

Phil

Operator's Manual

KB 5151jr Keyboard
for the IBM PCjr
Personal Computer

Scanned by
MBB

by **key tronic**[®]
The Responsive Input Company[™]

for warranty information see back cover

Copyright © 1986 key tronic corporation
All Rights Reserved
KTC 98-00053-002

A word about R.F. interference from the FCC . . .

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient the receiving antenna.
- Relocate the computer away from the receiver.
- Move the computer with respect to the receiver.
- Move the computer away from the receiver. Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

“How to Identify and Resolve Radio-TV Interference Problems”

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

This equipment is supplied with a shielded cable. It must use a shielded cable in order to meet FCC Class B emission limits.

Table of Contents

Introduction	4
Installation	5
Keyboard Features	7
Typewriter Area	8
Function Keys	9
Cursor Control Keypad	10
Numeric Keypad	11
Key Operation Comparison Chart	12
Technical Data	13
Theory of Operation	15
Maintenance	19
Technical Assistance	19

Introduction

The Key Tronic® KB 5151jr** keyboard is a direct plug compatible replacement for the IBM*** PCjr computer keyboard. There are no software modifications or special interfaces needed. The KB 5151jr performs all functions described in the IBM PCjr *Guide to Operations* handbook while incorporating keyboard changes and other features for greater flexibility and user convenience.

Key Tronic, world leader in keyboards, has listened to the market commentary on the IBM PCjr keyboard design and has chosen to include features in the KB 5151jr not found on the PCjr keyboard. These features enhance ease of operation and in no way alter the normal function or use of your personal computer.



So, whether you are just entering the computer world or using the PCjr to supplement office projects, the full-travel full-size KB 5151jr with its professional features makes transition simple. Ergonomic comfort, high reliability, industry standardization, reduced data entry errors — all these and more are hallmarks of Key Tronic quality. Now you can enjoy all the benefits of professional comfort and convenience designed and built for you by the industry professional.

*Key Tronic is a registered trademark of Key Tronic Corporation.

**KB 5151jr is a trademark of Key Tronic Corporation.

***IBM and PCjr are trademarks of International Business Machine Corporation.

Installation

To install the KB 5151jr keyboard, proceed as follows.

1. Place the computer's power switch to the Off position, "O".



2. Plug in the KB 5151jr keyboard.

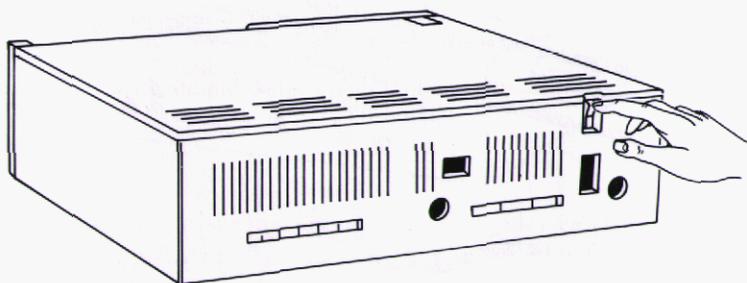


Installation Cont'd.

- Place the PCjr computer's power switch to the On position, "I". A beep will be heard after the computer has checked itself and finds that everything is working correctly. Your KB 5151jr keyboard is then ready for use.

If no beep is heard, refer to your IBM PCjr *Guide to Operations* for assistance. Use Section 6 "Testing Your IBM PCjr" to help you solve any difficulty that may arise. You are also welcome to contact our Product Support Specialists for assistance. See Technical Assistance in the back of this manual.

NOTE: Some IBM test instructions may refer to using the Fn (Function) key. Substitute the Ctrl (Control) key of the KB 5151jr for the Fn key of the PCjr keyboard. For example, if you wish to discontinue running Test Tag J on the KB 5151jr, press and hold the **Ctrl** key and then depress the **Break** key when instructed to "press the Fn key and then the B (Break) key."



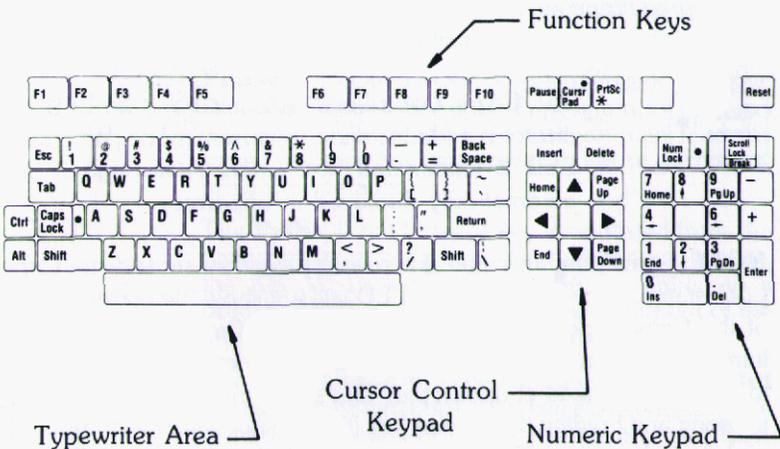
Keyboard Features

When compared to the IBM PCjr keyboard, major differences can be seen in the general layout of the KB 5151jr™. Separate cursor and numeric keypads and relocation of the program function keys (F1 through F10) across the top are changes incorporated to enhance use of your keyboard.

Another feature is the status LED (light emitting diode) indicators on the Caps and Num Lock keys. A frequent cause of keyboard data entry error is the accidental setting of these keys. To reduce the number of such errors, the KB 5151jr incorporates the LEDs to indicate current mode. You can now tell at a glance in which mode the key is set.

The KB 5151jr, as opposed to the IBM PCjr keyboard, returns certain keys to standard locations and places the character legend of each key on its keytop for easier key identification. This style reduces confusion in locating and selecting desired keys and functions.

The keyboard is divided into four sections: the Function Keys, the Typewriter Area, the Cursor Control Keypad, and the Numeric Keypad. Each section will be discussed in detail.



Keyboard Features Cont'd.

Typewriter Area



Efficiency and accuracy are enhanced by full-size sculptured keytops with easily read legends and raised tactile indexes on the **F** and **J** “home” keys.

On the left-hand side of the typewriter area . . .

Many awkward keystroke combinations are eliminated by deletion of the Fn key and addition of “one press” function keys. The Key Operation Comparison chart on page 12 shows equivalent keystrokes for the desired functions. For PCjr programs using the Fn key, the **Ctrl** key performs the same function.



The **Caps Lock** key is relocated and an LED indicator is added to show its current mode. When the LED is illuminated, the letters A through Z are automatically displayed in uppercase.

NOTE: Some programs may alter memory locations set aside for Caps Lock status. If this happens, the LED will not show the correct mode of the Caps Lock key. As a result, when the Caps Lock LED is illuminated and an alphabet key is depressed, the letter will be displayed in lowercase instead of uppercase. This situation can be corrected by pressing and holding the **Reset** key (this will not reset the computer) and then depressing the **Caps Lock** key. For details, see Theory of Operation, pages 15-18.

On the right-hand side of the typewriter area . . .



A **Grave** key is added above the Return key. The use of the Alt key (as on the PCjr keyboard) is no longer needed when using this key. To obtain the tilde symbol (~), hold down the **Shift** key and then depress the **Grave** key.



A **Return** key replaces the former PCjr Enter key. Normally the function of the **Return** key is to end a line-of-text by moving the cursor from the last character of a line to the first character position of the next line following. The **Return** key also performs "enter" functions as prescribed by the application program.



A **Backslash** key is added next to the right Shift key. The use of the Alt key, as on the PCjr keyboard, is not needed. To obtain the upper character, hold down the **Shift** key and then press the **Backslash** key.

Function Keys

All program function keys are located across the top of the keyboard and new keys have been added. Keys **F1** through **F10** function the same as described in your IBM PCjr *Guide to Operations*, however, use of these keys does not require the need of a Fn (Function) key as on the PCjr keyboard.



Pause is relocated to the program function key row. Pressing **Pause** will stop your program, or suspend operation of the system, so that you can read the screen. Pressing any key other than Pause will resume program operation.



The **PrtSc** (Print Screen) key is relocated from the typewriter area to the program function key row on the KB 5151jr keyboard. If you are linked to a printer, **Shift + PrtSc** will cause a print out of the information appearing on the screen.



The **Reset** key is an added feature. **Ctrl + Reset** will cause a system reset. This key also enables mode reset of the Caps Lock LED and Num Lock LEDs. For resetting these keys, read the NOTE following the description of these keys.

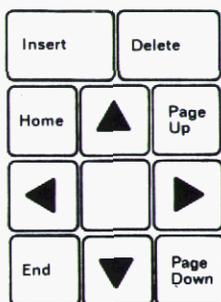
Keyboard Features Cont'd.

Function Keys Cont'd.



Cursr Pad is an added key that controls the status of the Cursor Control Keypad. The LED located on its keytop indicates whether the keypad is enabled or disabled. Note, however, that when the cursor keypad is disabled and the numeric keypad is in its numeric mode, the numeric keypad must be returned to its cursor mode (Num Lock LED Off) *before* the **Cursr Pad** key can be used to reactivate the cursor keypad.

Cursor Control Keypad



The KB 5151jr incorporates a separate Cursor Control Keypad dedicated to cursor and edit functions. On power-up, both Cursr Pad and Num Lock LEDs are illuminated and their associated keypads active. After power-up, pressing the Cursr Pad key turns Off its status LED, deactivates the cursor control keypad, and transfers control of cursor and edit functions to the numeric keypad. To reactivate the cursor keypad, the numeric keypad must be in its cursor mode (Num Lock LED Off) before depressing the Cursr Pad key.

NOTE: Some software applications may alter memory locations set aside for cursor and numeric keypad operation. In such cases the cursor control keypad could generate numbers instead of cursor and edit functions. To correct this situation, deactivate the cursor keypad by pressing the **Cursr Pad** key. Next, press and hold the **Reset** key and then depress the **Num Lock** key. This will reset the cursor keypad to its proper mode. For more information, see Theory of Operation, pages 15-18.

Numeric Keypad



An **Enter** key is added with the same function as the **Return** key. It ends a line-of-text by moving the cursor from the last character of one line to the first character position of the next line following; or, it performs “enter” functions as prescribed by the application program.



The **Num Lock** key has a LED indicator to show when the Numeric Keypad is in numeric mode. On power-up the LED is illuminated and the numeric keypad is locked in numeric mode. Only after depressing the **Cursr Pad** key and therefore deactivating the cursor keypad can the **Num Lock** key be used for cursor and edit functions. When the Num Lock LED is Off, the primary function of the numeric keypad is cursor and edit functions with the **Shift** key required to obtain numbers.

NOTE: Some programs may alter memory locations set aside for Num Lock status thereby affecting proper operation of the cursor and numeric keypads. In such cases, when the Num Lock LED is illuminated to indicate numeric mode, the numeric keypad could generate cursor and edit commands instead of numbers. To correct this situation perform the following:

Make sure the cursor control keypad is deactivated by using the **Cursr Pad** key. Press and hold the **Reset** key (this will not reset the computer) and then depress the **Num Lock** key. For more information, see Theory of Operation on pages 15-18.

Keyboard Features Cont'd.

Key Operation Comparison Chart

PCjr Keyboard	KB 5151 Keyboard Equivalent
Press and hold Fn key then press F1 key (Fn + F1)	F1
Fn + F2	F2
Fn + F3	F3
Fn + F4	F4
Fn + F5	F5
Fn + F6	F6
Fn + F7	F7
Fn + F8	F8
Fn + F9	F9
Fn + F10	F10
Fn then Pg Up	Page Up
Fn then Pg Dn	Page Down
Fn then Home	Home
Fn then End	End
Fn then Pause	Pause
Fn then Sc Lock	Scroll Lock
Fn then Break	Ctrl + Break (Scroll Lock)
Ctrl with Fn then End	Ctrl + End
Fn then Echo	Ctrl + PrtSc
Ctrl with Fn then Home	Ctrl + Home
Ctrl with Fn then Pg Dn	Ctrl + Page Down
Ctrl with Fn then Pg Up	Ctrl + Page Up
Fn then Prt Sc	Shift + PrtSc
Hold Alt, Press Fn then N	Num Lock
Hold Shift, Press Fn then F1 thru F10	Shift + F1 thru F10
Hold Ctrl, Press Fn then F1 thru F10	Ctrl + F1 thru F10
Hold Alt, Press Fn then F1 thru F10	Alt + F1 thru F10

Technical Data

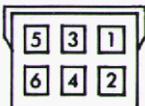
Keyboard Interface Information

The maximum power requirement of the KB 5151jr™ is 85ma at +5VDC. The keyboard has an attached cable and connector that connects to the receptacle at the rear of the PCjr computer (see Keyboard Interface Connector below). This is a shielded cable containing a +5VDC line, a ground, and a signal line. Data is serial TTL.

Capacitive key switches are used with a microprocessor performing the functions of keyswitch scanning, translating keypresses to IBM down-up scan codes, and maintaining bidirectional serial communications with the host computer.

Keyboard communication with the host computer is accomplished by having the keyboard send IBM down-up scan codes to the host rather than ASCII codes (see the Scan Code Chart on following page). For example, key number 16 of the KB 5151jr Scan Code Chart produces the hex code 01 on make and 81 on break. Break codes are formed by adding hex 80 to the make codes.

Keyboard Interface Connector Chart

PIN	DESCRIPTION	VOLTAGE	CONNECTOR
1	Keying Slot	0	 Connector on the Keyboard Cable.
2	N/A	0	
3	Keyboard Data	TTL	
4	Cable Connect	0	
5	Keyboard Power	+5VDC	
6	Ground	0	

Theory of Operation

As referenced in the Cursor Control and Numeric Keypad Notes, there are instances where LED status indications may become erroneous when certain software applications are used. In order to clarify the source of these problems, the following information is provided:

Key Status Conventions

Operation of the Cursor Control Keypad enhancement relies on the IBM PCjr Shift-key convention of the Basic Input/Output System (BIOS). This convention is defined in firmware and is a standard function of the IBM PCjr. BIOS is designed to accept a “down/up” keycode scheme, which simply means that every key generates one code when pressed, and a second code when released.

Each key produces a unique pair of codes. These codes do not represent characters, but rather the location of the key on the keyboard. The character representation for that location is stored in the host memory. The host tables carry both a primary and alternate character assignment for all data keys and some of the function keys. An “unshifted” input elicits the primary, and a “shifted” input the alternate.

A “Shift” or “Control” input does *not* produce a new code, but adds a Shift or Control key code to the key pressed to form a code string; i.e., depressing **Shift** + **A** sends the Shift key’s down code plus the A key’s down-up code followed by the Shift key’s up code when the Shift key is released. The Shift down code causes a “toggle” in the BIOS, actually a change in a specific BIOS memory location that represents Num Lock and Shift status. It then interprets any successive input as the character of the key, based on the modified status. The Shift key up code toggles BIOS back to its original status.

On power-up, keyboard status defaults to the IBM convention; i.e., Num Lock, Shift, Caps Lock, Alt, Scroll Lock, and Control are all OFF. Keypress “**A**” is displayed as “a”, and **Shift** + **A** is displayed as “A”. The Cursor Control Keypad and the Numeric Keypad are active and ready to interpret key entry. The keyboard intelligence will then issue any necessary modifiers to key code output to insure correct host response.

Theory of Operation Cont'd.

Power Up Status

When the system is powered up, the keyboard is set to "base state." This means that both numeric and cursor control keypads are active and the keyboard intelligence considers BIOS status to be in "clear" mode; i.e., ready to see unshifted keypad codes as cursors and shifted keypad codes as numbers. Keyboard intelligence causes the system to operate as described below.

Keyboard Status Control

For maximum efficiency, Key Tronic provides features such as Caps Lock LED, Numeric Lock LED, and Cursor Pad. Since these are not functions of the host, the keyboard firmware implements a "zone" scheme to identify input source keys and to output recognizable data that satisfies the BIOS convention. The zones are separated by function: Typewriter Area, Numeric Keypad, Cursor Control Keypad, and the numeric keys (0-9) of the typewriter area.

The Caps Lock key only affects the alphabetic characters on the keyboard; Num Lock only affects the Numeric Keypad; and Cursr Pad only affects the Cursor Control Keypad. During key status polling, the keyboard will automatically identify a keypress zone and satisfy one of the two following conditions of zone recognition:

1. On the first keypress in a zone, the proper down or up Shift code and the down-up code for the key pressed is sent. (The Shift code preceding the key pressed code signifies a zone change.)
2. On subsequent keypresses in that zone, only the down-up key codes will be sent. If the user changes zone, condition 1 applies.

Numeric Keypad

The Numeric Keypad (NK) output is seen as cursor/edit commands in unshifted mode, and numerics in shifted mode. When in the base state, the zone recognition scheme identifies an NK input and inserts a Shift down code for the first keypress. This shift status remains in effect until the user moves to another zone. That will cause a Shift up code to be issued to regain the base state condition.

Cursor Control Keypad

The Cursor Control Keypad (CCK) output is sent only in an unshifted mode and seen as cursor/edit commands when the keyboard is in base state (Cursr Pad, and Num Lock LEDs are On). The keyboard firmware then “sees” CCK zone keypresses. A secondary feature of this status is that the Num Lock key is under control of the keyboard firmware and cannot be disengaged while CCK is active.

Note that the CCK and NK use identical keycodes. In order to correctly interpret the input location, the keyboard firmware uses the zone recognition technique discussed earlier. Since BIOS is set to “clear,” NK keycodes are prefixed with a Shift down code by the keyboard firmware to indicate input of numeric values. CCK keypresses do not require modification since BIOS is set to recognize them. Using the Shift key will temporarily reset the BIOS and produce cursor/edit commands from the NK, but zone protocol does not permit Shift to affect CCK output.

Convention Violation

Some software applications modify the host “system status” when initializing. The specific BIOS memory locations containing preset keyboard status conditions may be cleared to default status. This condition does not affect the keyboard in the base state mode, but when host operated software intentionally sets other than default or “clear” status, the keyboard is not notified of such change.

Since the keyboard is not capable of responding to unknown changes, the keyboard LEDs which are illuminated to indicate engaged functions will be “out of sync.”

It is also possible for such changes to occur during runtime of the application, which is a violation of BIOS usage rules. The user must then resort to the following recovery scheme:

If both Cursr Pad and Num Lock LEDs are On, disengage the Cursr Pad LED. Next, press and hold the **Reset** key and then depress the **Num Lock** key. Pressing the Reset key in this situation will *not* reset the system.

Theory of Operation Cont'd.

Convention Violation Cont'd.

NOTE: If the LED status is adjusted to agree with the status set by the software on initialization, there is no certainty as to the BIOS condition when exiting the application and the LED status will likely be incorrect for normal operation. The recovery procedure previously described must then be repeated to get back in sync.

Software packages which do not adhere to BIOS convention may not produce cursor movement from the Cursor Control Keypad. In such cases, the Numeric Keypad must be used for cursor control until a correction is implemented by the vendor.

Additionally, there may be software which, while adhering to the convention, adds other cursor capability not compatible with the Cursor Control Keypad due to unusual use of the BIOS. In such cases, both the software vendor and Key Tronic should be notified so that a solution can be implemented (See Technical Assistance.)

Maintenance

The KB 5151jr keyboard is designed and manufactured to operate without preventive maintenance. The keyboard exterior may be cleaned with a mild household type cleaner, and a soft damp lint-free cloth or paper towel. Be careful not to wipe dirt into the keyboard. Do not allow spray cleaner to run into the keyboard. *Never* use petroleum base solvent which could damage the plastic or painted surfaces.

Technical Assistance

If you should encounter problems with the use of this keyboard, first review your system operator's guide. If the problem appears to originate from the keyboard, you are welcome to contact our Product Support Specialist (PSS) to obtain assistance. To reach the PSS, call toll-free, 1-800-262-6006, or, if in the state of Washington, (509) 928-8000. If calling from outside the continental U.S.A., call Spokane, Washington, U.S.A., (509) 928-8000.

Packing Notice

Please retain original packaging for reuse should your unit ever need to be returned for service. The bag and box are custom designed to protect the keyboard from electrostatic and mechanical shock in shipment.

Key Tronic Corporation Limited Warranty

Key Tronic Corporation warrants the products which it manufactures to be free from defects in materials and workmanship for a period of 90 (ninety) days from the date of purchase from Key Tronic or an authorized Key Tronic dealer. This warranty is limited to such purchaser and is not transferable.

During the 90 (ninety) day warranty period, Key Tronic will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to Key Tronic, an authorized dealer or an authorized service location. The purchaser is responsible for insuring any returned product and assumes the risk of loss during shipping. All replaced parts and products become the property of Key Tronic.

Proof-of-purchase with a date must be provided by the purchaser when requesting that warranty work be performed. The purchaser may request information on how to obtain warranty service by contacting an authorized dealer or writing to Key Tronic, P.O. Box 14687, Spokane, WA 99214, U.S.A., or calling 1-800-262-6006, or, if in the state of Washington, (509) 928-8000. If calling from outside the continental U.S.A., call Spokane, Washington, U.S.A., (509) 928-8000.

THIS LIMITED WARRANTY DOES NOT EXTEND TO ANY PRODUCTS WHICH HAVE BEEN DAMAGED AS A RESULT OF ACCIDENT, MISUSE, ABUSE, OR AS A RESULT OF SERVICE OR MODIFICATION BY ANYONE OTHER THAN KEY TRONIC, AN AUTHORIZED DEALER OR AN AUTHORIZED SERVICE LOCATION. THIS LIMITED WARRANTY DOES NOT EXTEND TO THE USE OF THIS PRODUCT WITH ANY EQUIPMENT OTHER THAN THE EQUIPMENT FOR WHICH IT IS DESIGNED.

EXCEPT AS EXPRESSLY SET FORTH ABOVE, NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. KEY TRONIC EXPRESSLY DISCLAIMS ALL EXPRESSED OR IMPLIED WARRANTIES NOT STATED HEREIN. IN EVENT THE PRODUCT IS NOT FREE FROM DEFECTS AS WARRANTED ABOVE, THE PURCHASER'S SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. UNDER NO CIRCUMSTANCES WILL KEY TRONIC BE LIABLE TO THE PURCHASER OR ANY USER FOR ANY DAMAGES, INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOST PROFITS, LOST SAVINGS, OR OTHER DAMAGES ARISING OUT OF THE USE OF, OR INABILITY TO USE, THE PRODUCT.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, AND SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS. SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

"Feel the Key Tronic Touch"™

key tronic®

The Responsive Input Company™

P.O. Box 14687 • Spokane, Washington 99214

Outside Washington State 1-800-262-6006

Inside Washington State (509) 927-5515

Telecopier: (509) 928-3851 • TWX 510-773-1885