES** - Over twenty set-up files are supplied on the Utility Disk which you received with your SmartCard. These files allow you to pre-configure the Smartcard for use with most popular software packages. Refer to Appendix C for a detailed description of each of the set-up files.

**SMARTBALL** - A space efficient cursor control device that converts hand movements into accurate computer signals. Moving the ball determines in which direction the cursor moves. Phenolic ball features optically encoded shafts housed in a modular constructed case.

**SMARTMOUSE** - A cursor control device which fits in the palm of your hand that converts hand movements into accurate computer signals. When moving the mouse on a flat surface such as a desk, the cursor will move in the same direction the SmartMouse is moved. Modular construction featuring opto-mechanical design.

**SPECIAL TOGGLE CHARACTER OUTPUT** - The symbol is “/ +” and when one of the Output Character Strings is programmed with this symbol, the SmartCard switches between the Primary and Alternate Character Sets.

**SYNTAX** - The set of rules used for creating SmartCard commands. The syntax is the words or letters which the SmartCard will accept as keywords and also how these keywords and data must be keyed in for proper interpretation.



**TOGGLE** - The act of switching between the Primary and Alternate Output Character Strings.

**UTILITY DISK** - A 5¼-inch magnetic floppy disk containing WICO supplied programs for use with the SmartCard.

**UTILITY PROGRAM** - An Applesoft program included on the SmartCard Utility Disk which is designed to allow the user to modify the response or actions of the controller to suit personal preferences. It is a Menu-Driven Program.

**WORK SPACE** - Temporary storage in the computer's memory to be utilized as the user is setting up the program or commands to be entered. The data in the Work Space may be erased or saved depending on the user's needs.

**WRAPAROUND** - When the display of a command requires more than one line on the screen. This occurs when a command requires the display of a large number of special characters.

## **One-Year Limited Warranty**

WICO Corporation warrants to the original consumer purchaser of the SmartCard (for purposes of this limited warranty the term "SmartCard" includes the SmartCard interface card, and/or the SmartMouse or SmartBall mechanisms) that the SmartCard will be free from defects in materials and workmanship for one year from the date of purchase. If the SmartCard is discovered to be defective within the warranty period, WICO will, at its option, repair or replace, at no charge, any part which WICO determines is defective.

To obtain warranty services during the warranty period, send the SmartCard, postage prepaid, with a check or money order for \$10.00 to cover handling, and proof of date of purchase, to:

**WICO Consumer Division  
Consumer Relations  
6400 W. Gross Point Road  
Niles, Illinois 60648**

This warranty is strictly limited to the mechanical parts and the housing of the SmartCard mechanism. It does not cover normal wear and tear and is not applicable and shall be void if WICO determines that the defect has arisen through, or the product shows signs of abuse, misuse, negligence, excessive wear, modifications or tampering. Under these conditions, you must pay for all parts and all labor charges for services performed in connection with repair or replacements of the product. WICO will inform you of these charges and will repair the product after receipt of payment.

This warranty is not applicable and shall be void if WICO determines that the SmartCard is not properly installed. You are solely responsible for installing the SmartCard properly.

This warranty specifically does not cover damage to or defects in the computer system in which the SmartCard is installed. WICO will not repair or replace your computer system and has no liability whatsoever for damages to your computer system, including, but not limited to, damages caused by the installation of the SmartCard.

**REPAIR OR REPLACEMENT OF THE SMARTCARD AS PROVIDED UNDER THIS WARRANTY IS YOUR EXCLUSIVE REMEDY. WICO SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT. EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THIS PRODUCT IS LIMITED IN DURATION TO THE DURATION OF THIS WARRANTY.**

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Dear Customer:

Thank you for purchasing the finest computer/video game control money can buy. WICO would like to keep you up to date on our newest products for use with your home system. If you'd like to be placed on our Advance Notice List, please complete the section below and mail this card to WICO today. Thank you.

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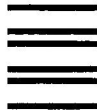
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\_\_\_\_ GRAPHICS \_\_\_\_\_ ENTERTAINMENT/GAME \_\_\_\_\_ OTHER



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