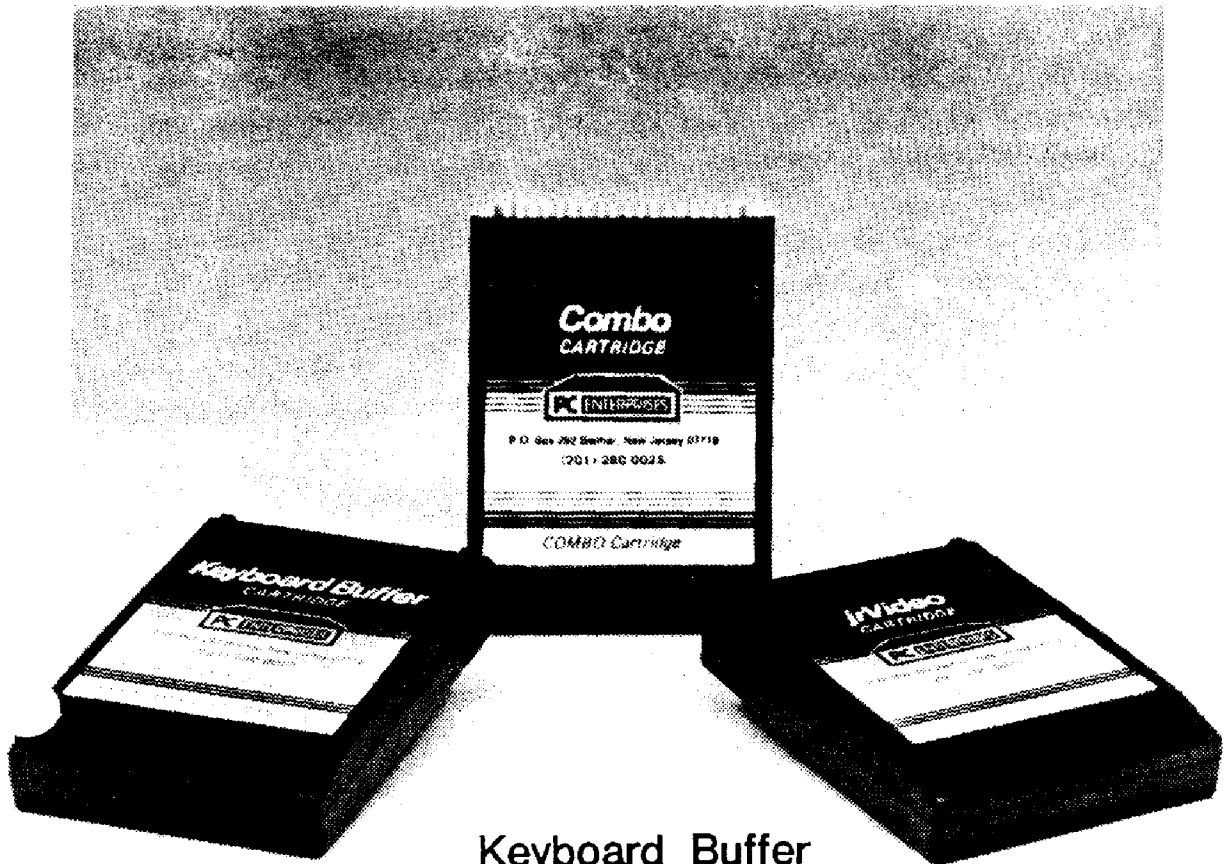


# PC Enterprises' Keyboard Buffer Cartridge

Installation and Operation Manual



## Keyboard Buffer

*A Pseudo DMA Cartridge for the PCjr*

*(C) Copyright David Cox 1984, 1985, 1986, 1987*

*PC Enterprises, PO Box 292, Belmar, NJ 07719 (908) 280-0025*

**If your PCjr has not already been set up at this time, please do so before installing this option.**

**This carton should contain the following:**

- \* Keyboard Buffer Cartridge
- \* Installation and Operation Manual

**Please inspect this package to determine whether any item appears missing or damaged. If any item is missing or damaged report the missing or damaged item to the place of purchase as soon as possible.**

## **INTRODUCTION**

Congratulations on your purchase of a PC Enterprises product. We expect our product to serve you reliably for many years to come. We hope you will be pleased with this product and pledge to try very hard to keep you satisfied with our support, service and new PCjr products.

This product enables the PCjr to perform like an IBM PC or other computer which has Direct Memory Access (DMA) when the keyboard is used to input information. In addition, the Keyboard Buffer Cartridge improves system reliability because it prevents four bugs in DOS and two bugs in the PCjr BIOS from interfering with the proper operation of the computer.

## **DEDICATION**

The PCjr was once criticized because its keyboard could not be used while the diskette drive was being operated. We at PC Enterprises take this opportunity to thank David Cox for contributing his time and expertise to help make the PCjr the powerful computer that it is today. David Cox, for countless hours of devoted effort we say thanks. Without the efforts and support of people like you, the PCjr would likely have become just another box packed away somewhere in the attic.

## **Copyright Notice**

The firmware contained within this product has been copyrighted by Cryptographic Software. PC Enterprises is licensed by Cryptographic Software to produce and market the product. All rights reserved.

Copyright 1988 by PC Enterprises. All rights reserved.  
IBM and IBM PCjr are registered trademarks of the International Business Machines Corporation.  
Keyboard Buffer is a trademark of PC Enterprises.  
PC Enterprises is not in any way affiliated with IBM.

## What You Should Know

Each time you start your PCjr with DOS the PCjr automatically sets up a 15 character keyboard buffer. This buffer permits you to type much faster than the computer could otherwise accept information. Unfortunately, there's one problem: the buffer set up by DOS can not be used when it is probably needed the most - during diskette drive operations.

The reason the buffer set up by DOS can not be used during diskette operations has to do with timing. The process of reading or writing to a diskette while it's rotating 5 times per second is a process which requires precise timing. If the keyboard were permitted to interrupt the microprocessor during one of these timing cycles the microprocessor would need to start the transfer all over.

To prevent the keyboard from interrupting the microprocessor during critical timing cycles the PCjr turns off the keyboard interrupt during diskette operations. That's why you'll hear the computer beep if you happen to type while the diskette drive is spinning.

The beep signifies that the keyboard sent information to the computer while the microprocessor was too busy to be interrupted. As a result, the microprocessor ignores the information and the computer beeps to let you know. When this happens you normally need to stop typing and wait for the diskette operation to complete, then re-enter the rejected information.

Certain other computers have a feature known as DMA which stands for Direct Memory Access. This feature permits information to be transferred to and from the diskette drive

without the supervision of the microprocessor. The PCjr does not have DMA.

If the PCjr did have DMA you would be able to type during a diskette drive operation because the operation would not require the attention of the microprocessor. While the Keyboard Buffer Cartridge does not add DMA it does permit you to use your keyboard just as if you would if the PCjr did have DMA.

## How it Works

Anytime you press (or release) a key on your keyboard the keyboard sends a scan code to the PCjr system unit. The PCjr BIOS converts this scan code to a character after determining whether the Alt, Shift, Function, or Control keys were also pressed.

When the Keyboard Buffer Cartridge is installed and activated it alters the interrupt vectors for keyboard and diskette I/O to point at the routines inside the cartridge. This means the cartridge routines replace the usual keyboard and diskette I/O routines provided on the PCjr's ROM BIOS.

The new routines do not reject scan codes which are received during diskette operations. Instead, they store these codes in low memory. When the diskette operation finishes the routines process the stored information.

## Fringe Benefits

### Correcting Problems with DOS

The NMI interrupt is the interrupt which gets the PCjr's attention when you press a key on

your keyboard. At least six bugs are known to exist in DOS which relate to this interrupt (refer to page 71 of the November 1984 issue of PC Tech Journal for more information). Four of these bugs can interrupt normal operation of the PCjr.

When the Keyboard Buffer Cartridge is activated the cartridge checks whether these bugs exist in your DOS. If so, in-core patches are applied to correct the bugs and the message "DOS NMI bugs patched" will be displayed.

### **Correcting Problems with BIOS**

Problems can also be found with the computer's BIOS (Basic Input/Output System) which is provided on a computer chip installed inside your PCjr.

At least one bug in the PCjr's BIOS is quite serious because it causes the keyboard to lock up without warning. In fact, when this bug shows up even pressing Ctrl/Alt/Del will not work as the keyboard routine is stuck in an endless loop.

#### **In technical terms...**

*The problem occurs if an NMI is triggered during the interval between the OUT at EDD0 and the OUT at EDDA (approximately 20 usec) while a diskette read, write or verify operation (A-77) is taking place. If the NMI progresses past the start bit check, the CPU will loop, disabled, in the I-30 routine (A-36) since timer 1 is not running.*

What this means to the rest of us is that there's a very short period of time during diskette drive operations during which if you should happen to press (or release) a key the system will crash.

This problem can occur whether you use a wireless keyboard or a keyboard cord, however, you can expect the problem to occur more frequently when you use a wireless keyboard.

The reason concerns stray light. Many people who use a wireless keyboard have heard the PCjr system unit beep, occasionally, for no apparent reason. This beep is normally caused by stray light triggering the wireless receiver.

If stray light should happen to trigger the PCjr's wireless receiver during the 20 microsecond period of time during which the system is vulnerable the PCjr will crash without warning losing all information in memory at the time!

To make matters worse the diskette drive indicator light comes on at precisely the point in time when the system is vulnerable. If enough of this light is reflected off your shirt, or off another object in your room, the wireless receiver could be triggered - and the effect will be the same as if you had pressed a key, your system will crash!

When you plug a keyboard cord into the PCjr "K" connector the wireless receiver is disabled. This means you will not need to be concerned with stray light causing your system to crash, however, the problem will still occur if you happen to press (or release) a key during the critical 20 microseconds.

The second bug in BIOS is less serious, however, it too can cause the PCjr to perform unreliably. This bug is in the KBDNMI routine and it concerns the parity check of transmitted key codes.

A parity check is a system used by computers to determine whether all bits transmitted have been

received properly. The PCjr Technical Reference Manual (pg 2-99) indicates scan codes will be rejected if they do not have odd parity.

Although the PCjr does perform a parity check on all scan codes received, this bug prevents the system from rejecting codes which fail the test. As a result the computer attempts to process all scan codes received - even scan codes which fail the parity test.

Both of these bugs in BIOS are eliminated when the Keyboard Buffer Cartridge is activated because the routines which contain the bugs are no longer used.

The fringe benefit of the Keyboard Buffer Cartridge is therefore that it enables more reliable operation of the PCjr by preventing four known bugs in DOS and two bugs in BIOS from interfering with the operation of your system.

## Increasing the Buffer Size

The usual keyboard buffer set up by DOS is 15 characters, and while the PCjr's BIOS supports a larger buffer - DOS 2.1 does not. This is due to another bug, this time in one of the hidden DOS files. The same bug also appears in another DOS file which is named ANSI.SYS.

The Keyboard Buffer Cartridge includes a routine which permits you to increase the size of the keyboard buffer set up by DOS from 15 to 47 characters.

If you attempt to use this routine and the cartridge encounters this bug an in-core patch will be applied and the message "DOS buffer reset patch applied" will be displayed. If you are also using the ANSI.SYS device driver the

message "ANSI.SYS buffer reset patch applied" will also be displayed.

While later versions of DOS seem to have corrected the bug in the hidden DOS file the same bug in ANSI.SYS appears to have been overlooked.

## Compatibility with Other Products

### Other Cartridges

The PCjr has four select lines available for normal PCjr cartridges. Each cartridge installed must use its own select line, or else a memory conflict may occur.

The select line that a cartridge uses is determined by the cartridge's manufacturer - and can not easily be changed.

The Keyboard Buffer Cartridge uses the second select line (CS2). This will not conflict with the IBM PCjr BASIC Cartridge which uses the fifth select line (CS5) or with any other PC Enterprises product.

### Keyboards and Numeric Keypads

As previously mentioned, although the PCjr Technical Reference Manual indicates keyboard scan codes will be rejected if they do not have "odd" parity a bug in the PCjr's BIOS prevents scan codes which fail the parity test from being rejected, as they should be. The JRSYNC command corrects this bug and therefore causes the parity check to be implemented properly.

Unfortunately, a few manufacturers of add on keyboards for the PCjr seem to have overlooked



this specification and designed their keyboards to use "even" parity. If the keyboard you use generates "even" parity it will not work at all after you activate the JRSYNC command. Instead the PCjr will sound a beep each time you press any key as each and every scan code produced will fail the test for "odd" parity.

If this should happen you may wish to contact the manufacturer of your keyboard and ask whether the keyboard can be modified so that it conforms to IBM's specification.

While most manufacturers will correct this problem it may not be practical for you to have your keyboard serviced. In this case you may choose to use the JRSYCNP (No Parity) command instead of the JRSYNC command.

The JRSYCNP command does everything that the JRSYNC command does except it does not activate parity checking. This permits you to use the Keyboard Buffer Cartridge with your existing keyboard even if your keyboard generates invalid parity.

### **Speed Up Devices**

The process of synchronizing diskette and keyboard operations is quite timing dependent. As a result, the Keyboard Buffer Cartridge may not work correctly if you change the clock speed of your computer.

The PC Enterprises Speed Up Board is one such device which increases the clock speed of the computer. While the Keyboard Buffer Cartridge does work with the PC Enterprises Speed Up Board the reason is that the PC Enterprises Speed Up board includes firmware support for the cartridge. This means speed up boards

manufactured by other companies are not likely to work.

## **Four Printers**

The JRSYNC47 command needs to store the address of the keyboard buffer work space somewhere in low memory. It uses the location at 40:E which is normally reserved for the I/O address of printer 4. This means a compatibility problem will exist if you try to use the JRSYNC47 command and also have four printers attached. It also means the cartridge will not work correctly if you activate the 47 character buffer - then try to run another program which uses this same address for its own purposes. If a compatibility problem should occur you may need to settle for using the 15 character buffer.

## **What the Software Does**

Four commands are provided on the Keyboard Buffer Cartridge:

### **JRSYNC**

The JRSYNC command activates the main routine which synchronizes keyboard and diskette operations. It is this routine that lets you type while the diskette drive is in use. The command also eliminates four bugs in DOS and two bugs in BIOS.

### **JRSYNCNP**

This command is provided for those who can not use the JRSYNC command because the keyboard that they use generates invalid parity. The JRSYNCNP command does exactly the same thing

as the JRSYNC command except that it does not enable parity checking.

### **JRSYNC47**

The JRSYNC47 command increases the usual keyboard buffer from 15 characters to 47 characters. The use of this command is strictly optional.

### **JRSYNCDD**

If you enter the JRSYNC47 command and receive the message, "Out of range of 47 character buffer" it means the cartridge was unable to reserve enough space in low memory to use as the work area for the 47 character buffer. If this should happen you'll need to use a device driver named JRSYNCDD.SYS which is also provided on the cartridge.

When you issue the JRSYNCDD command the device driver named JRSYNCDD.SYS will be copied from the cartridge to your diskette.

## **INSTALLING THE SOFTWARE**

### **JRSYNC and JRSYNCNP**

Entering the JRSYNC or JRSYNCNP command from the DOS prompt is all that you need to do to synchronize keyboard and diskette operations. These commands should work with any program which uses the PCjr's BIOS routines - as all programs should.

If you should encounter a program which does not work when the cartridge is activated you do not need to remove the cartridge to run the program. Simply restart the computer without entering the JRSYNC or JRSYNCNP command.

## **JRSYNC47**

In most cases all you need to do to increase the normal keyboard buffer from 15 to 47 characters is to enter the JRSYNC47 command after you have entered either the JRSYNC or JRSYNCNP command.

When you enter the JRSYNC47 command the computer will try to allocate 1K of memory in the first 64K block for use as the cartridge's work area. If the entire first 64K block is already allocated to other programs you'll receive the message "Out of range of 47 character buffer". This normally happens if you previously installed a background program, ramdisk, or print spooler.

If you do receive this message the problem can be easily solved if you use the device driver included on the cartridge. The instructions below direct you to add a line to your CONFIG.SYS file before any other device drivers in your CONFIG.SYS file have a chance to hog up all of the first 64K block of memory.

### **Step By Step Software Installation Instructions**

The name of the device driver which reserves space for the 47 character buffer is JRSYNCCDD.SYS. Once properly installed you will be able to activate the 47 character buffer at any time you desire - without concern as to whether other programs have already gobbled up all of lower memory.

- 1 Remove the write protect tab from the working copy of your DOS diskette and insert the diskette in drive A.

- 2     Insert the Keyboard Buffer Cartridge into either cartridge slot and turn your PCjr on if it is not already on. This causes DOS to be started in the normal fashion.
  
- 3     Type the command JRSYNCDD at the DOS prompt and press ENTER.

*Note: This procedure causes a device driver named JRSYNCDD.SYS to be written on your diskette. Once written on your diskette, this file can be copied from diskette to diskette like any other file.*

- 4     Now add the following line to your existing CONFIG.SYS file:

**DEVICE=JRSYNCDD.SYS**

It does not need to be the first line, however it must appear before any other device drivers in your CONFIG.SYS file have a chance to hog up the first 64K of memory.

If you do not presently have a CONFIG.SYS file on your diskette you will need to create one. You can do this by typing the following:

```
COPY CON CONFIG.SYS     then press ENTER  
DEVICE = JRSYNCDD.SYS   then press ENTER
```

Next, press function key 6 then press ENTER. The message, "One file(s) copied" will be displayed.

If you have any problems creating or modifying your CONFIG.SYS file please refer to your DOS manual.

# USING THE CARTRIDGE

## Step By Step Operation Instructions

Follow these instructions to synchronize keyboard and diskette operations, to fix the previously described bugs in DOS and BIOS, and to expand the usual 15 character buffer to 47 characters.

- 1 Be sure you have installed the software as explained in the preceding section of this manual titled, "Step by Step Software Installation Instructions".
- 2 Insert your working copy of DOS in drive A and insert the Keyboard Buffer Cartridge into either cartridge slot, then start DOS in the usual manner.
- 3 Enter the command: **JRSYNC** at the DOS prompt then press ENTER.

*Note: If you do not want to type this command each time you turn your computer on you may add the command to your AUTOEXEC.BAT file. Refer to your DOS manual for additional information on AUTOEXEC.BAT files.*

- 4 Now test your keyboard to determine whether or not it has a parity problem. To test the keyboard simply press any key and verify that the keyboard still works. If you hear a beep each time you press a key it probably means your keyboard is generating invalid parity.

If this should happen, restart your system without entering the JRSYNC

command. This time use the JRSYNCNP command instead.

*Hint: If you determine that your keyboard is not compatible with the JRSYNC command and you have already added this command to your AUTOEXEC file you may need to remove the cartridge in order to make the required changes.*

- 5 Now, enter the command JRSYNC47 at the DOS prompt and press ENTER. (You may also add this command to your AUTOEXEC.BAT file if you have one).

## Testing

The best way to test the cartridge is probably to enter a DOS command, such as EDLIN, which causes a diskette operation - then continue typing while the diskette operation is taking place. The system should not beep at all. (If you are not familiar with the EDLIN program you may refer to your DOS Manual for instructions on using this command).

However, the simplest way to test the cartridge is probably to enter the DIR command several times in a row. If all is well you will not hear the system beep at all (unless of course you fill up the 15 or 47 character buffer).

## Reminder!

To take full advantage of the Keyboard Buffer Cartridge you must now start to break some of your old habits. You'll probably notice times that you find yourself waiting for a prompt to appear on the screen. The next time you notice this happening stop waiting and start typing. Enjoy the benefit of the Keyboard Buffer Cartridge.

# Limited Warranty

PC Enterprises warrants the original purchaser of this product that it will be in good working order for the one year period from the date of purchase from PC Enterprises or authorized dealer. Should this product fail to be in good working order at any time during the warranty period, PC Enterprises will, at its option, repair or replace the product at no additional cost except that as stated below. Repair parts and replacement products will be furnished either reconditioned or new. All replaced parts and products become the property of PC Enterprises. This warranty does not include service to repair damage to the product as a result of misuse, disaster, accident, or modification of the product.

Warranty service may be obtained by contacting the Customer Service department of PC Enterprises to receive a Return Authorization (RA) number prior to returning any product. Any products returned without a valid RA number written clearly on the outside of the package will be indiscriminately refused. The product should be shipped US Mail to PC Enterprises and must include a copy of the original receipt or other proof of the purchase date. You agree to insure the product or assume the risk of loss or damage in transit, to prepay shipping charges and to use the original shipping container or equivalent.

All express and implied warranties for this product including the warranties of merchantability and fitness for a particular purpose, are limited in duration to a one year period from the date of purchase, and no warranties, whether express or implied, will apply after this period. Some states do not allow limitations on how long an implied warranty lasts, so the above may not apply to you.

If this product is not in good working order as warranted above, your sole remedy shall be repair or replacement as provided above. In no event will PC Enterprises be liable to you for any damages, whether incidental or consequential, arising out of the use of, or inability to use such a product. Some states do not allow the exclusion of limitation of incidental or consequential damages for the consumer products, whereas the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

Modification or other disassembly of the PC Enterprises' product without written permission from PC Enterprises will void this warranty.